SFWAPPDoc1

APPLICATION

FOR A SITE CERTIFICATE FOR THE

SHEPHERDS FLAT WIND FARM

PREPARED FOR

OREGON ENERGY FACILITY SITING COUNCIL

JANUARY 2007

PREPARED BY

CAITHNESS SHEPHERDS FLAT, LLC

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ACRONYMS AND ABBREVIATIONS

Applicant	Caithness Shepherds Flat, LLC
CFR	Code of Federal Regulations
Council	Oregon Energy Facility Siting Council
Department	Oregon Department of Energy
DEQ	Oregon Department of Environmental Quality
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
SFWF	Shepherds Flat Wind Farm
WTG	Wind turbine generator

EXHIBIT A

APPLICANT INFORMATION

Information about the applicant and participating persons, including:

(A) The name and address of the applicant including all co-owners of the proposed facility, the name, mailing address and telephone number of the contact person for the application, and if there is a contact person other than the applicant, the name, title, mailing address and telephone number of that person;

(B) The contact name, address and telephone number of all participating persons, other than individuals, including but not limited to any parent corporation of the applicant, persons upon whom the applicant will rely for third-party permits or approvals related to the facility, and, if known, other persons upon whom the applicant will rely in meeting any facility standard adopted by the Council.

(C) If the applicant is a corporation, it shall give:

(i) The full name, official designation, mailing address and telephone number of the officer responsible for submitting the application;
(ii)The date and place of its incorporation;
(iii) A copy of its articles of incorporation and its authorization for submitting the application; and
(iv) In the case of a corporation not incorporated in Oregon, the name and address of the resident attorney-in-fact in this state and proof of registration to do business in Oregon.

(D) If the applicant is a wholly owned subsidiary of a company, corporation, or other business entity, in addition to the information required by paragraph (C), it shall give the full name and business address of each of the applicant's full or partial owners;

(E) If the applicant is an association of citizens, a joint venture or a partnership, it shall give:

(i) The full name, official designation, mailing address and telephone number of the person responsible for submitting the application;
(ii) The name, business address and telephone number of each person participating in the association, joint venture or partnership and the percentage interest held by each;
(iii) Proof of registration to do business in Oregon;
(iv) A copy of its articles of association, joint venture agreement or partnership agreement and a list of its members and their cities of residence; and
(v) If there are no articles of association, joint venture agreement or partnership agreement, the applicant shall state that fact over the signature of each member;

(F) If the applicant is a public or governmental entity, it shall give:

(i) The full name, official designation, mailing address and telephone number of the person responsible for submitting the application; and
(ii) Written authorization from the entity's governing body to submit an application;

(G) If the applicant is an individual, the individual shall give his or her mailing address and telephone number;

Applicant Information

Name and address of applicant:	Caithness Shepherds Flat, LLC c/o Caithness Corporation 565 Fifth Avenue, 29th Floor New York, NY 10017
Date of formation:	June 29, 2006
Place of formation:	Delaware
Contact person for applicant:	Derrel A. Grant Caithness Shepherds Flat, LLC c/o Caithness Corporation 565 Fifth Avenue, 29th Floor New York, NY 10017 (212) 921-9099
Contact person for application:	Patricia Pilz 656 San Miguel Way Sacramento, CA 95819 (916) 456-7651
Applicant is wholly-owned by:	Caithness Energy, L.L.C. c/o Caithness corporation 565 Fifth Avenue, 29th Floor New York, NY 10017 (212) 921-9099
Person responsible for submitting application:	Christopher McCallion Executive Vice President Chief Financial Officer Caithness Shepherds Flat, LLC 565 Fifth Avenue, 29th Floor New York, NY 10017 (212) 921-9099
Affidavit as to truth and accuracy:	Please see Attachment A-1
Authorization for submitting application:	Please see Attachment A-2

Proof of registration to do business in Oregon:	Please see Attachment A-3
Oregon attorney-in-fact:	Corporation Service Company 285 Liberty Street, N.E. Salem, OR 97301
Applicant's limited liability company agreement:	Please see Attachment A-4

EXHIBIT B

DESCRIPTION OF PROPOSED FACILITY

Information about the proposed facility, construction schedule and temporary disturbances of the site, including:

(A) A description of the proposed energy facility, including as applicable:

(i) Major components, structures and systems, including a description of the size, type and configuration of equipment used to generate electricity and useful thermal energy;

(ii) A site plan and general arrangement of buildings, equipment and structures;

(iii) Fuel and chemical storage facilities, including structures and systems for spill containment;

(iv) Equipment and systems for fire prevention and control;

(v) Structures, systems and equipment for waste management and waste disposal, including, to the extent known, the amount of wastewater the applicant anticipates and the applicant's plans for disposal of wastewater and storm water. If the applicant has submitted any permit applications to the Office, as described in OAR 345-021-0000(4), that contain this information, the applicant may copy relevant sections of those documents into this exhibit or include in this exhibit cross-references to the relevant sections of those documents;

(vi) For thermal power plants and electric generating facilities producing energy from wind, solar or geothermal energy:

(I) A discussion of the source, quantity, availability, and energy content of all fuels (Btu, higher heating value) or the wind, solar or geothermal resource used to generate electricity or useful thermal energy. For the purpose of this subparagraph, "source" means the coal field, natural gas pipeline, petroleum distribution terminal or other direct source;

(II) Fuel cycle and usage including the maximum hourly fuel use at net electrical power output at average annual conditions for a base load gas plant and the maximum hourly fuel use at nominal electric generating capacity for a non-base load power plant or a base load gas plant with power augmentation technologies, as applicable;

(III) The gross capacity as estimated at the generator output terminals for each generating unit. For a base load gas plant, gross capacity is based on the average annual ambient conditions for temperature, barometric pressure and relative humidity. For a non-base load plant, gross capacity is based on the average temperature, barometric pressure and relative humidity at the site during the times of year when the facility is intended to operate. For a baseload gas plant with power augmentation, gross capacity in that mode is based on the average temperature, barometric pressure and relative humidity at the site during the times of year when the facility is intended to operate with power augmentation.

(IV) A table showing a reasonable estimate of all on-site electrical loads and losses greater than 50 kilowatts, including losses from on-site transformers, plus a factor for incidental loads, that are required for the normal operation of the plant when the plant is at its designed full power operation.

(V) Process flow, including power cycle and steam cycle diagrams to describe the energy flows within the system;

(VI) Equipment and systems for disposal of waste heat;

(VII) The maximum number of hours per year and energy content (Btu per year, higher heating value) of alternate fuel use;

(VIII) The nominal electric generating capacity;

(IX) The fuel chargeable to power heat rate;

(vii) For transmission lines, the rated voltage, load carrying capacity, and type of current;

(viii) For pipelines, the operating pressure and delivery capacity in thousand cubic feet per day;

(ix) For surface facilities related to underground gas storage, estimated daily injection and withdrawal rates, horsepower compression required to operate at design injection or withdrawal rates, operating pressure range and fuel type of compressors; and

(x) For facilities to store liquefied natural gas, the volume, maximum pressure, liquefication and gasification capacity in thousand cubic feet per hour;

(B) A description of major components, structures and systems of each related or supporting facility;

(C) The approximate dimensions of major facility structures and visible features;

(D) If the proposed energy facility is a pipeline or a transmission line or has, as a related or supporting facility, a transmission line or pipeline that, by itself, is an energy facility under the definition in ORS 469.300, a corridor selection assessment explaining how the applicant selected the corridor(s) for analysis in the application. In the assessment, the applicant shall evaluate the corridor adjustments the office has described in the project order, if any. The applicant may select any corridor for analysis in the application and may select more than one corridor. However, if the applicant selects a new corridor, then the applicant must explain why the applicant did not present the new corridor for comment at an informational meeting under OAR 345-015-0130. In the assessment, the applicant shall discuss the reasons for selecting the corridor(s), based upon evaluation of the following factors:

(i) Least disturbance to streams, rivers and wetlands during construction;

(ii) Least percentage of the total length of the pipeline or transmission line that would be located within areas of Habitat Category 1, as described by the Oregon Department of Fish & Wildlife;

(iii) Greatest percentage of the total length of the pipeline or transmission line that would be located within or adjacent to public roads, as defined in ORS 368.001, and existing pipeline or transmission line rights-of-way;

(iv) Least percentage of the total length of the pipeline or transmission line that would be located within lands that require zone changes, variances or exceptions;

(v) Least percentage of the total length of the pipeline or transmission line that would be located in a protected area as described in OAR 345-022-0040;

(vi) Least disturbance to areas where historical, cultural or archaeological resources are likely to exist; and

(vii) Greatest percentage of the total length of the pipeline or transmission line that would be located to avoid seismic, geological and soils hazards;

(viii) Least percentage of the total length of the pipeline or transmission line that would be located within lands zoned for exclusive farm use;

(E) For the corridor(s) the applicant selects under paragraph (D) and for any related or supporting facility that is a pipeline or transmission line, regardless of size:

(i) The length of the pipeline or transmission line;
(ii) The proposed right-of-way width of the pipeline or transmission line, including to what extent new right-of way will be required or existing right-of-way will be widened;
(iii) If the proposed corridor follows or includes public right-of-way, a description of where the facility would be located within the public right of way, to the extent known. If the applicant might choose to located all or part of the facility adjacent to but not within the public right-of way, describe the reasons the applicant would use to justify locating the facility outside the public right-of-way. The applicant must include a set of clear and objective criteria and a description of the type of evidence that would support locating the facility outside the public right-of-way, based on those criteria.
(iv) The diameter and location, above or below ground, of each pipeline; and
(v) A description of transmission line structures and their dimensions;

(F) A construction schedule including the date by which the applicant proposes to begin construction and the date by which the applicant proposes to complete construction. Construction is defined in OAR 345-001-0010. The applicant shall describe in this exhibit all work on the site that the applicant intends to begin before the Council issues a site certificate. The applicant shall include and estimate of the cost of that work. For the purpose of this exhibit, "work on the site" means any work within a site or corridor, other than surveying, exploration or other activities to define or characterize the site or corridor, that the applicant anticipates or has performed as of the time of submitting the application;
(G) A map showing all areas that may be temporarily disturbed by any activity related to the design, construction and operation of the proposed facility;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit B as follows:

> All paragraphs apply except (A)(viii), (A)(ix), (A)(x) and (D).
>
> [Applicant] must provide specifications on all turbine types that might be used at the SFWF (if specific turbine types are not known, [Applicant] must provide information on the range of turbine types that might be used). Specifications include: peak generating capacity, turbine hub height in meters, rotor diameter in meters, maximum sound power level (and octave band data), overall weight of metals in the tower and nacelle per turbine in net (U.S.) tons, estimated cubic yards of concrete per turbine in the tower foundation to a depth of three feet below grade (that is, the concrete in the foundation above that depth) and the maximum diameter of the foundation. If the project might include more than one size of turbine (generating capacity), [Applicant] must state the maximum number of turbines in each turbine size that would be built.
>
> [Applicant] must include a physical description and description of the location of all components of the facility (turbines, met towers, access roads, transmission lines

(including collector lines), substations, operations and maintenance buildings). Corridors for turbine strings, access roads and transmission lines may be defined by GPS coordinates and a distance from centerline. [Applicant] must describe any improvement or modification of existing structures, including roads.

Facility Description

While Applicant submitted a facility description in its Notice of Intent to apply for a site certificate, it is present re-evaluating facility design and choice of turbine. This Exhibit B will be amended upon the completion of the design process.

EXHIBIT C

LOCATION OF PROPOSED FACILITY

Information about the location of the proposed facility, including:

(A) A map or maps, including a 7.5-minute quadrangle map, showing the proposed locations of the energy facility site, and all related or supporting facility sites, in relation to major roads, water bodies, cities and towns, important landmarks and topographic features; and

(B) A description of the location of the proposed energy facility site and the proposed site of each related or supporting facility, including the approximate land area of each. If a proposed pipeline or transmission line is to follow an existing road, pipeline or transmission line, the applicant shall state to which side of the existing road, pipeline or transmission line the proposed facility will run, to the extent this is known;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit C as follows:

> Maps included in Exhibit C should provide enough information for property owners potentially affected by the facility to determine whether their property is within or adjacent to the site. Major roads should be named. The application should include identification of lands enrolled in the Conservation Reserve Program and lands currently used for commercial agriculture. [Applicant] should include maps drawn to a scale of 1 inch = 2,000 feet when necessary to show detail.
>
> [Applicant] should include maps that show the site boundary. "Site boundary" is the area defined in OAR 345-001-0010(53) plus the area within any requested micrositing corridors for turbines or other components. The proposed turbine string layout should be indicated (including alternative layouts if the use of different turbine sizes would result in different turbine string alignments).
>
> **Note:** Exhibit G of the NOI includes a map showing the Shepherds Flat "project area" in five unconnected sections. Because the components of a wind facility must be connected by access roads and transmission infrastructure, [Applicant] should include maps in the site certificate application that show how the project segments would be connected.

Location of Proposed Facility

The location of the proposed facility straddles Gilliam and Morrow Counties immediately south of the Columbia River in north-central Oregon.

The site has a northern and southern area, linked by the Willow Creek Valley. Because the northern and southern areas differ in topography, land use, and habitat value, they will be discussed separately, where appropriate, throughout this Application.

The Shepherds Flat Wind Farm (SFWF) was named in honor of the generations of shepherds who tended winter-grazing livestock in the northern project area. This area is comprised of approximately 15,580 acres of privately owned land. The southern project area is comprised of

approximately 16,520 acres, privately owned, the majority of which are cultivated and planted in dry-land wheat. Approximately 1,718 acres are enrolled in the Conservation Reserve Program.

Maps

Figure C-1	Quadrangle map showing project location in relation to major landmarks
Figure C-2a	To be provided
Figure C-2b	To be provided
Figure C-3	Conservation Reserve Program lands within the project area
Figure C-4	Analysis areas
Figures C-5 through C-25	Detail maps of site boundary for land owner reference

Permanent project facilities footprint

Component	Unit of Measure	Measure per Component	No. of Units	Total Footprint (acres)
Turbine pads	$Foot^2$	6,000	300	41.3
Substations	$Foot^2$	43,560	2	2.0
Meteorological towers	$Foot^2$	25	10	0.0057
New project roads	$Foot^2$ disturbed per foot road	25	368,016	211.2
				254.5

Temporary project facilities footprint

Component	Unit of Measure	Measure per Component	Number of Units	Total Footprint (acres)
Turbine pads (including laydown areas)	$Foot^2$	9,500	300	65.4
Substations	$Foot^2$	53,560	2	2.5
Roads	$Foot^2$ disturbed per foot road	40	381,360	350.2
Concrete batch plant	$Foot^2$	130,680	1	3.0
Staging areas	$Foot^2$	225,000	4	20.7
Total				**441.8**

Figure C-1

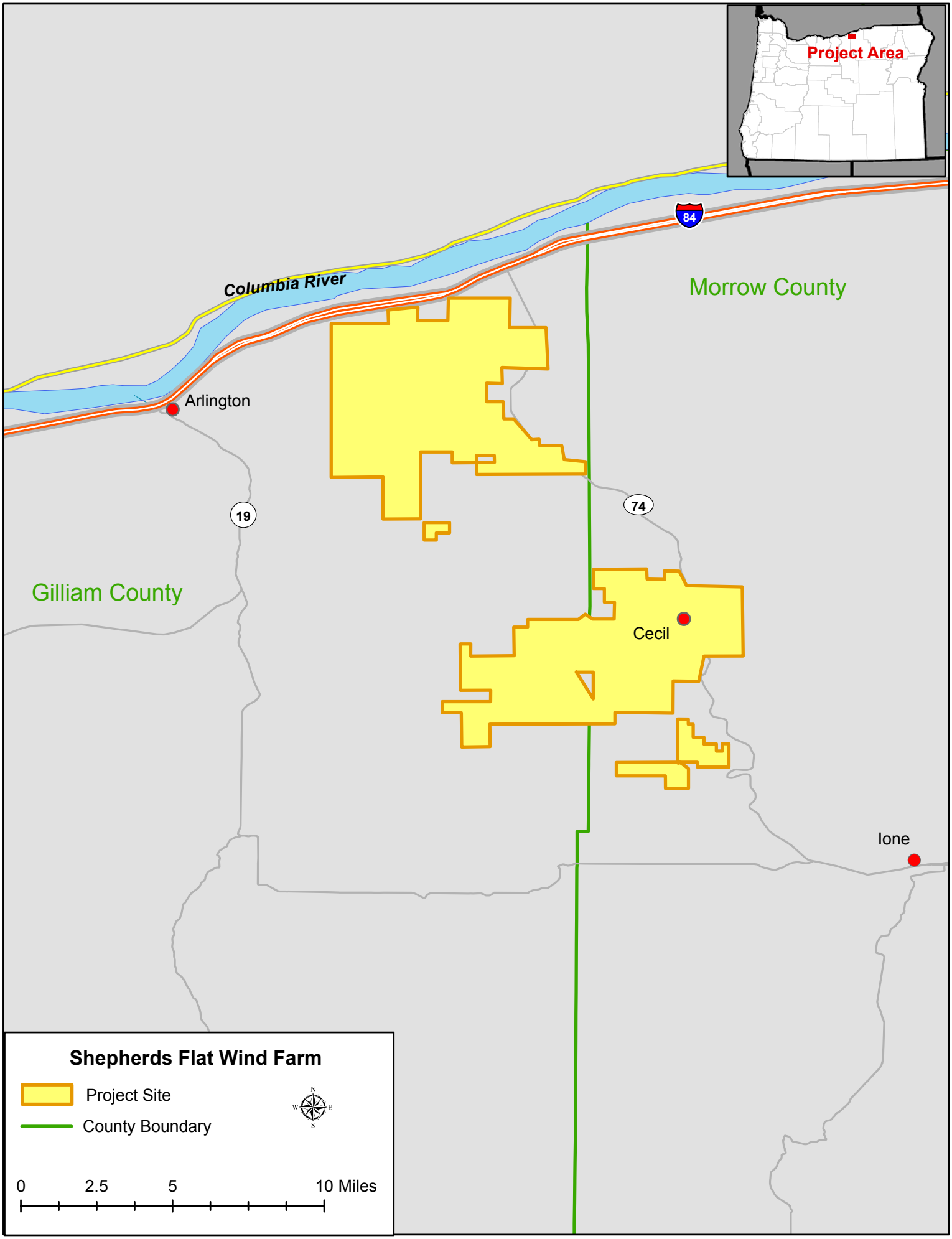

Project Area
Columbia River
84
Morrow County
Arlington
19
74
Gilliam County
Cecil
Ione
Shepherds Flat Wind Farm
Project Site
County Boundary
N
W
E
S
0
2.5
5
10 Miles

Figure C-3

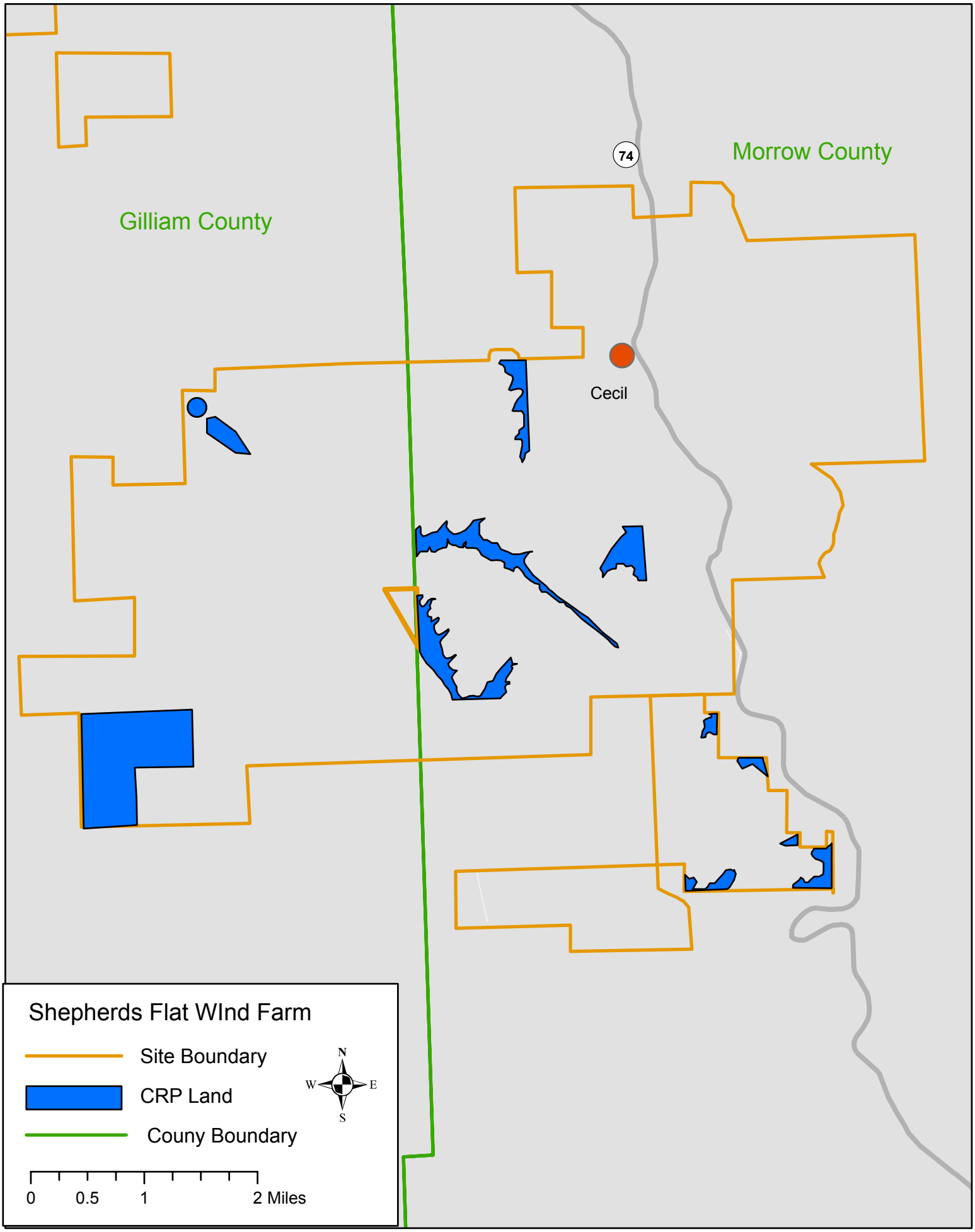

Gilliam County
Morrow County
74
Cecil
Shepherds Flat WInd Farm
Site Boundary
CRP Land
Couny Boundary
N
W
E
S
0
0.5
1
2 Miles

Figure C-4

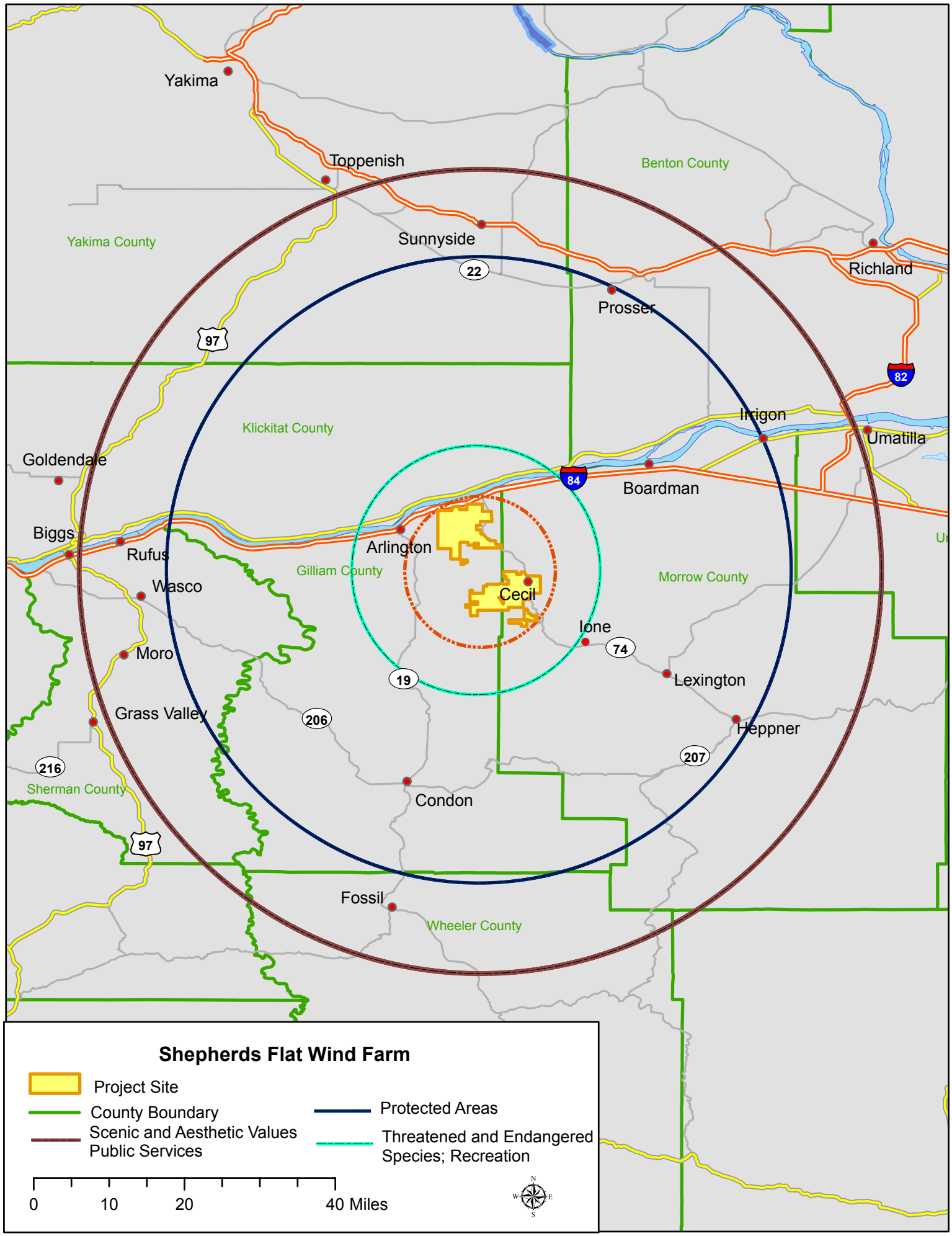
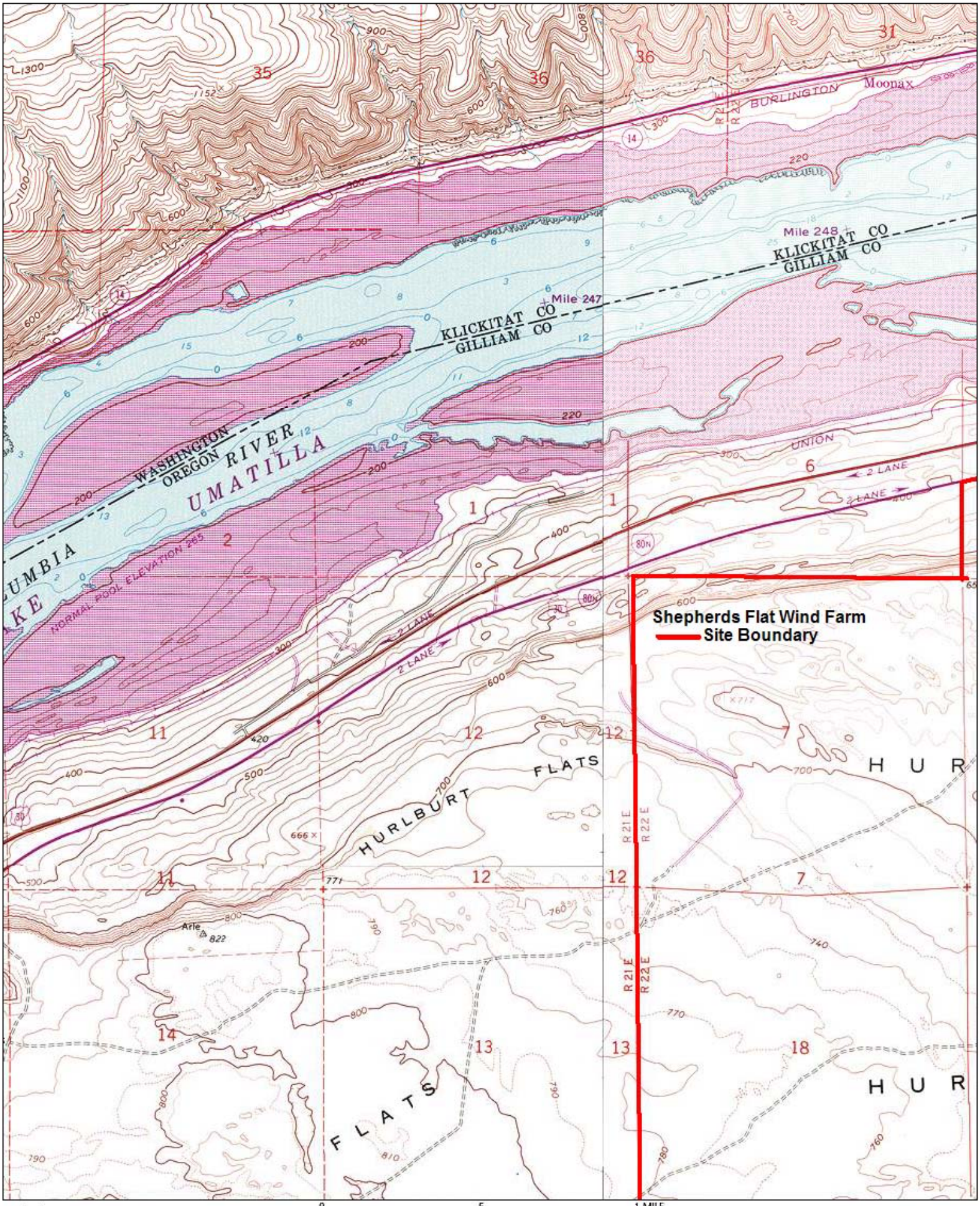

Yakima
Toppenish
Benton County
Yakima County
Sunnyside
22
Richland
Prosser
97
82
Klickitat County
Irrigon
Umatilla
Goldendale
84
Boardman
Biggs
Rufus
Arlington
Gilliam County
Morrow County
Wasco
Cecil
Ione
74
Moro
19
Lexington
Grass Valley
206
Heppner
207
216
Sherman County
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Project Site
County Boundary
Scenic and Aesthetic Values
Public Services
Protected Areas
Threatened and Endangered
Species; Recreation
0
10
20
40 Miles
N
W
E
S

Figure C-5



TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-6

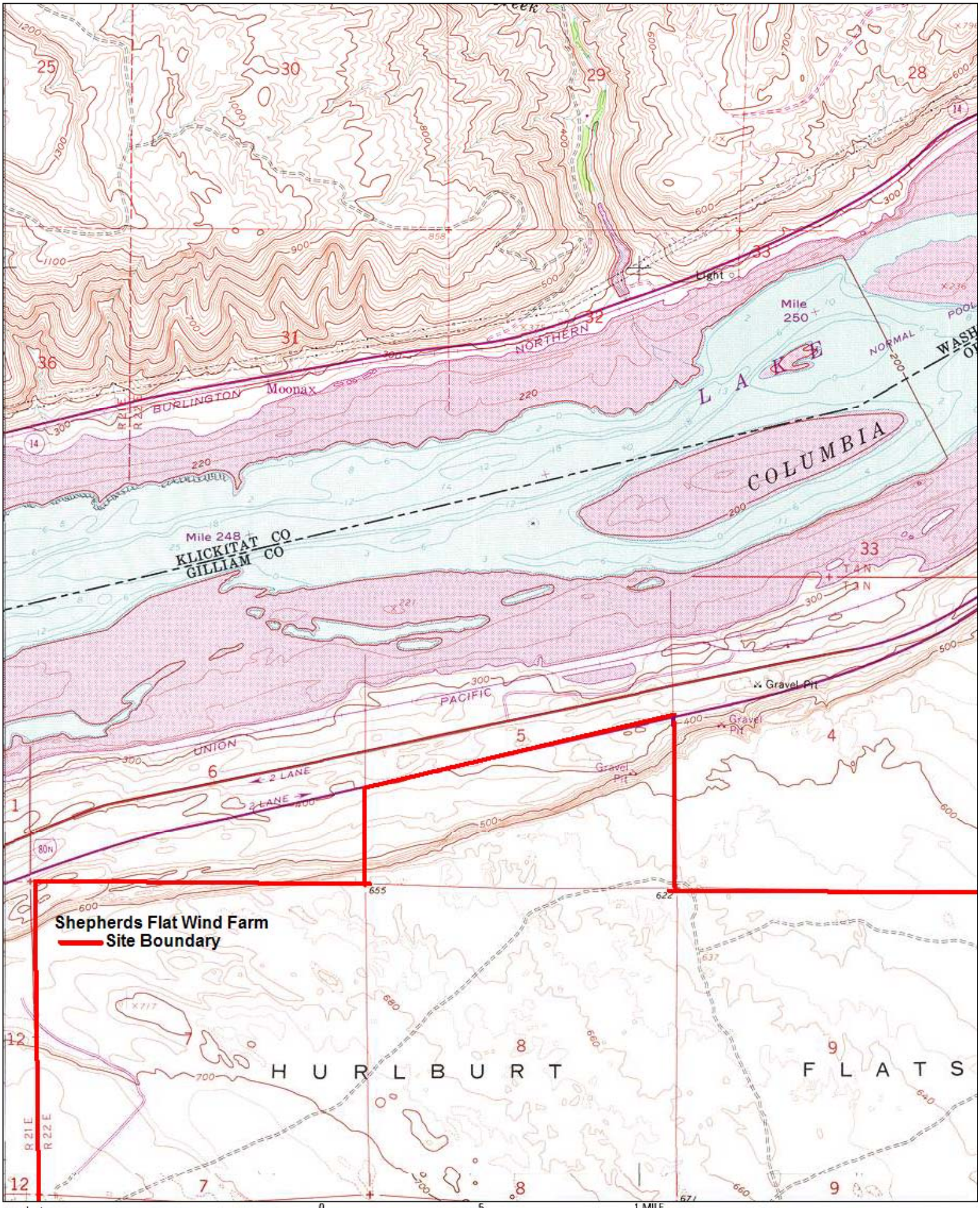


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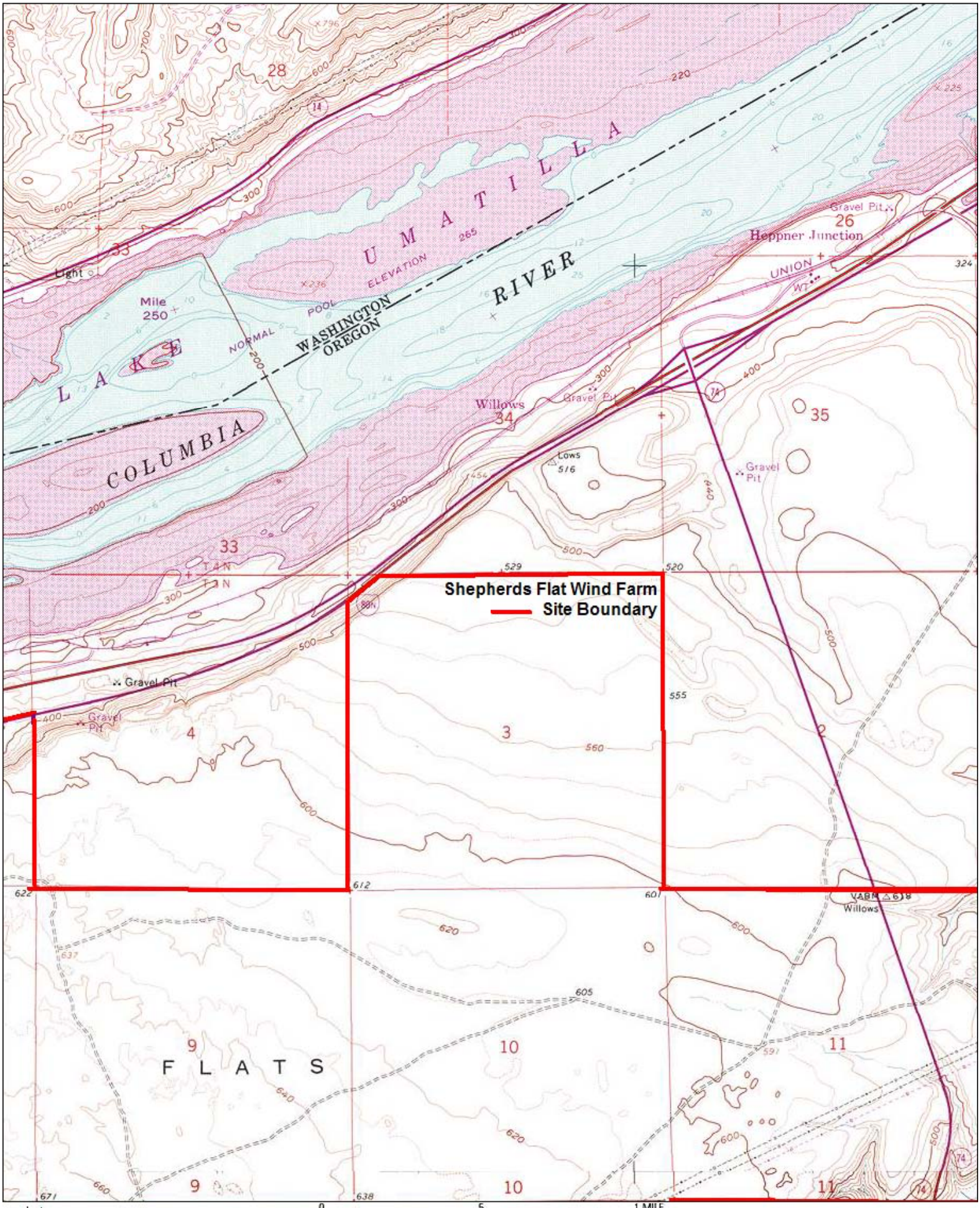
Figure C-7



TN MN 17°

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0 1000 FEET 0 500 1000 METERS

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Figure C-8

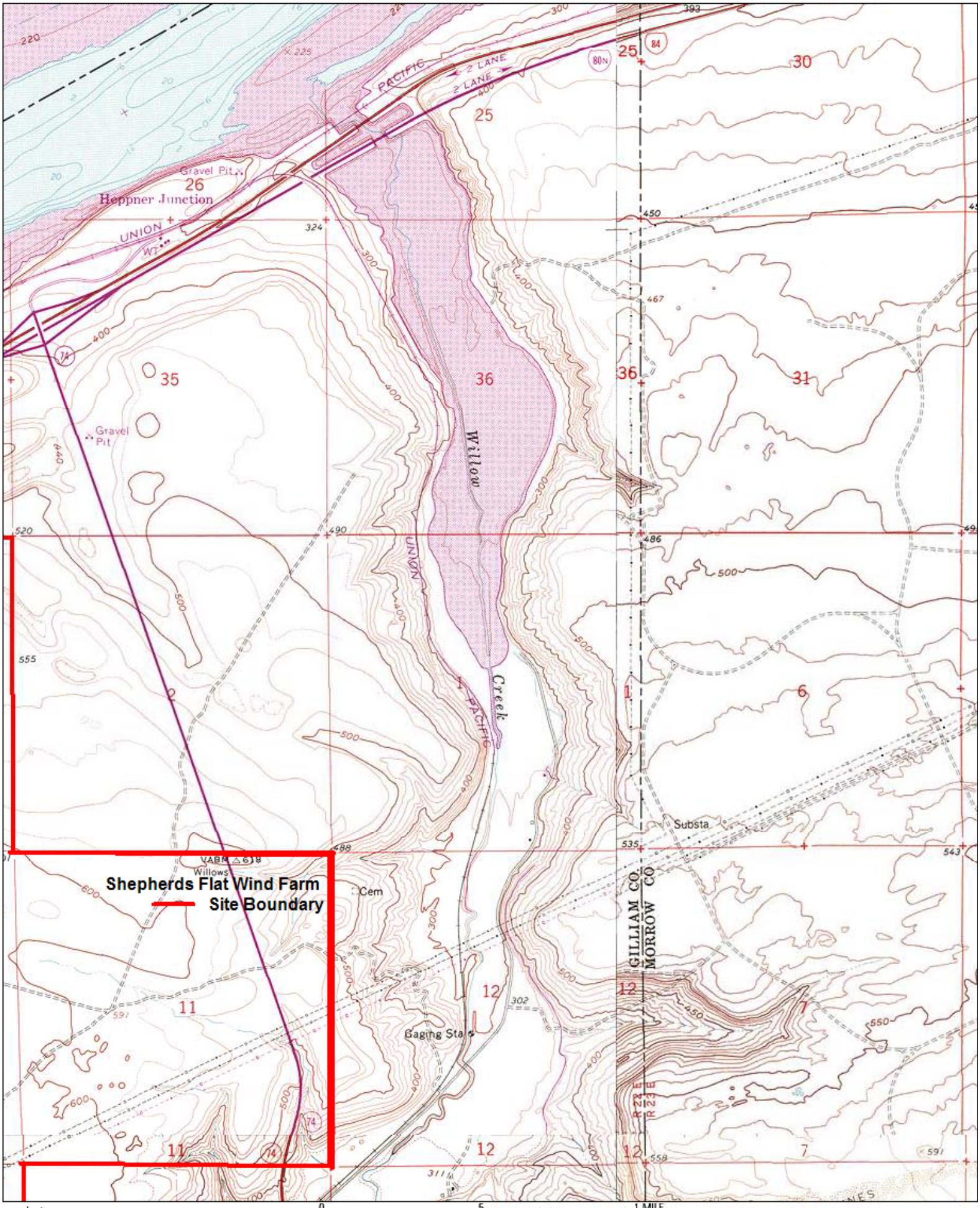

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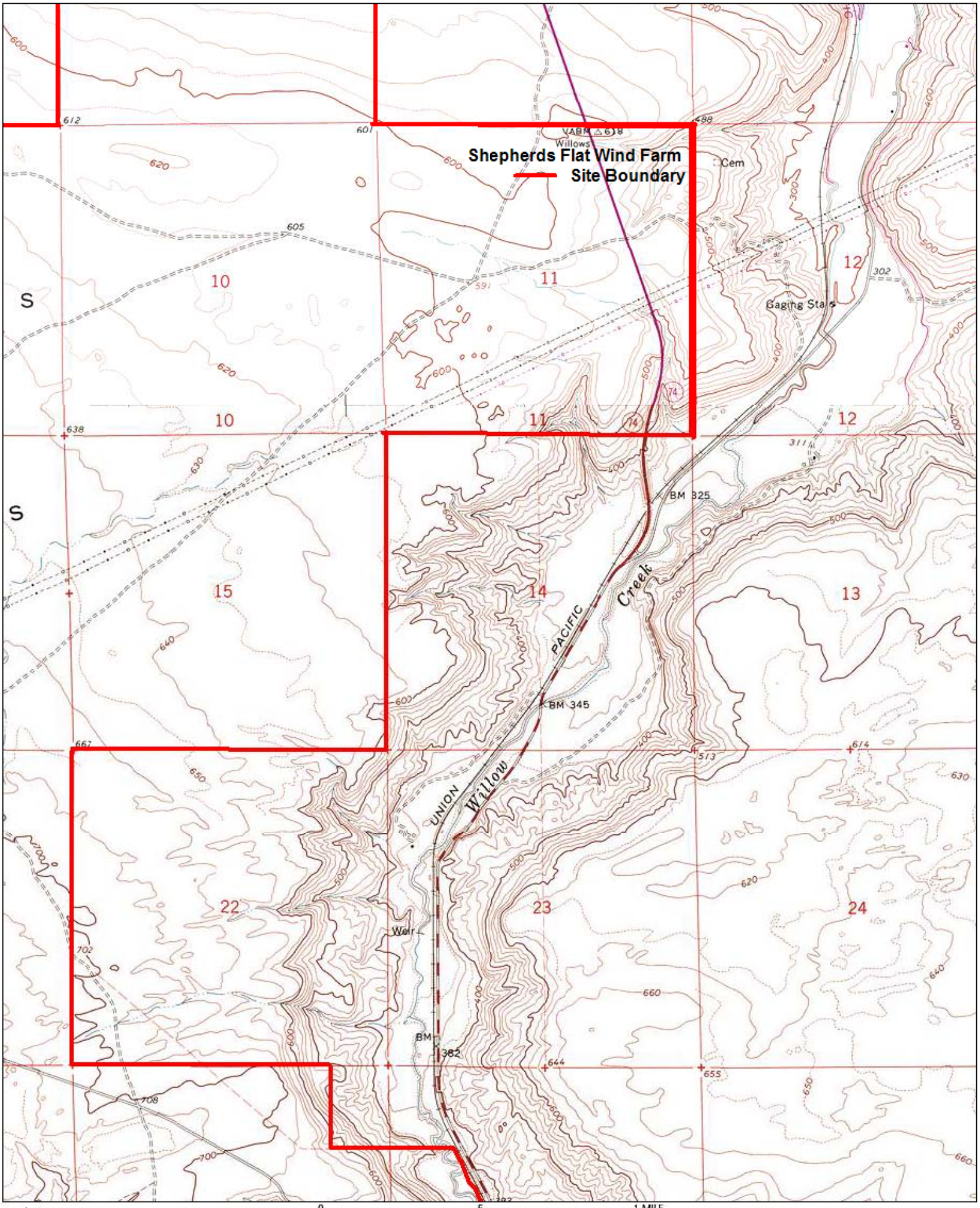
Figure C-9



TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

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Figure C-10

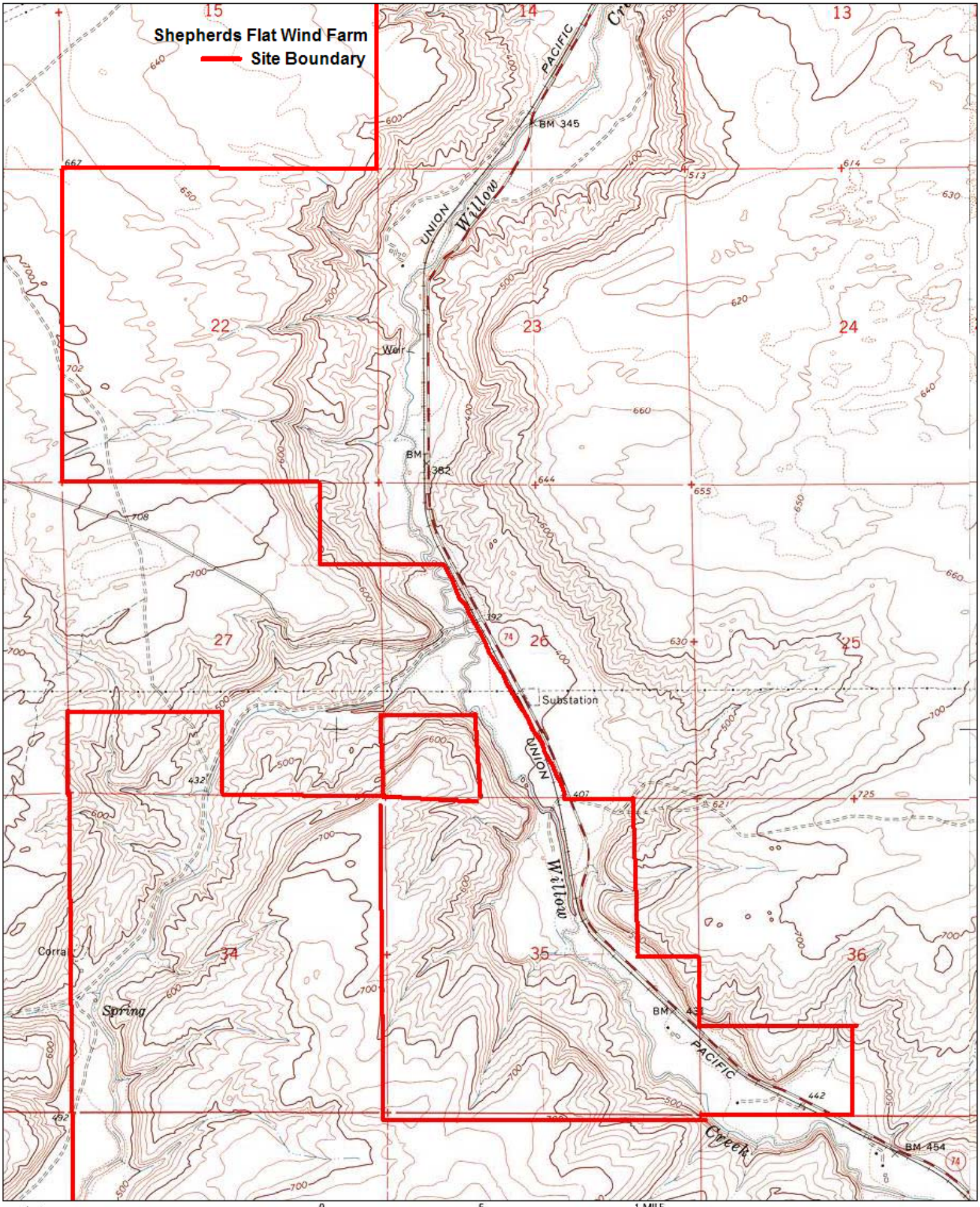

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Figure C-11

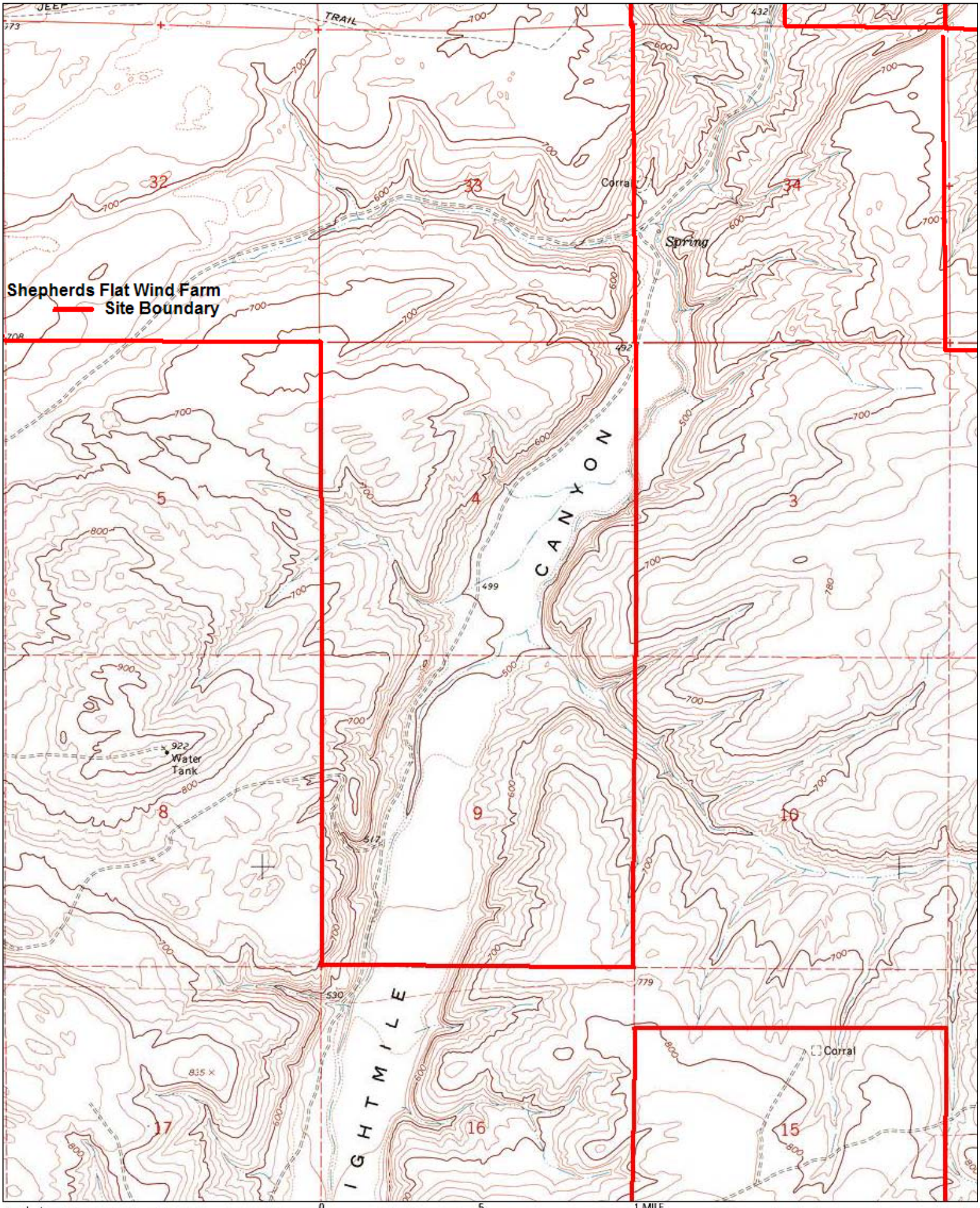

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Figure C-12

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-13

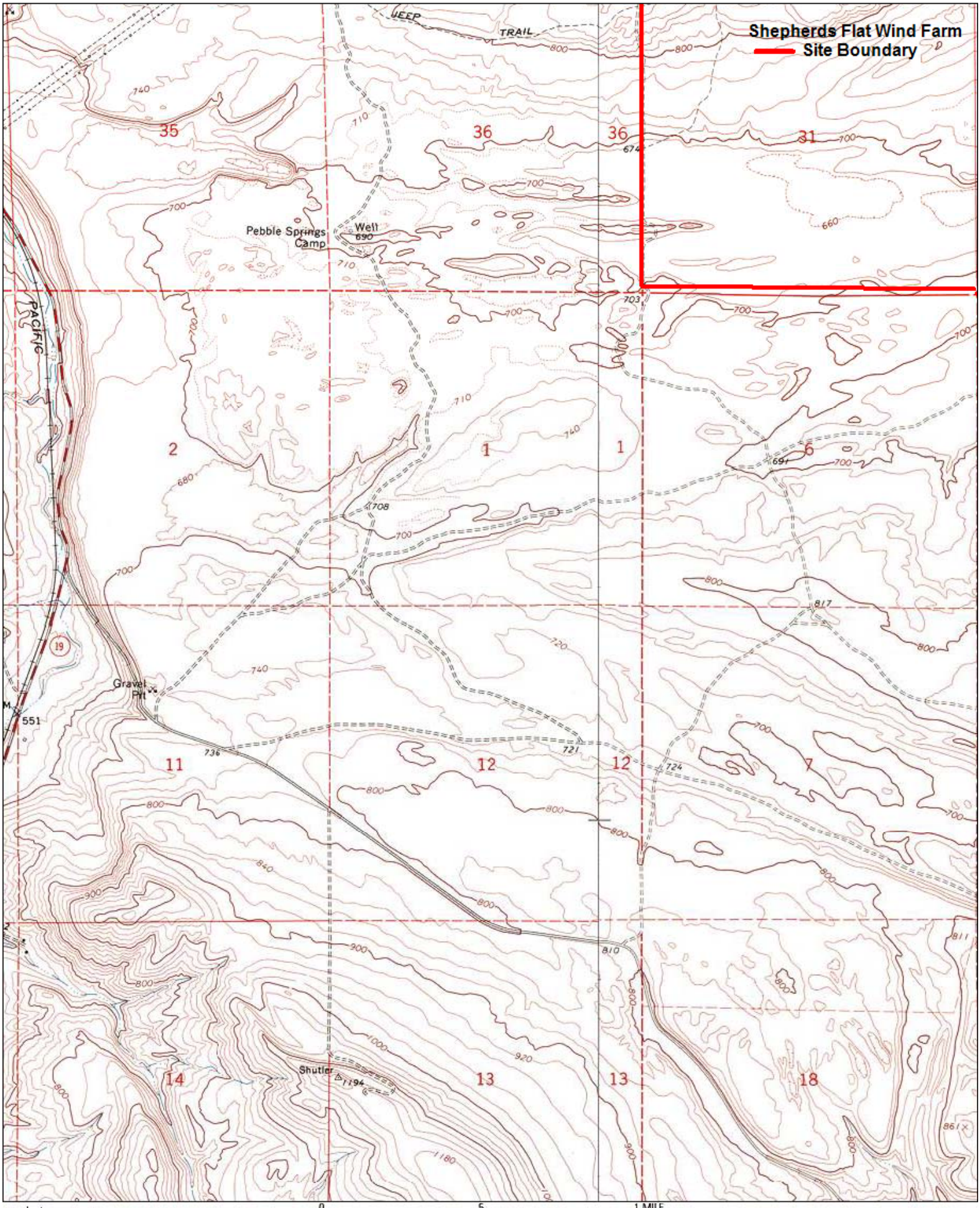

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Figure C-14

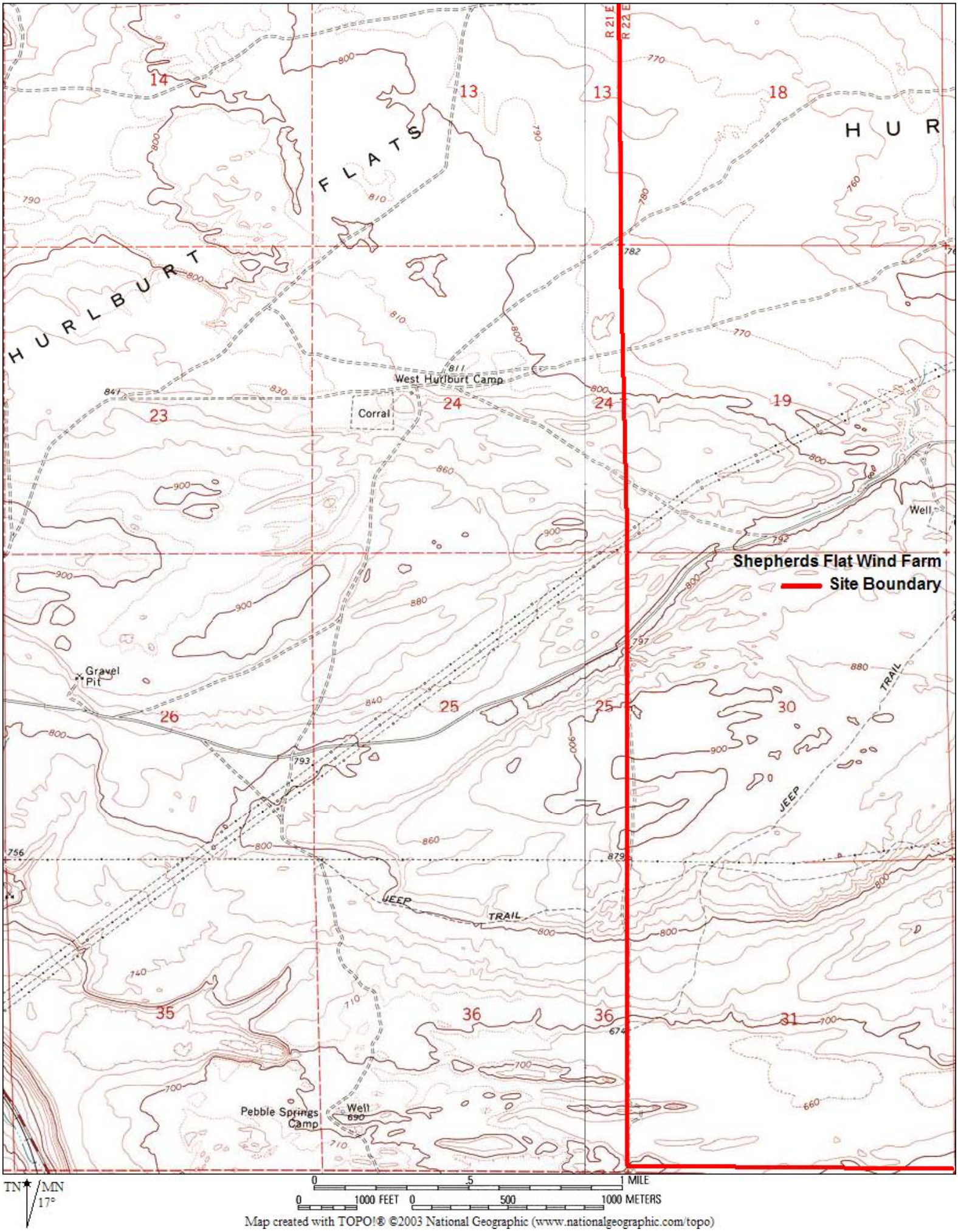

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Figure C-15

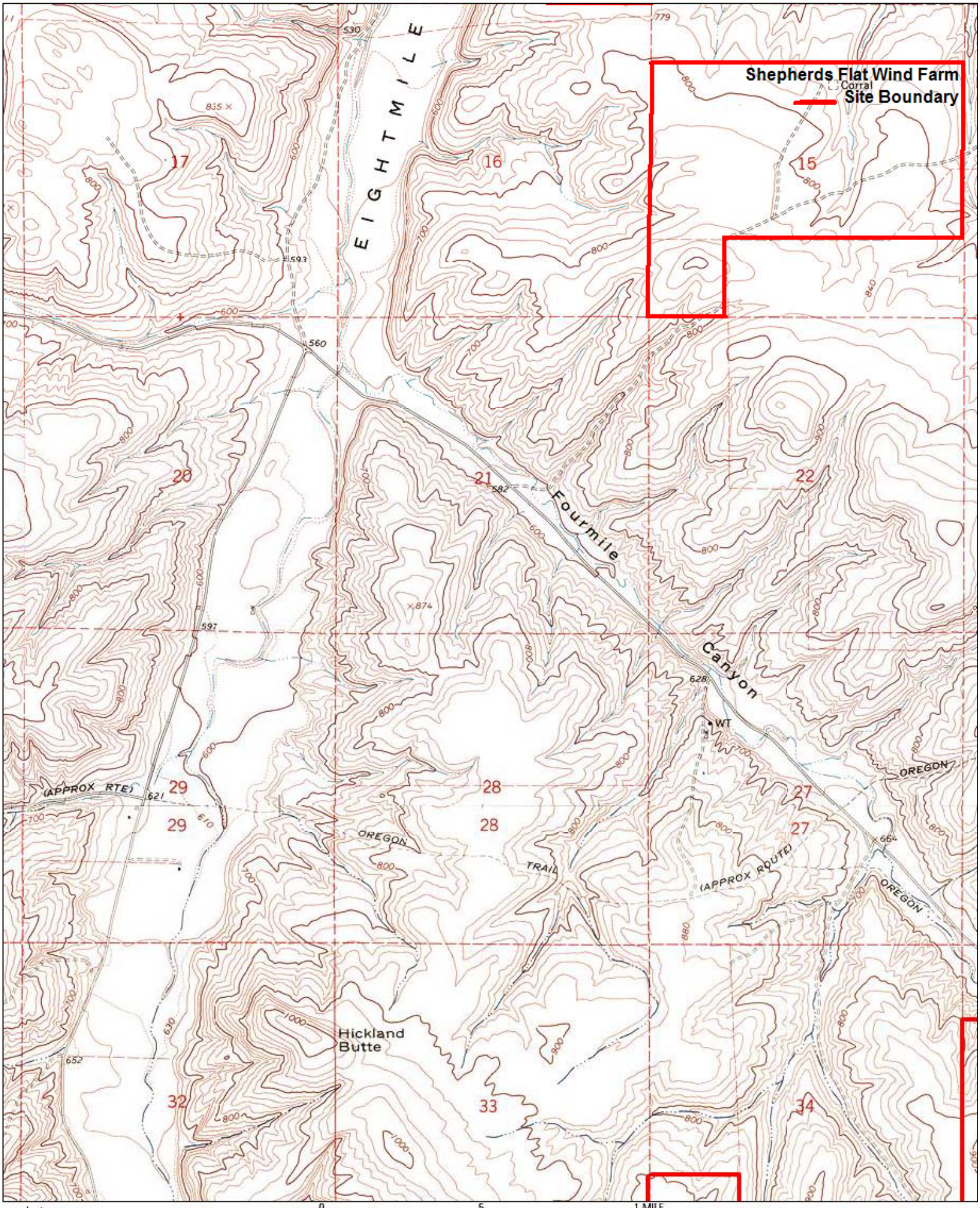

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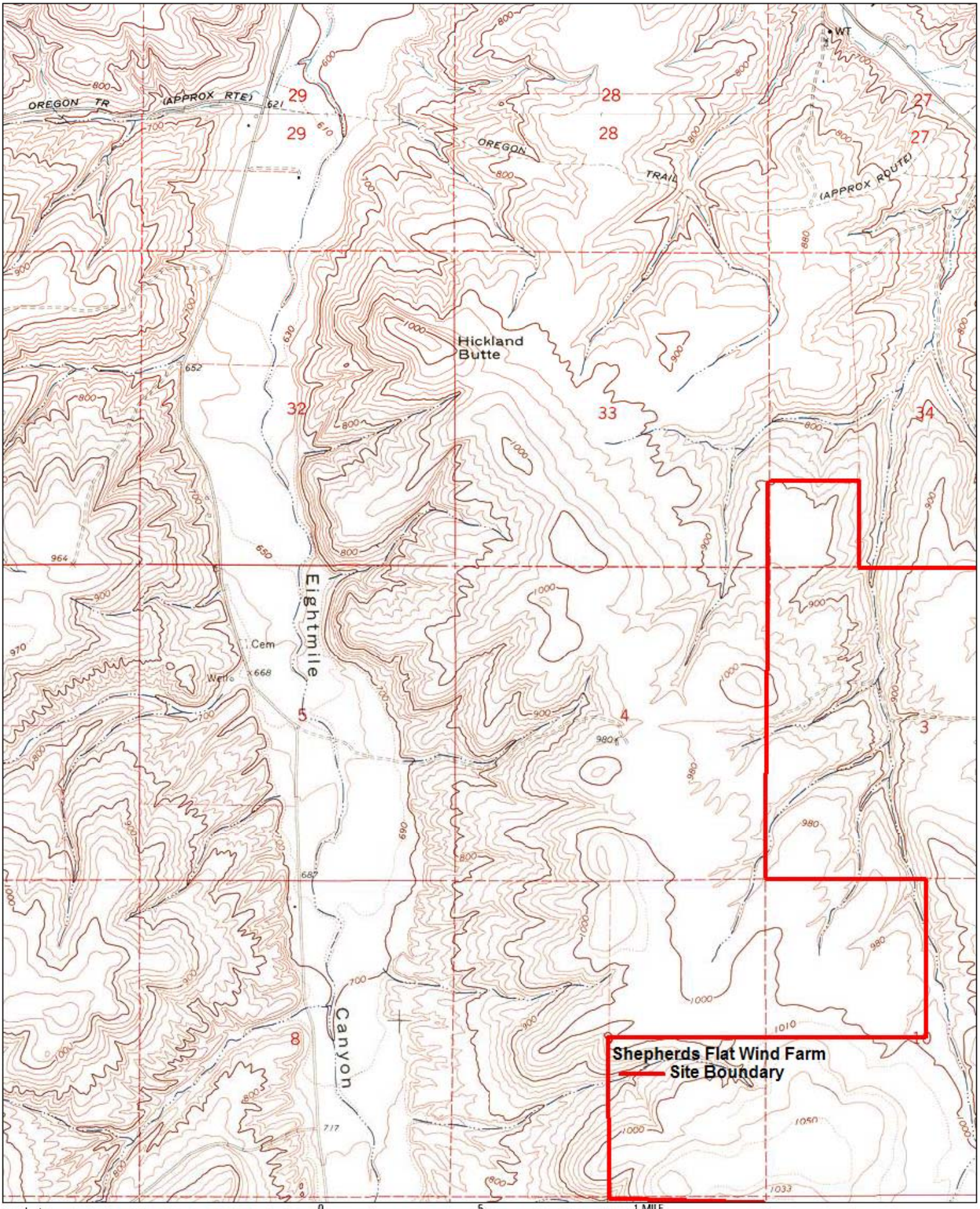
Figure C-16



TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

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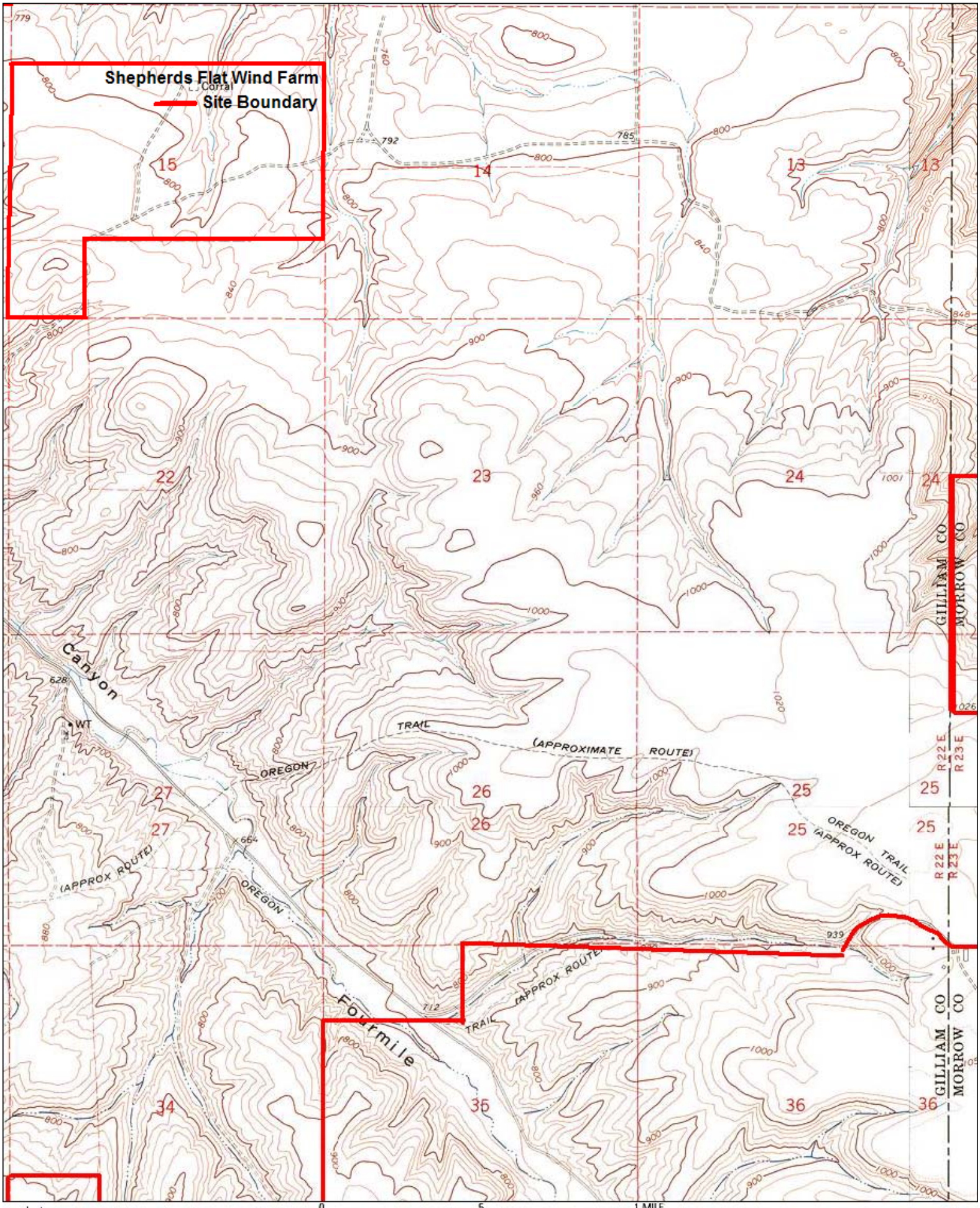
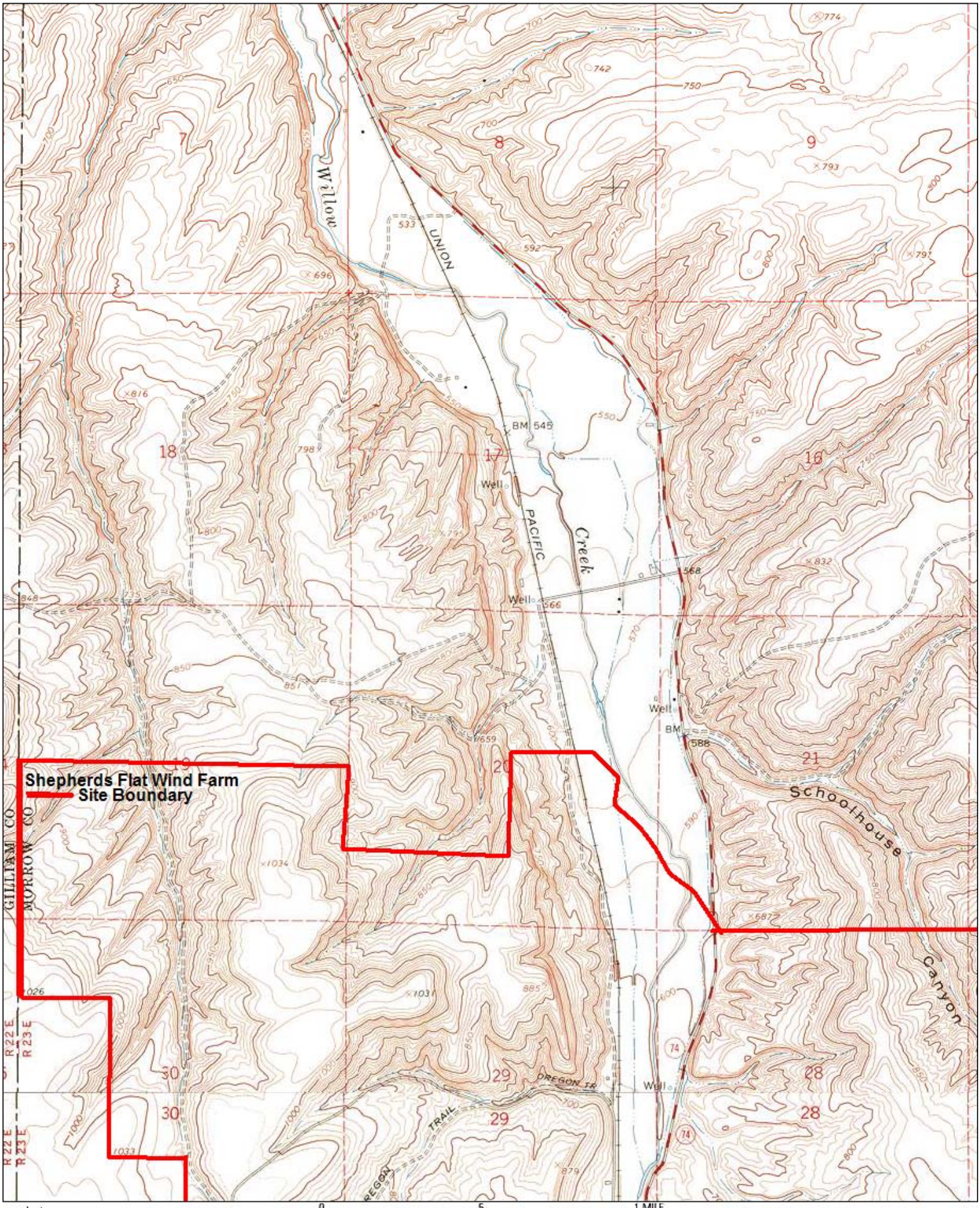
Figure C-17



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-18



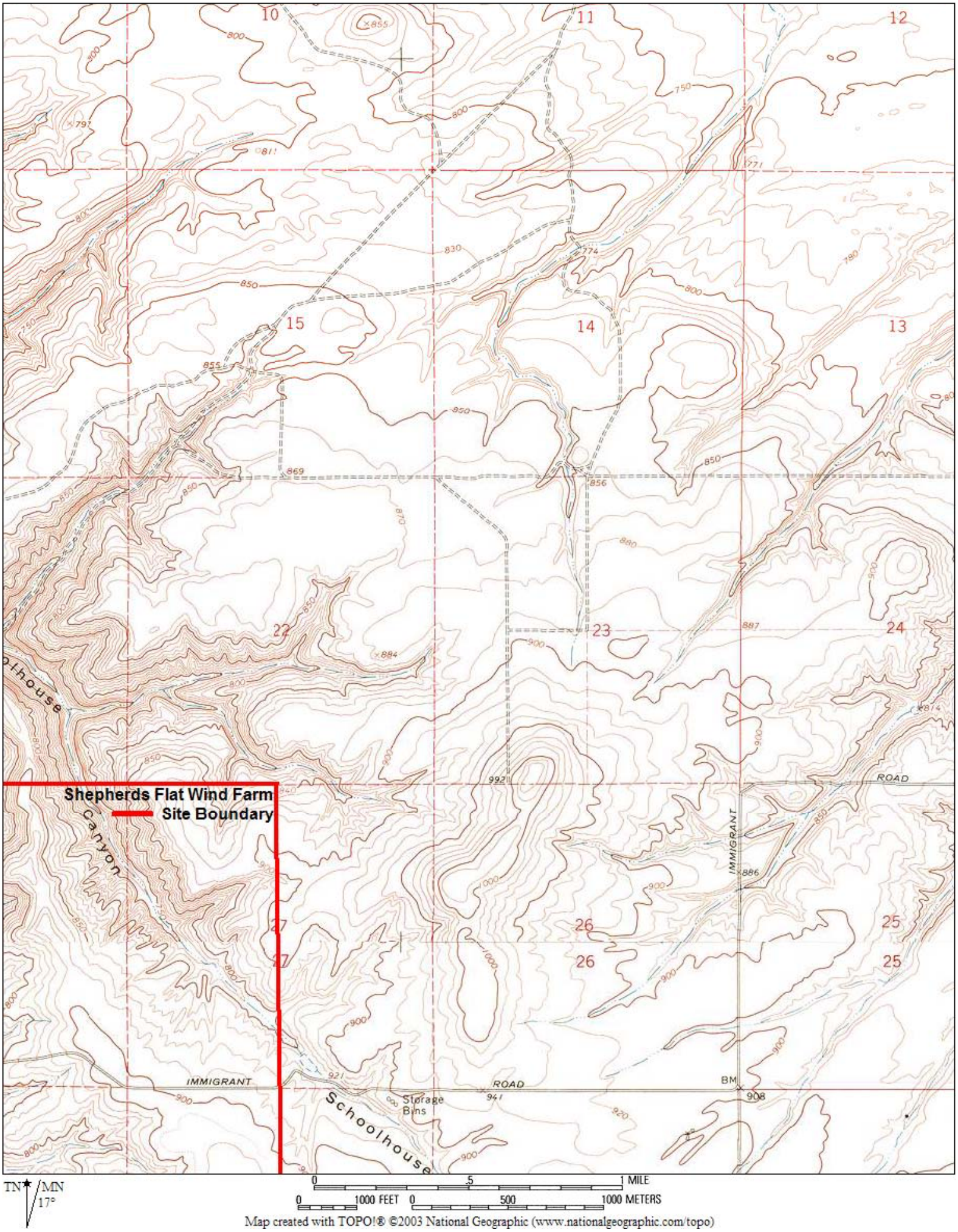
TN / MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

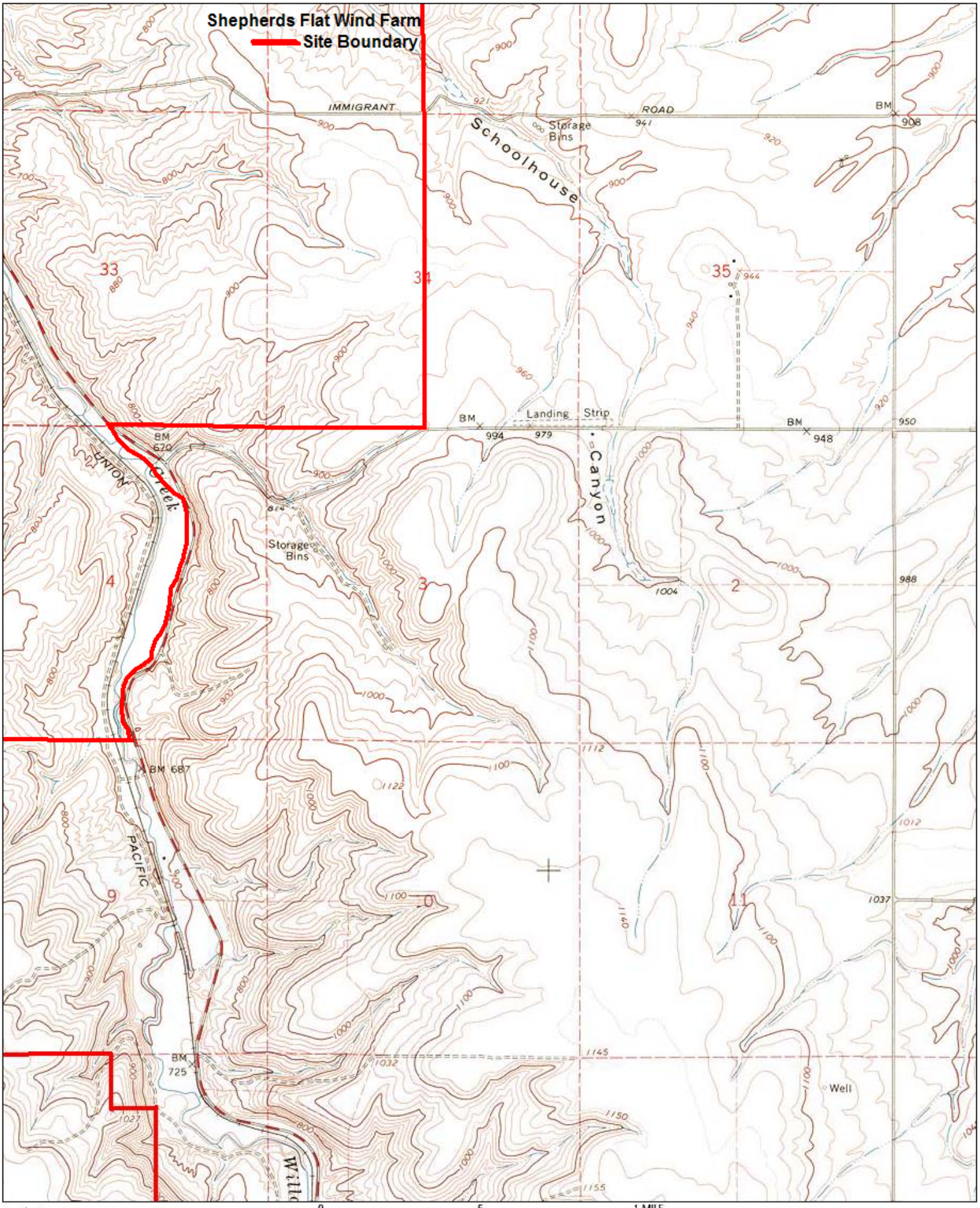
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-19



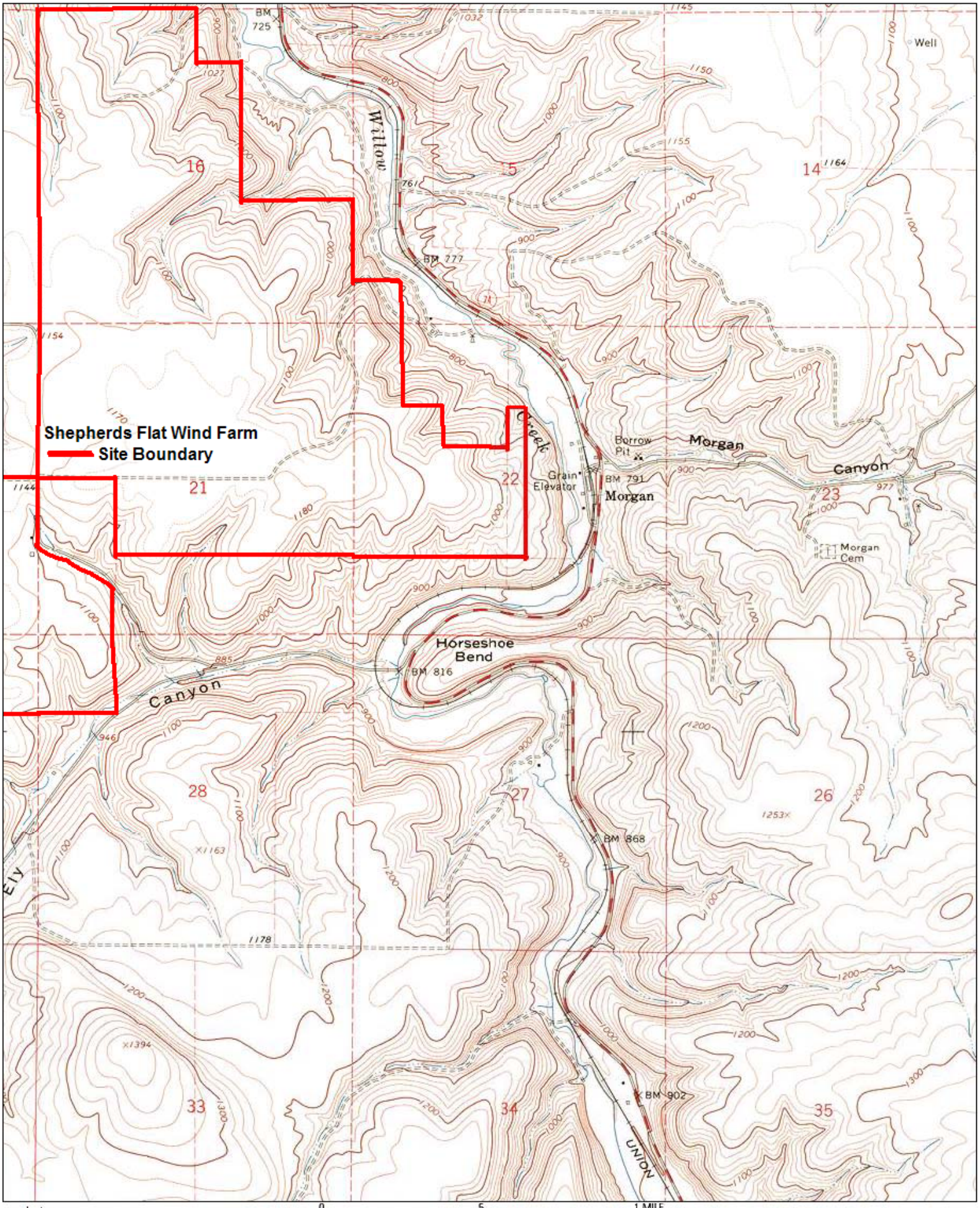
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-20



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-21



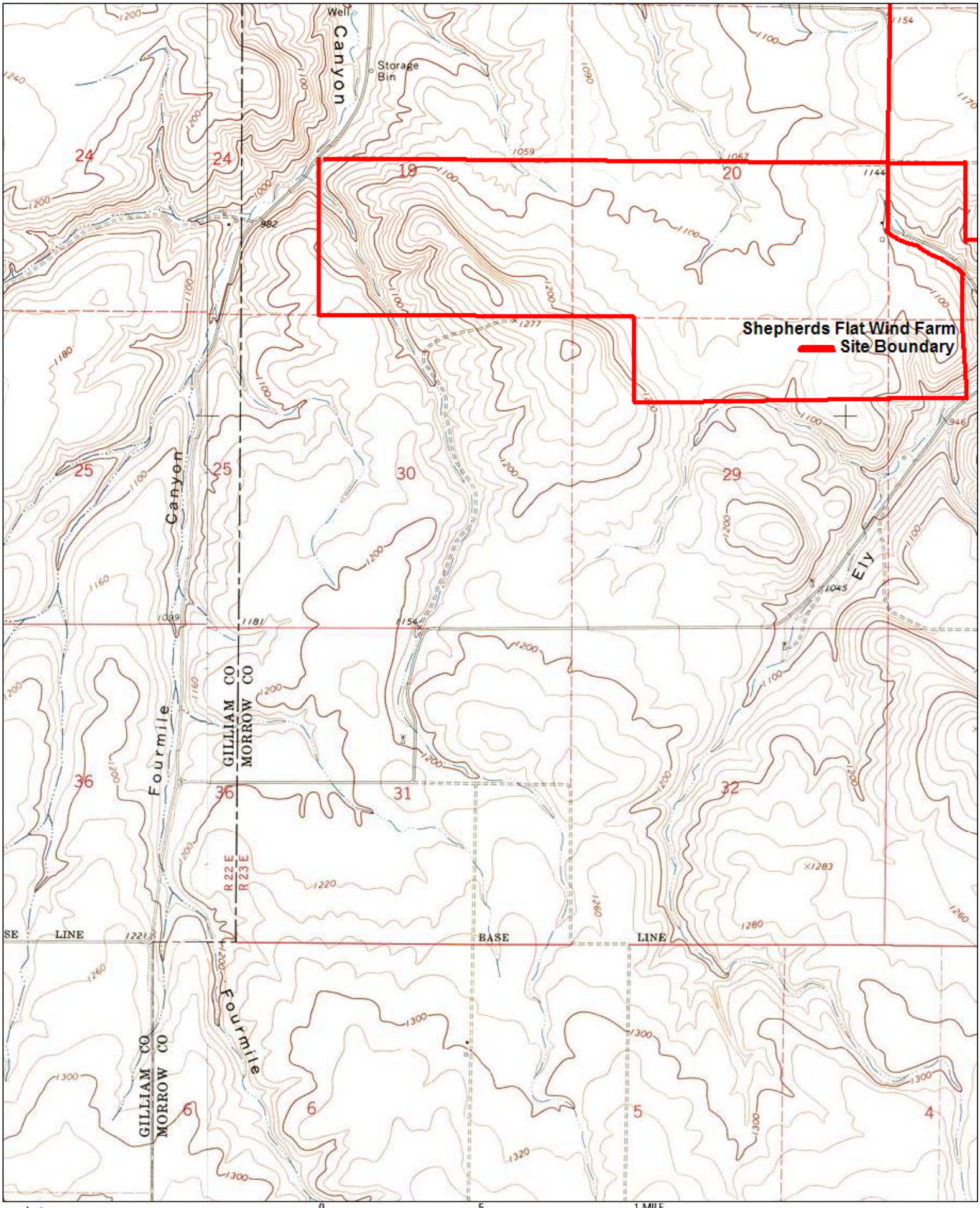
TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

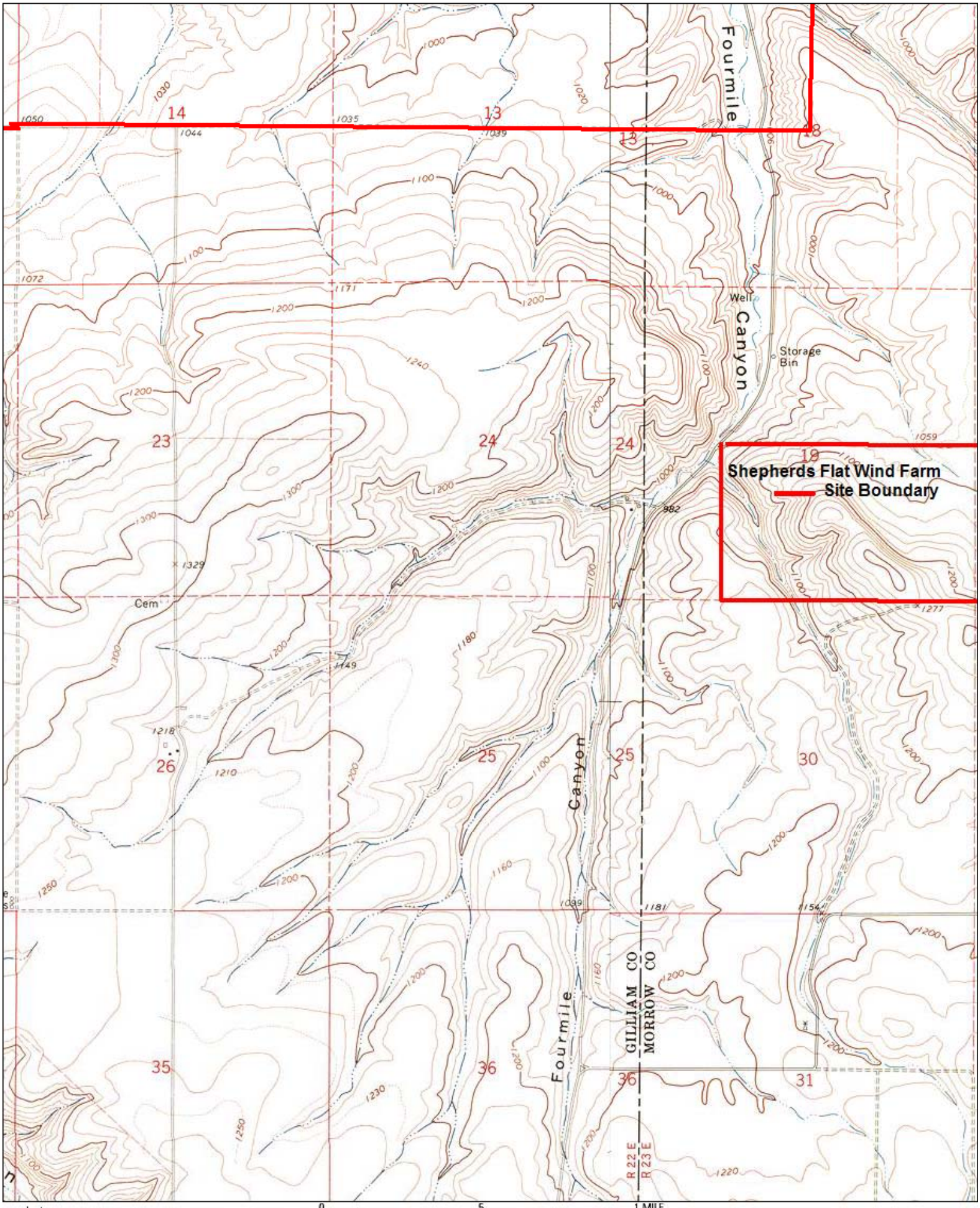
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-22



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-23



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-24

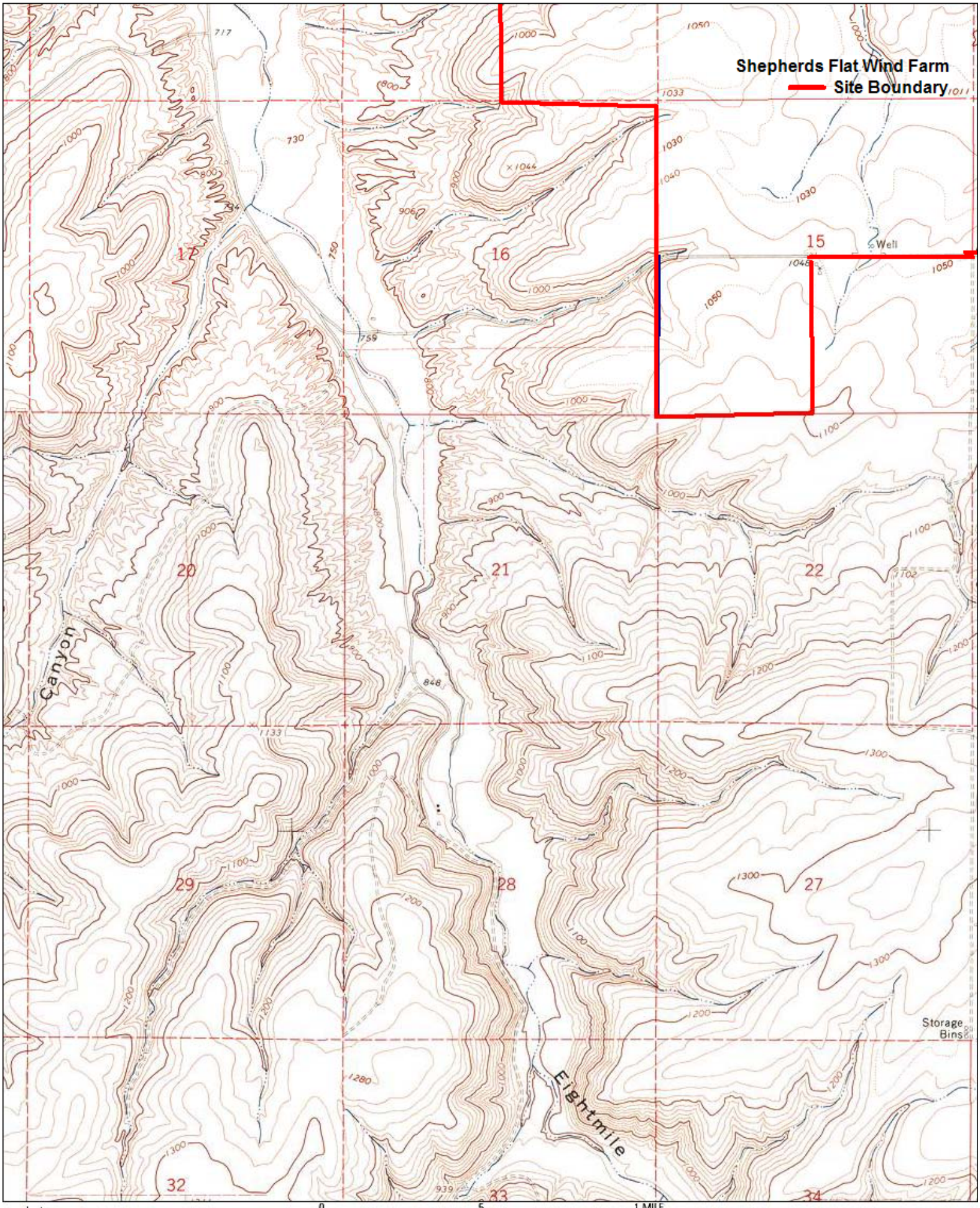


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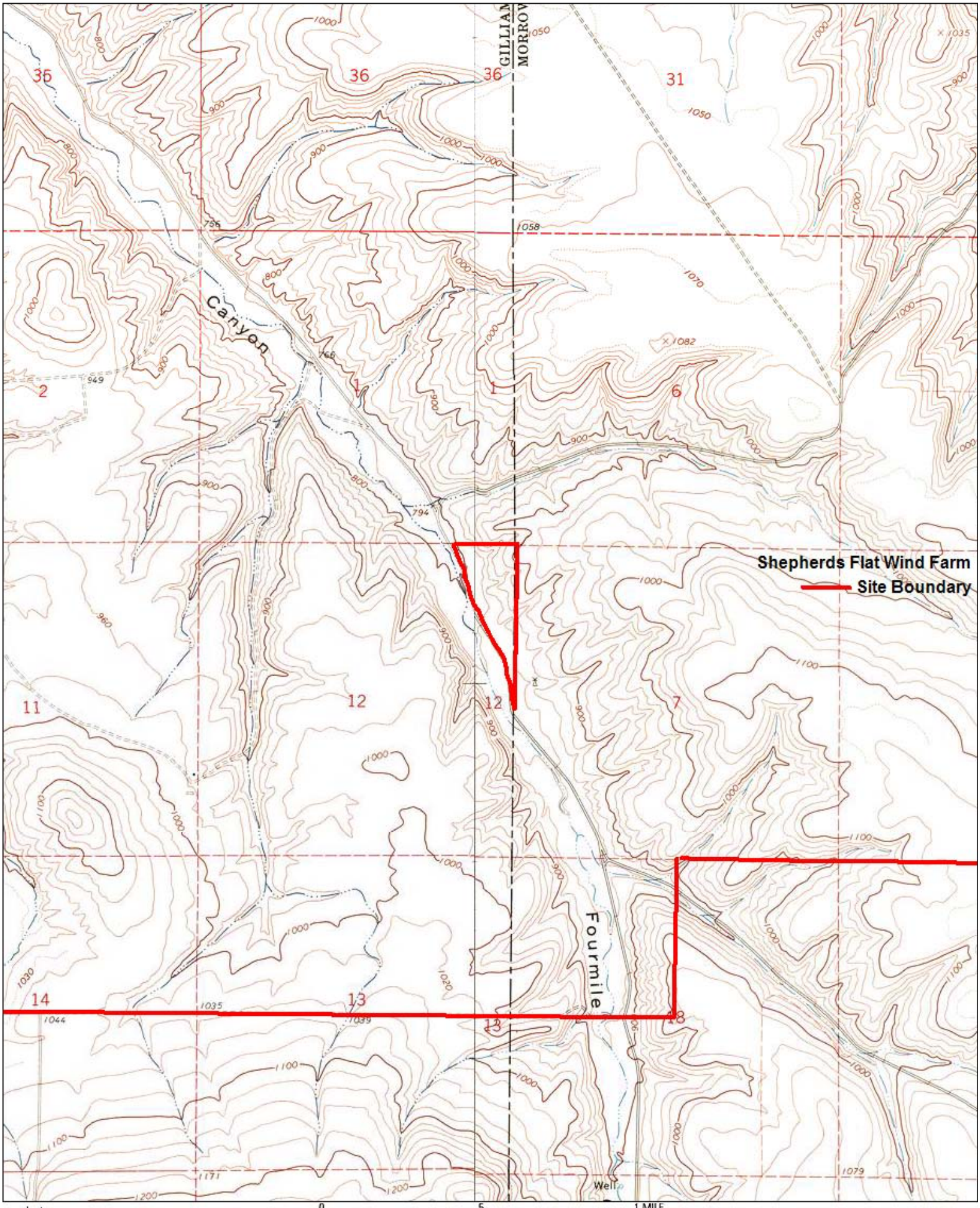
Figure C-25



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

EXHIBIT D

ORGANIZATIONAL EXPERTISE

Information about the organization expertise of the applicant to construct and operate the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0010, including:

(A) The applicant's previous experience, if any, in constructing and operating similar facilities;

(B) The qualifications of the applicant's personnel who will be responsible for constructing and operating the facility, to the extent that the identities of such personnel are known when the application is submitted;

(C) The qualifications of any architect, engineer, major component vendor, or prime contractor upon whom the applicant will rely in constructing and operating the facility, to the extent that the identities of such persons are known when the application is submitted;

(D) The past performance of the applicant, including but not limited to the number and severity of any regulatory citations in constructing or operating a facility, type of equipment, or process similar to the proposed facility;

(E) If the applicant has no previous experience in constructing or operating similar facilities and has not identified a prime contractor for construction or operation of the proposed facility, other evidence that the applicant can successfully construct and operate the proposed facility. The applicant may include, as evidence, a warranty that it will, through contracts, secure the necessary expertise; and

(F) If the applicant has an ISO 9000 or ISO 14000 certified program and proposes to design, construct and operate the facility according to that program, a description of the program;

(G) If the applicant relies on mitigation to demonstrate compliance with any standards of Division 22 or 24 of this chapter, evidence that the applicant can successfully complete such proposed mitigation, including past experience with other projects and the qualifications and experience of personnel upon whom the applicant will rely, to the extent that the identities of such persons are known at the date of submittal.

Caithness Energy, L.L.C.

Caithness Energy, L.L.C. ("Caithness"), the parent company of Caithness Shepherds Flat, LLC, is a privately owned company based in New York City specializing in power plant development, operations and asset management. Caithness' primary focus for more than 20 years has been to develop, finance, own, and operate power projects, which utilize natural gas, geothermal, wind, and solar energy. Caithness' efforts have resulted in a portfolio of some of the premier energy projects in the United States, making Caithness one of the largest privately held independent power producers.

Caithness and its affiliates have ownership in 32 power projects, including 1,439 MW of gas turbine projects, 60MW of diesel projects, 420 MW of geothermal projects, 375 MW of wind projects, 160 MW of solar projects and 27 MW of hydroelectric projects.

Caithness operates 14 of its projects and provides asset management services for all 32 projects. The operators and managers are experienced in all aspects of power production.

In addition to the current operating portfolio, Caithness has approximately 850 additional megawatts of production at varying stages of development, including a 350 MW facility located in Long Island, NY which is expected to begin construction this spring. Other development projects include Blythe II in California and the 118-mile Desert Southwest Transmission Line.

EXHIBIT E

CONSTRUCTION AND OPERATION PERMITS

Information about permits needed for construction and operation of the facility, including:

(A) Identification of all federal, state and local government permits needed before construction and operation of the proposed facility, legal citation of the statute, rule or ordinance governing each permit, and the name, address and telephone number of the agency or office responsible for each permit.

(B) A description of each permit and the reasons the permit is needed for construction or operation of the facility.

(C) For state or local government permits or approvals for which the Council must determine compliance with applicable standards, evidence to support findings by the Council that construction and operation of the proposed facility will comply with all statutes, rules and standards applicable to the permit. The applicant may show this evidence:

(i) In Exhibit J for permits related to wetlands;
(ii) In Exhibit O for permits related to water rights.

(D) For federally-delegated permit applications, evidence that the responsible agency has received a permit application and the estimated date when the responsible agency will complete its review and issue a permit decision.

(E) If the applicant will not itself obtain a state or local government permit or approval for which the Council would ordinarily determine compliance but instead relies on a permit issued to a third party, identification of any such third-party permit and for each:

(i) Evidence that the applicant has, or has a reasonable likelihood of entering into, a contract or other agreement with the third party for access to the resource or service to be secured by that permit;
(ii) Evidence that the third party has, or has a reasonable likelihood of obtaining, the necessary permit; and
(iii) An assessment of the impact of the proposed facility on any permits that a third party has obtained and on which the applicant relies to comply with any applicable Council standard.

(F) If the applicant relies on a federally-delegated permit issued to a third party, identification of any such third-party permit and for each:

(i) Evidence that the applicant has, or has a reasonable likelihood of entering into, a contract or other agreement with the third party for access to the resource or service to be secured by that permit;
(ii) Evidence that the responsible agency has received a permit application; and
(iii) The estimated the date when the responsible agency will complete its review and issue a permit decision.

(G) The applicant's proposed monitoring program, if any, for compliance with permit conditions;

Permits needed

Federal Permits

Permit	Agency
Notice of Proposed Construction or Alteration 14 CFR Part 77	Federal Aviation Administration Northwest Mountain Region 1601 Lind Avenue, SW Suite 315 Renton, WA 98055

The Federal Aviation Administration requires the installation of aircraft hazard lighting on all structures more than 200 feet in height. Facility turbines will exceed this limit.

State Permits: Federally Delegated

Permit	**Agency**
National Pollutant Discharge Elimination System (NPDES) General Permit Clean Water Act, Section 402, 40 CFR Part 122; ORS Chapter 468B, OAR Chapter 340 Division 40	Oregon Department of Environmental Quality Water Quality 811 SW 6th Avenue Portland, OR 97204 (503) 229-5279

The U. S. Environmental Protection Agency has delegated authority to DEQ to issue NPDES Storm Water Discharge permits for construction and operation activities. The General Permit is required when there will be discharge into the waters of the United States. While the facility itself will not discharge any water, in the event of a severe rain storm, it is possible that there will be run-off from the project site. The Council may rely on the determinations of compliance and the conditions or the federally-delegated permit in making its determination about whether other standards and requirements under the Council's jurisdiction are met.

State Permits

Permit	Agency
Energy Facility Site Certificate OAR Chapter 345, Divisions 1,21,22,24,26 and 27.	Energy Facility Siting Council Oregon Office of Energy 625 Marion Street, NE—Suite 1 Salem, OR 97301 (503) 378-4040

Oregon requires an Energy Facility Site Certificate from the Energy Facility Siting Council for facilities when the average electric generating capacity is 35 megawatts or more if the power is produced from wind energy. The proposed facility exceeds that limit.

Archaeological Permit ORS 97.745, ORS 358.920, ORS 390.010 and -.235, OAR Chapter 736, Division 51.	Oregon Parks and Recreation Department

An archaeological permit may be required to conduct archaeological investigations of the site.

Water Pollution Control Facility (WPCF) Permit ORS Chapter 468B, OAR Chapter 340, Divisions 45 and 71.	Oregon Department of Environmental Quality Water Quality 811 SW 6th Avenue Portland, OR 97204 (503) 229-5279

If applicant intends to discharge sanitary wastes to an on-site septic system during operation, the facility may need a WPCF permit depending on the design capacity of the system. Applicant must first verify that the site is suitable for an on-site septic system by applying to DEQ or its designated agency for a site evaluation of groundwater and soil conditions. However, no on-site septic system is proposed.

Water Right ORS Chapters 536 through 540, OAR Chapter 690, Divisions 1 through 410.	Water Resources Department Water Rights Division

Under Oregon law, all water is publicly owned. The Applicant intends to purchase the water used during facility construction from holders of existing water rights, but a temporary transfer of those rights may be necessary.

Permit	Agency
Removal-Fill Permit	Oregon Department of State Lands

ORS 196.800-.900, OAR Chapter 141, Division 85.

A removal-fill permit is required if 50 cubic yards or more of material is removed, filled or altered within a jurisdictional water of the State (OAR 141-085-0015). However, the Applicant does not intend to fill or alter material within the jurisdictional water of the State.

Oversize Load Movement Permit/Load Registration ORS 818.030; OAR ch 734 div 82	Oregon Department of Transportation Motor Carriers Transportation Division 550 Capitol Street, NE Salem, OR 97301 (503) 378-1289

Wind turbine nacelles, towers and rotors are large and heavy. Special transportation equipment required to move these facility components, and oversize load permits are required.

County Permits

Conditional Use Permit	Gilliam County, Oregon

Applicable substantive criteria from county codes and comprehensive plan.

Applicant requests a Council determination regarding land use in accordance with ORS 469.504(1)(b).

Conditional Use Permit	Morrow County, Oregon

Applicable substantive criteria from county codes and comprehensive plan.

Applicant requests a Council determination regarding land use in accordance with ORS 469.504(1)(b).

EXHIBIT F

PROPERTY OWNERS OF RECORD

A list of the names and mailing addresses of all owners of record, as shown on the most recent property tax assessment roll, of property located within or adjacent to the corridor(s) the applicant has selected for analysis as described in subsection (b) and property located within or adjacent to the site of the proposed facility. The applicant shall submit an updated list of property owners as requested by the Office of Energy before the Office issues notice of any public hearing on the application for a site certificate as described in OAR 345-015-0220. In addition to incorporating the list in the application for a site certificate, the applicant shall submit the list to the Office in electronic format suitable to the Office for the production of mailing labels. Property adjacent to the proposed site of the facility or corridor means property that is:

(A) Within 100 feet of the site or corridor, where the site or corridor is within an urban growth boundary;

(B) Within 250 feet of the site or corridor, where the site or corridor is outside an urban growth boundary and not within a farm or forest zone; and

(C) Within 500 feet of the site or corridor, where the site or corridor is within a farm or forest zone;

Property owners

The site is within a farm zone. Property owners of record within the site or within 500 feet of the site are:

Owner Name	Mailing Address
State of Oregon C/O Parks and Recreation Dept.	1115 Commercial NE Salem, OR 97310
United States of America Bureau of Land Management	PO Box 550 Prineville, OR 97754
J. R. Krebs	PO Box 8 Arlington, OR 97812
BAIC, Inc. C/O Threemile Canyon Farms Attn: Mr. Martin Myers	75906 Threemile Road Boardman, OR 97818
Geo. G. & Lorene Griffith	68496 Hwy. 74 Ione, OR 97843

Owner Name	Mailing Address
Don W. & Patricia A. Phillips	PO Box 689 Beaver Creek, OR 97004
Brian L. & Lorence L. Sullivan	75181 Sullivan Road Ione, OR 97843
Richard, Joanne & Mark Goodhead	75398 Hwy. 74 Ione, OR 97843
Eugene S. Logan, Jr.	75396 Hwy. 74 Ione, OR 97843
Raymond & Nawarat Treveno	735 E. View Drive Hermiston, OR 97838
Pacific Power & Light Co.	825 N.E. Mulnomah Suite 1900 Portland, OR 97232
Jarrod & Alison Ogden	74475 Hwy. 74 Ione, OR 97843
Joseph V. & Cheryl L. Taylor	78559 Paul Smith Rd. Boardman, OR 97818
Portland General Electric Co.	121 S Salmon Street Portland, OR 97204
Clinton H. & Maureen C. Krebs Skye H. & Penny M. Krebs	69956 Hwy. 74 Ione, OR 97843
Oregon Department of Transportation	417 Transportation Bldg. Salem, OR 97310
State Highway Commission	135 Transportation Bldg. Salem, OR 97310
Harry P. & Linda M. Moffitt	PO Box 2303 Gresham, OR 97030
Willow Farms, LLC	415 E Mill Plain Blvd. Vancouver, WA 98660

Owner Name	Mailing Address
Vic Jansen Randy & Nancy Allred	406 W Broadway S Moses Lake, WA 98837
Crum Ranches, LLC Monty Crum Ranches, LLC	PO Box 121 Ione, OR 97843
Thomas F. Sumner Living Trust Phyllis A. Sumner Living Trust	PO Box 8 Arlington, OR 97812
Dana & Tonya Heideman Loren A. & Della Heideman	68809 Four Mile Canyon Rd. Ione, OR 97843
Eastern Z Farms, LLC	12423 River Rd. N Gervais, OR 97026
American Exchange Services, Inc.	320 Church Street Salem, OR 97308
Ronald W. Haguewood	PO Box 407 Ione, OR 97843
Morrow County	PO Box 788 Heppner, OR 97836
Barbara A. Nelson	72521 Tutuilla Creek Rd. Pendleton, OR 97801
George E. Miller Trust C/O Wells Fargo	PO Box 13519 Arlington, TX 76094
Justin C. & Stacie J. Miller	PO Box 374 Ione, OR 97843
Keven & Linda Haguewood et. al.	PO Box 195 Ione, OR 97843
Howard E. Crowell, Jr. Kathy Jo Crowell	68104 Hwy. 74 Ione, OR 97843
British-American Mortgage Co. C/O Fuhrman Dev. Co.	236 SE Spokane St. Portland, OR 97202

Owner Name	Mailing Address
Macwheat, Inc.	PO Box 28 Ione, OR 97843
Mary Knowles, Trustee	67207 Little Butter Creek Heppner, OR 97836
Pete & Laurel Cannon	PO Box 255 Ione, OR 97843
Four Mile Land Co.	68809 Four Mile Canyon Rd. Ione, OR 97843
Brad D. & Grace C. Clement	67505 Hwy. 74 Ione, OR 97843
J.P. Sullivan	PO Box 362 Ione, OR 97843
Gerald R. & Linda J. Miller	PO Box 321 Ione, OR 97843
Robert A. Barnes	66791 Hwy. 74 Ione, OR 97843
Christy L. Buscher C/O Robert Barnes	66791 Hwy. 74 Ione, OR 97843
Terri Schaber, Trustee Terri Schaber	PO Box 147 Ione, OR 97843
R. C. & Gayleen Miller	66066 Hwy. 74 Ione, OR 97843
Larry & Elvita Engelgau	01816 SW Palatine Hill Rd. Portland, OR 97819
State of Oregon	417 Transportation Bldg. Salem, OR 97310
Proudfoot Ranches, Inc.	PO Box 28 Ione, OR 97843

Owner Name	Mailing Address
Joe D. & Donna M. Reitmann	PO Box 302 Ione, OR 97843
Marvin & Beverly Boyle	PO Box 347 Ione, OR 97843

EXHIBIT G

MATERIALS ANALYSIS

A materials analysis including:

(A) An inventory of substantial quantities of industrial materials flowing into and out of the proposed facility during construction and operations;

(B) The applicant's plans to manage hazardous substances during construction and operation, including measures to prevent and contain spills; and

(C) The applicant's plans to manage non-hazardous waste materials during construction and operation;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit G as follows:

> [Applicant] must include in the application a list of all hazardous materials that might be stored or used at the facility site during construction and operation. [Applicant] must comply with DEQ regulations concerning the use, clean up and disposal of hazardous materials. The requirement is incorporated in the general standard of review, OAR 345-022-0000.

Materials

Industrial Materials

Construction

Industrial materials flowing into the site during construction:

- Rock and gravel used for the construction of new project roads and the improvement of existing roads.
- Concrete used for turbine and transformer foundations.
- Diesel fuel for on-site equipment.

No industrial materials are expected to flow out of the site.

Operations

No substantial quantities of industrial materials will flow into or out of the site during facility operations.

Hazardous Substances

Construction and operations personnel follow all federal, state, and local governmental regulation and guidelines when using, storing, transporting, or disposing of any hazardous material which may be used in conjunction with the construction and operation of the facility. The facility will not use, store, transport or dispose of extremely hazardous material (40 Code of Federal Regulation 335). All lubricants, oils, greases, antifreeze, cleansers and degreasers, and hydraulic fluids which may be used in the operation of a facility will be kept in approved containers.

All construction vehicles and equipment will be maintained and serviced in accordance with manufacturer recommendations to minimize leaks of motor oils, hydraulic fluids and fuels. The refueling and maintenance of vehicles that are authorized for highway travel will be performed off-site at an appropriate facility.

Wind turbines and transformers use lubricants, oils, greases, antifreeze, cleansers and degreasers, and hydraulic fluids. None of these products contains any compounds listed as extremely hazardous by the US Environmental Protection Agency. They are used in moderate quantities and are contained entirely within the spill trap and nacelle of the turbine so that the possibility of accidental leakage is minimal. Lubricants, hydraulic fluids, antifreeze and oils will be checked quarterly, filled as needed and changed every one to two years, as recommended by the manufacturer. Spent lubricants, hydraulic fluids, antifreeze, cleansers and degreasers, and oils will be recycled by a certified waste contractor.

Transformers contain cooling oil, which does not contain polychlorinated biphenyls (PCBs). Inspection of each transformer will be performed on a regular basis.

Towers and other project equipment will arrive at the site painted, and rarely need repainting during the life of the equipment. Should any repainting be necessary, it will be performed by licensed contractors in full compliance with applicable laws and regulations.

Herbicides, if used at all, will be used at landowner request to minimize the potential for introduction of any weed species into adjacent areas. Any application of herbicides will be done either by the landowner or, after consultation with the landowner, by a contract professional charged with observance of all regulations governing use and selection of herbicides. Herbicides will not be stored on-site nor any excess herbicides disposed of on the project site.

EXHIBIT H

GEOLOGICAL AND SOIL STABILITY

Information from reasonably available sources regarding the geological and soil stability of the site and vicinity, providing evidence to support findings by the Council as required by OAR 345-022-0020, including:

(A) A description of the geological features and topography of the site and vicinity;

(B) A description of site specific geological and geotechnical work performed or planned to be performed before construction. The applicant shall include:

(i) A proposed schedule for geotechnical work;
(ii) A description of the nature and extent of the work with a discussion of the methods used to assess the expected ground response, including amplification, at the site;
(iii) A list of the professional literature relied on in characterizing the site; and
(iv) The names of the personnel responsible for the work and a description of their relevant experience;

(C) For all transmission lines, a description of locations along the proposed route where the applicant proposes to perform site specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, dead ends, corners, and portions of the proposed route where geologic reconnaissance and other site specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction;

(D) For all pipelines that would carry explosive, flammable or hazardous materials, a description of locations, along the proposed route where the applicant proposes to perform site specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, and portions of the proposed alignment where geologic reconnaissance and other site specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction;

(E) A map showing the location of existing and significant potential geological and soil stability hazards and problems, if any, on the site and in its vicinity that could adversely affect, or be aggravated by, the construction and operation of the proposed facility;

(F) An assessment of seismic hazards. For the purposes of this assessment, the maximum probable earthquake (MPE) is the maximum earthquake that could occur under the known tectonic framework with a 10 percent chance of being exceeded in a 50 year period. If seismic sources are not mapped sufficiently to identify the ground motions above, the applicant shall provide a probabilistic seismic hazard analysis to identify the peak ground accelerations expected at the site for a 500 year recurrence interval and a 5000 year recurrence interval. In the assessment, the applicant shall include:

(i) Identification of the Oregon Building Code Seismic Zone designation for the site;

(ii) Identification and characterization of all earthquake sources capable of generating median peak ground accelerations greater than 0.05g on rock at the site. For each earthquake source, the applicant shall assess the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE) and the MPE;

(iii) A description of any recorded earthquakes within 50 miles of the site and of recorded earthquakes greater than 50 miles from the site that caused ground shaking at the site more intense than the Modified Mercalli III intensity. The applicant shall include the date of occurrence and a description of the earthquake that includes its magnitude and highest intensity and its epicenter location or region of highest intensity;

(iv) Assessment of the median ground response spectrum from the MCE and the MPE and identification of the spectral accelerations greater than the design spectrum provided in the Oregon Building Code. The applicant shall include a description of the probable behavior of the subsurface materials and amplification by subsurface materials and any topographic or subsurface conditions that could result in expected ground motions greater than those characteristic of the Oregon Building Code Seismic Zone identified above; and

(v) An assessment of seismic hazards expected to result from reasonably probable seismic events. As used in this rule "seismic hazard" includes ground shaking, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement, and subsidence;

(G) An assessment of soil-related hazards such as landslides, flooding and erosion which could, in the absence of a seismic event, adversely affect or be aggravated by the construction or operation of the facility;

(H) An explanation of how the applicant will design, engineer and construct the facility to avoid dangers to human safety from the seismic hazards identified in paragraph (F). The applicant shall include proposed design and engineering features, applicable construction codes, and any monitoring for seismic hazards; and

(I) An explanation of how the applicant will design, engineer and construct the facility to adequately avoid dangers to human safety presented by the hazards identified in paragraph (G);

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit H as follows:

> All paragraphs apply, except that references to the "Oregon Building Code Seismic Zone" in paragraphs (F)(i) and (iv) are outdated. The applicant should instead discuss design standards or criteria from the 2004 Oregon Structural Specialty Code. [Applicant] should consult with the Oregon Department of Geology and Mineral Industries regarding information to include in the site certificate application.

Separately, the Oregon Department of Geology and Mineral Industries (DOGAMI) has commented on the need for adequate information about geologic hazards and geotechnical analysis. The DOGAMI comments may be found at Attachment H-1.

Seismic and Geotechnical Evaluations

Site-specific seismic and geotechnical evaluations of the project area will be completed before the commencement of construction. The evaluations will assess subsurface soil and geological conditions and provide information that will be used to identify geological or geotechnical hazards and facilitate the design of turbine foundations and other project structures.

Figure H-1 shows know fault lines in the vicinity of the project site.

A preliminary geotechnical engineering study of a portion of the project site has been completed and may be found at Attachment H-2.

Figure H-1

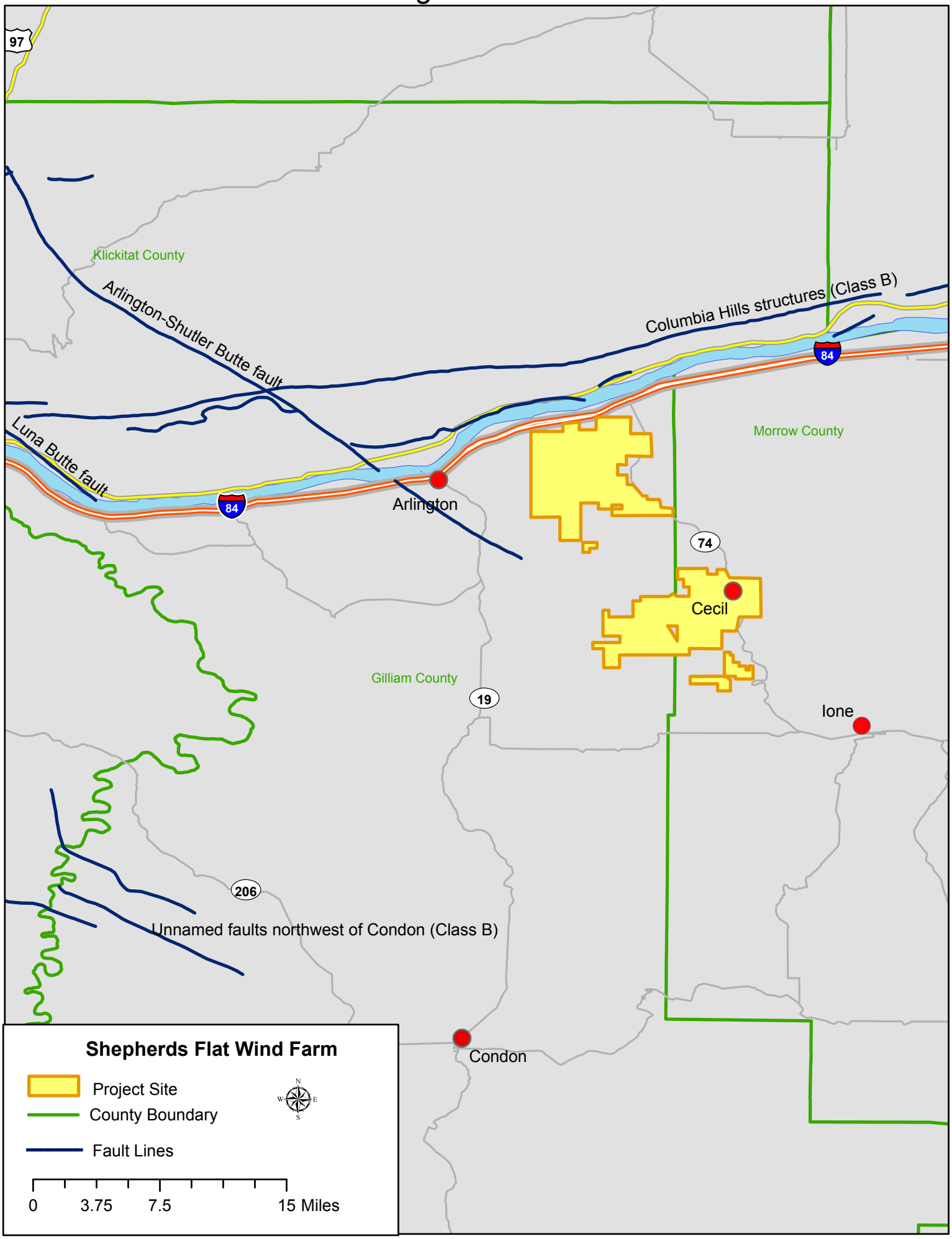

97
Klickitat County
Arlington-Shutler Butte fault
Columbia Hills structures (Class B)
84
Luna Butte fault
Morrow County
Arlington
74
Cecil
Gilliam County
19
Ione
206
Unnamed faults northwest of Condon (Class B)
Condon
Shepherds Flat Wind Farm
Project Site
County Boundary
Fault Lines
N
W
E
S
0
3.75
7.5
15 Miles

EXHIBIT I

SOIL CONDITIONS

Information from reasonably available sources regarding soil conditions and uses of the site and vicinity, providing evidence to support findings by the Council as required by OAR 345-022-0022, including:

(A) Identification and description of the major soil types at the site and its vicinity;

(B) Identification and description of any land uses on the proposed site and in its vicinity, such as growing crops, that require or depend on productive soils;

(C) Identification and assessment of significant potential adverse impact to soils from construction, operation and retirement of the facility, including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills;

(D) A description of any measures the applicant proposes to avoid or mitigate adverse impact to soils; and

(E) The applicant's proposed monitoring program, if any, for impact to soils;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit I as follows:

> All paragraphs apply. Include information describing the impact of construction and operation of the proposed facility on soil productivity in farm zones. Describe all measures proposed to maintain soil productivity during construction and operation. The applicant should consult with local farmers, landowners and soil conservation districts regarding mitigation of impacts to farmland.

Soils

Soil types found in the northern portion of the project are listed below (data from the Natural Resources Conservation Service):

Township	Range	Section	#	Soil Unit Name(s)
3N	22E	3	29D	Quincy-Rock outcrop complex, 1 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	5	29D	Quincy-Rock outcrop complex, 1 to 20 percent slopes
			22F	Nansene silt loam, 35 to 70 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	7	22F	Nansene silt loam, 35 to 70 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
3N	22E	8	39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	9	38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	10	38A	Roloff silt loam, 0 to 2 percent slopes
			38B	Roloff silt loam, 2 to 7 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	11	15E	Lickskillet very stony loam, 7 to 40 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			38B	Roloff silt loam, 2 to 7 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
3N	22E	15	38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	16	14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	17	14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	18	38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	19	14B	Krebs silt loam, 2 to 5 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
3N	22E	21	4C	Blalock loam, 2 to 12 percent slopes
			14B	Krebs silt loam, 2 to 5 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
3N	22E	27	4C	Blalock loam, 2 to 12 percent slopes
			13	Kimberly fine sandy loam
			14D	Krebs silt loam, 5 to 20 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
3N	22E	28	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
3N	22E	29	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
3N	22E	31	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			24D	Olex gravelly silt loam, 5 to 20 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			25D	Olex roloff complex, 5 to 20 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			56B	Willis silt loam, 2 to 5 percent slopes
3N	22E	32	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			23D	Olex silt loam, 12 to 20 percent slopes
			24D	Olex gravelly silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
3N	22E	33	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			23D	Olex silt loam, 12 to 20 percent slopes
			24D	Olex gravelly silt loam, 5 to 20 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
2N	22E	4	13	Kimberly fine sandy loam
			15E	Lickskillet very stony loam, 7 to 40 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
			41C	Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes
			58	Xeric torrifluvents, nearly level
2N	22E	9	13	Kimberly fine sandy loam
			15E	Lickskillet very stony loam, 7 to 40 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			40E 41B 41C	Sagehill fine sandy loam, 20 to 40 percent slopes Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes
2N	22E	15	40B 40C 40D 55B	Sagehill fine sandy loam, 2 to 5 percent slopes Sagehill fine sandy loam, 5 to 12 percent slopes Sagehill fine sandy loam, 12 to 20 percent slopes Warden silt loam, 2 to 5 percent slopes

A map showing these soils in the northern project area may be found at Figure I-1.

These northern soils are generally shallow and rocky and cannot be tilled. Livestock, primarily sheep, have been winter-grazed in the whole of the northern area since the early 1900s. The soil will not support summer grazing.

The area is crisscrossed with informal roads and four-wheel-drive "trails" which facilitate water delivery for stock and the movement of the sheep camps. The landowners believe that the introduction of formal project roads will improve soils and forage, as future traffic will be restricted to these routes, controlling soil compaction and vegetation destruction in the balance of the property. The site has frequent summer grass fires. New project roads will provide both fire breaks and remote site access. Both should help retain vegetation and improve soil stability.

Soil types found in the southern portion of the project are listed below (data from the Natural Resources Conservation Service):

Township	Range	Section	#	Soil Unit Name(s)
2N	23E	19	70B 70C 70D 71B 71C 71D 71E 78	Warden very fine sandy loam, 2 to 5 percent slopes Warden very fine sandy loam 5 to 12 percent slopes Warden very fine sandy loam, 12 to 20 percent slopes Warden silt loam, 2 to 5 percent slopes Warden silt loam, 5 to 12 percent slopes Warden silt loam, 12 to 20 percent slopes Warden silt loam, 20 to 40 percent slopes Xeric Torriorthents, nearly level
2N	23E	20	12 22 70B 70C 70D 71C 71D 71E	Esquatzel silt loam Kimberly fine sandy loam Warden very fine sandy loam, 2 to 5 percent slopes Warden very fine sandy loam 5 to 12 percent slopes Warden very fine sandy loam, 12 to 20 percent slopes Warden silt loam, 5 to 12 percent slopes Warden silt loam, 12 to 20 percent slopes Warden silt loam, 20 to 40 percent slopes
2N	23E	21	12 22	Esquatzel silt loam Kimberly fine sandy loam

Township	Range	Section	#	Soil Unit Name(s)
			70B	Warden very fine sandy loam, 2 to 5 percent slopes
			70C	Warden very fine sandy loam 5 to 12 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	27	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	28	12	Esquatzel silt loam
			22	Kimberly fine sandy loam
			45D	Ritzville silt loam,12 to 20 percent slopes
			70B	Warden very fine sandy loam, 2 to 5 percent slopes
			70C	Warden very fine sandy loam, 5 to 12 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	29	12	Esquatzel silt loam
			18E	Hankins silt loam, 5 to 35 percent south slopes
			22	Kimberly fine sandy loam
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
			77F	Wrenthamrock outcrop complex, 35 to 70 percent slopes
2N	23E	30	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			47E	Ritzville silt loam, 20 to 40 percent south slopes
			70D	Ritzville silt loam, 12 to 20 percent slopes
			71B	Warden silt loam, 2 to 5 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	34	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
2N	23E	33	22	Kimberly fine sandy loam
			28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
2N	23E	32	13D	Gravden very gravelly loam, 5 to 20 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			45D	Ritzville silt loam, 12 to 20 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
1N	23E	4	12	Esquatzel silt loam
			22	Kimberly fine sandy loam
			28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
1N	23E	5	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			46E	Ritzville silt loam, 20 to 40 percent north slopes
2N	23E	31	13D	Gravden very gravelly loam, 5 to 20 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
1N	23E	6	13D	Gravden very gravelly loam, 5 to 20 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
1N	23E	7	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			71B	Warden silt loam, 2 to 5 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
			75B	Willis silt loam, 2 to 5 percent slopes
1N	23E	8	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
1N	23E	18	45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			75B	Willis silt loam, 2 to 5 percent slopes
1N	23E	16	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
			47E	Ritzville silt loam, 20 to 40 percent south slopes
1N	23E	21	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			75D	Willis silt loam, 12 to 20 percent slopes
1N	23E	22	13E	Gravden very gravelly loam, 20 to 40 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			75D	Willis silt loam, 12 to 20 percent slopes
1N	23E	19	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
			47E	Ritzville silt loam, 20 to 40 percent south slopes
1N	23E	20	28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
1N	23E	28	28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
1N	23E	29	28E	Lickskillet very stony loam, 7 to 40 percent slopes
2N	22E	34	55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
2N	22E	35	13	Kimberly fine sandy loam
			24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
2N	22E	36	24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
1N	22E	3	55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	2	24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	1	13	Kimberly fine sandy loam
			24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
1N	22E	9	40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
1N	22E	10	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
1N	22E	11	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	12	32B	Ritzville silt loam, 2 to 7 percent slopes
			34E	Ritzville silt loam, 20 to 40 percent south slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	13	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			32D	Ritzville silt loam, 12 to 20 percent slopes
			34E	Ritzville silt loam, 20 to 40 percent south slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	14	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	15	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes

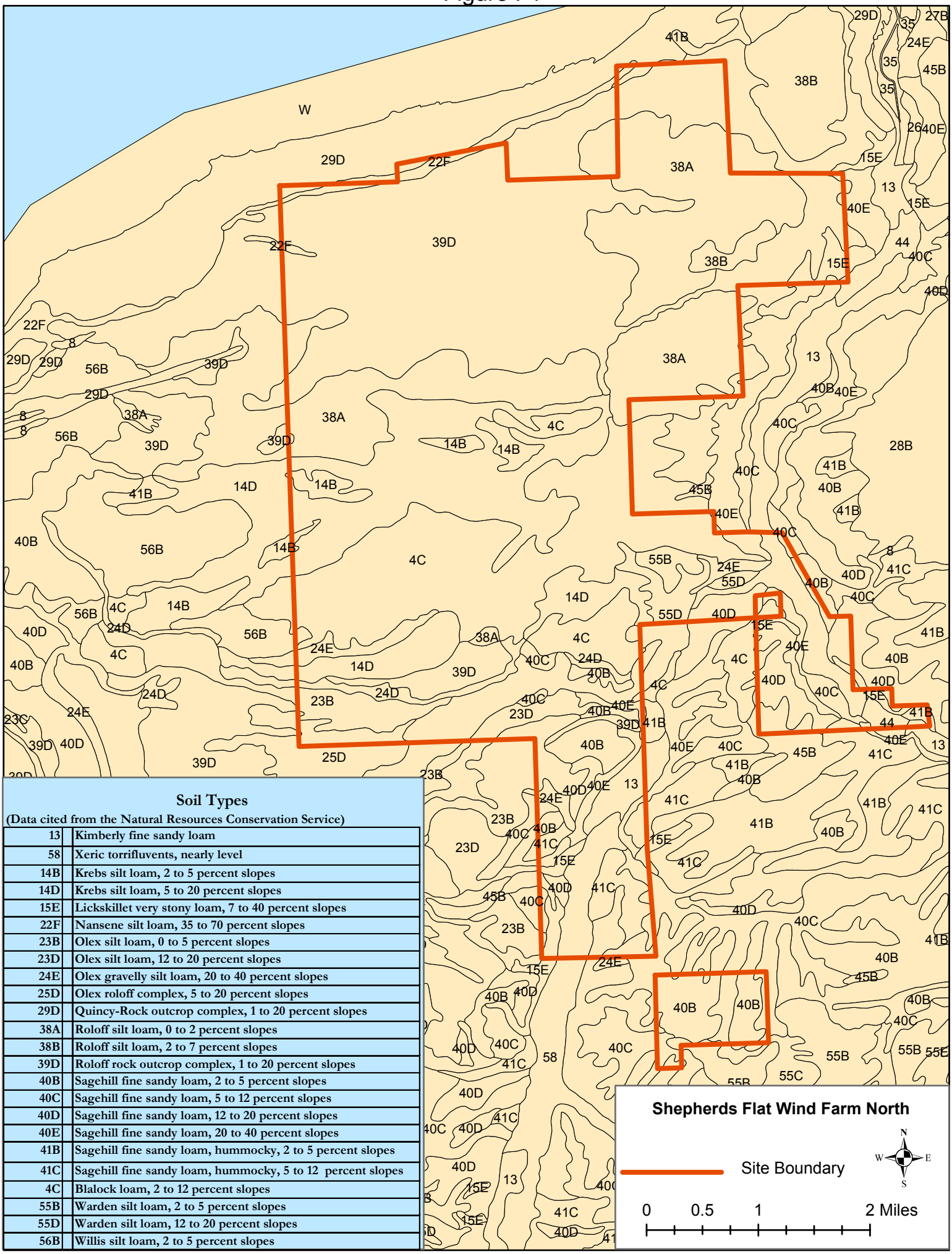
A map showing these soils in the southern project area may be found at Figure I-2.

The southern soils are deeper, but productivity is poor due to limited water resources: the project area is not irrigated, and fields are sometimes left unplanted in order to “bank” moisture. All land flat enough to plow is planted, when possible, in dry land wheat, and project facilities are located in these tilled fields.

Facility construction will temporarily disrupt farming activities in fields that are cultivated but have not yet been harvested in the year of construction. Standard construction practices include enforcement of speed limits and water application as necessary in order to reduce wind-blown soil loss.

During construction, the temporary disturbance width of project access roads may be up to 100 feet. The disturbance area outside the finished width of twelve feet is not graveled, but rather formed from a compacted base of native soil. When the construction phase is complete, these areas will be plowed and planted by the landowner as appropriate. Project access roads interconnect with each other and are available for use by both project staff and the landowner, limiting soil damage caused by cross-field driving.

Figure I-1

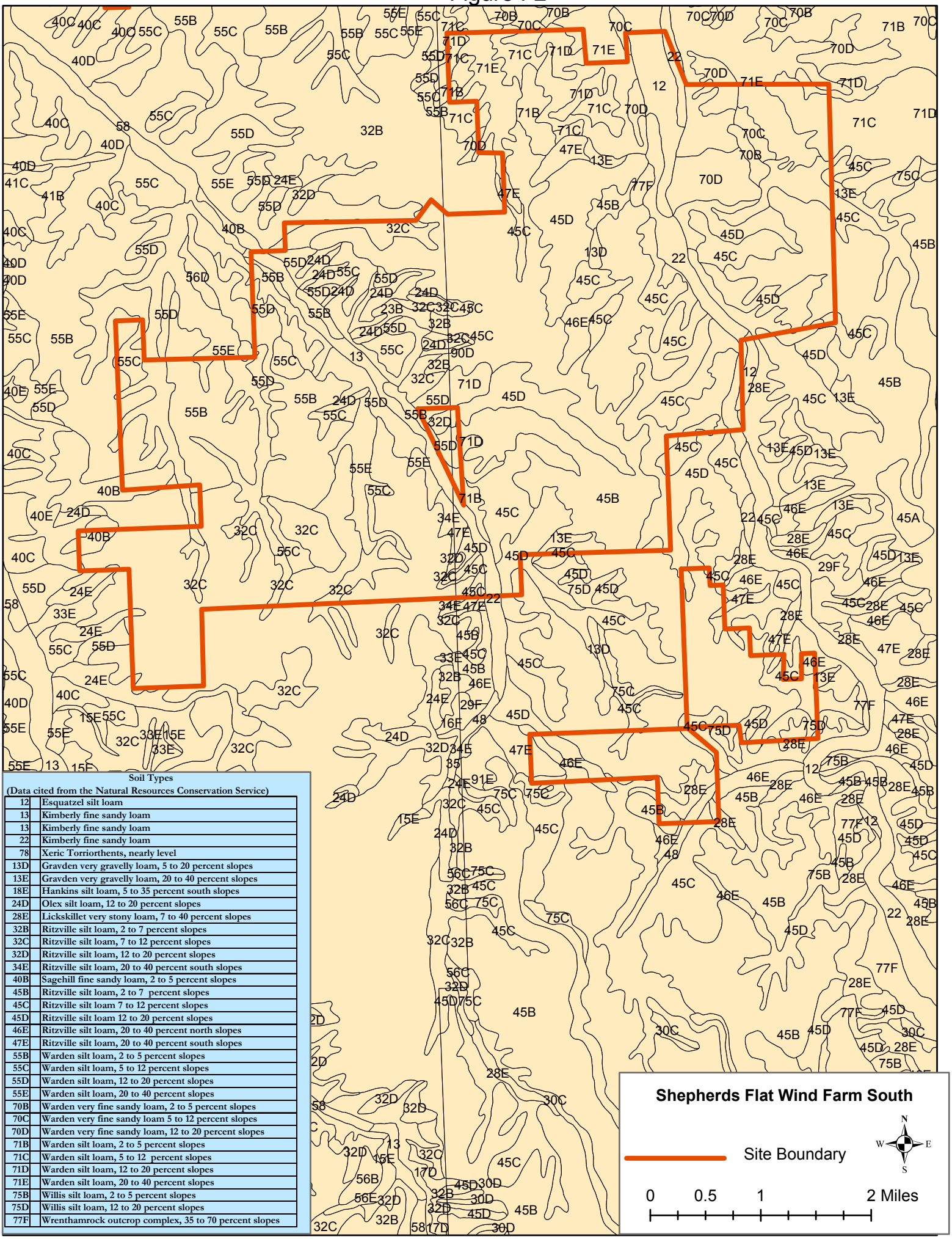


Soil Types

(Data cited from the Natural Resources Conservation Service)

13	Kimberly fine sandy loam
58	Xeric torrifluvents, nearly level
14B	Krebs silt loam, 2 to 5 percent slopes
14D	Krebs silt loam, 5 to 20 percent slopes
15E	Lickskillet very stony loam, 7 to 40 percent slopes
22F	Nansene silt loam, 35 to 70 percent slopes
23B	Olex silt loam, 0 to 5 percent slopes
23D	Olex silt loam, 12 to 20 percent slopes
24E	Olex gravelly silt loam, 20 to 40 percent slopes
25D	Olex roloff complex, 5 to 20 percent slopes
29D	Quincy-Rock outcrop complex, 1 to 20 percent slopes
38A	Roloff silt loam, 0 to 2 percent slopes
38B	Roloff silt loam, 2 to 7 percent slopes
39D	Roloff rock outcrop complex, 1 to 20 percent slopes
40B	Sagehill fine sandy loam, 2 to 5 percent slopes
40C	Sagehill fine sandy loam, 5 to 12 percent slopes
40D	Sagehill fine sandy loam, 12 to 20 percent slopes
40E	Sagehill fine sandy loam, 20 to 40 percent slopes
41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
41C	Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes
4C	Blalock loam, 2 to 12 percent slopes
55B	Warden silt loam, 2 to 5 percent slopes
55D	Warden silt loam, 12 to 20 percent slopes
56B	Willis silt loam, 2 to 5 percent slopes

Figure I-2



Soil Types
(Data cited from the Natural Resources Conservation Service)

12	Esquatzel silt loam
13	Kimberly fine sandy loam
13	Kimberly fine sandy loam
22	Kimberly fine sandy loam
78	Xeric Torriorthents, nearly level
13D	Gravden very gravelly loam, 5 to 20 percent slopes
13E	Gravden very gravelly loam, 20 to 40 percent slopes
18E	Hankins silt loam, 5 to 35 percent south slopes
24D	Olex silt loam, 12 to 20 percent slopes
28E	Lickskillet very stony loam, 7 to 40 percent slopes
32B	Ritzville silt loam, 2 to 7 percent slopes
32C	Ritzville silt loam, 7 to 12 percent slopes
32D	Ritzville silt loam, 12 to 20 percent slopes
34E	Ritzville silt loam, 20 to 40 percent south slopes
40B	Sagehill fine sandy loam, 2 to 5 percent slopes
45B	Ritzville silt loam, 2 to 7 percent slopes
45C	Ritzville silt loam 7 to 12 percent slopes
45D	Ritzville silt loam 12 to 20 percent slopes
46E	Ritzville silt loam, 20 to 40 percent north slopes
47E	Ritzville silt loam, 20 to 40 percent south slopes
55B	Warden silt loam, 2 to 5 percent slopes
55C	Warden silt loam, 5 to 12 percent slopes
55D	Warden silt loam, 12 to 20 percent slopes
55E	Warden silt loam, 20 to 40 percent slopes
70B	Warden very fine sandy loam, 2 to 5 percent slopes
70C	Warden very fine sandy loam 5 to 12 percent slopes
70D	Warden very fine sandy loam, 12 to 20 percent slopes
71B	Warden silt loam, 2 to 5 percent slopes
71C	Warden silt loam, 5 to 12 percent slopes
71D	Warden silt loam, 12 to 20 percent slopes
71E	Warden silt loam, 20 to 40 percent slopes
75B	Willis silt loam, 2 to 5 percent slopes
75D	Willis silt loam, 12 to 20 percent slopes
77F	Wrenthamrock outcrop complex, 35 to 70 percent slopes

EXHIBIT J

WETLANDS IMPACTS

Information based on literature and field study, as appropriate, about significant potential impacts of the proposed facility on wetlands that are within state jurisdiction under ORS Chapter 196, including:

(A) A determination, as defined in OAR 141-090-0020, of whether construction or operation of the proposed facility would affect any waters of the state, including wetlands, and, if so, a wetland delineation report, as defined in OAR 141-090-0020, describing how those waters would be affected;

(B) A wetland map, as defined in OAR 1141-090-0020, showing the location of any wetlands under state jurisdiction on or near the site and the source of the water for the wetlands, including any wetlands identified in the Statewide Wetland Inventory of the Division of State Lands;

(C) A description of each wetland identified in (A);

(D) A description of significant potential impact to each wetland, if any, including the nature and amount of material the applicant would remove from or place in each wetland and the specific locations where the applicant would remove or fill that material;

(E) Evidence that all required fill and removal permits of the Oregon Division of State Lands can be issued to the proposed facility in compliance with ORS 196.800 et seq., including:

(i) A discussion and evaluation of the factors listed in ORS 196.825 and OAR Chapter 141 Division 85; and

(ii) A description of the steps the applicant proposes to mitigate impacts to wetlands; and

(F) The applicant's proposed monitoring program, if any, for impacts to wetlands;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit J as follows:

> All paragraphs apply. This information should address all jurisdictional "waters of the state" and not just "wetlands" (OAR 141-085-0015).
>
> [Applicant] should include information in the application to support a finding whether a removal-fill permit is needed. [Applicant] should consult with the Department of State Lands and obtain its concurrence, which may require a formal delineation of wetlands and waters of the State within the site boundary. If a removal-fill permit is needed, the application must include an itemized demonstration of compliance with each applicable provision of ORS 196.825 and OAR 141-085-0029. If the permit is needed, the Council will make the issuing decision in consultation with the Department of State Lands.

Wetlands and Waters of the State

The site of the Shepherds Flat Wind Farm has a low probability of containing wetlands or jurisdictional waters of the state. Figure J-1 shows those wetlands recorded in the US Fish & Wildlife, Branch of Habitat Assessment, National Wetland Inventory.

The Department of State Lands has requested a wetlands and waters survey, which, in consultation with the Department of State Lands, is underway but not yet completed. The survey, when completed, will inform the need for and scope of federal and state permits.

Figure J-1

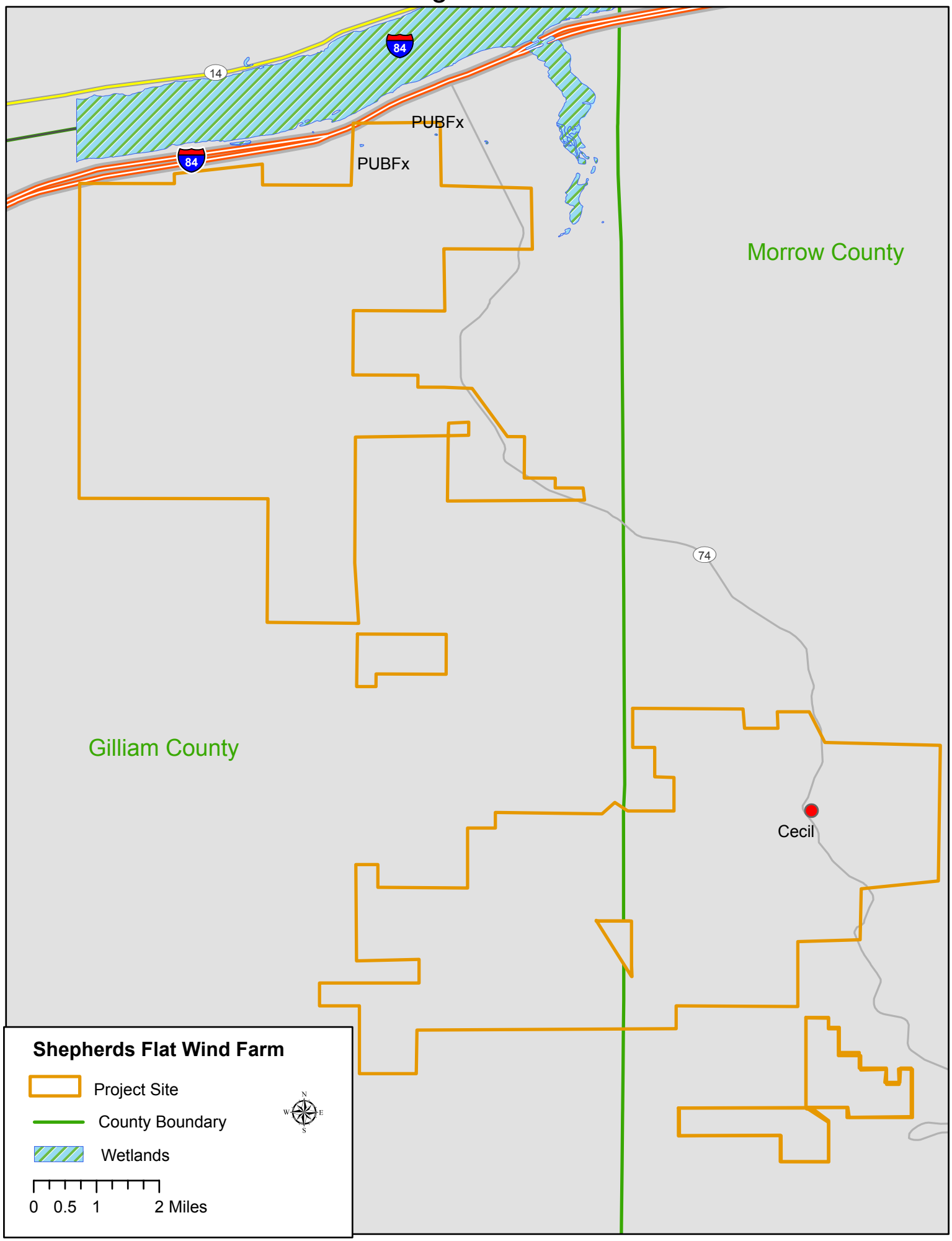

84
14
84
PUBFx
PUBFx
Morrow County
74
Gilliam County
Cecil
Shepherds Flat Wind Farm
Project Site
County Boundary
Wetlands
N
W
E
S
0 0.5 1 2 Miles

EXHIBIT K

LAND USE/STATEWIDE PLANNING GOALS

Information about the proposed facility's compliance with the statewide planning goals adopted by the Land Conservation and Development Commission, providing evidence to support a finding by the Council as required by OAR 345-022-0030. The applicant shall state whether the applicant elects to address the Council's land use standard by obtaining local land use approvals under ORS 469.504(1)(a) or by obtaining a Council determination under ORS 504(1)(b). An applicant may elect different processes for an energy facility and a related or supporting facility but may not otherwise combine the two processes. Notwithstanding OAR 345-021-0090(2), once the applicant has made an election, the applicant may not amend the application to make a different election. In this subsection, "affected local government" means a local government that has land use jurisdiction over any part of the proposed site of the facility. In the application, the applicant shall:

(A) Include a map showing the comprehensive plan designations and land use zones of the facility site, all areas that may be temporarily disturbed by any activity related to the design, construction and operation of the proposed facility and property adjacent to the site;

(B) If the applicant elects to obtain local land use approvals:

(i) Identify the affected local government(s) from which land use approvals will be sought;

(ii) Describe the land use approvals required in order to satisfy the Council's land use standard;

(iii) Describe the status of the applicant's application for each land use approval; and

(iv) Provide an estimate of time for issuance of local land use approvals;

(C) If the applicant elects to obtain a Council determination on land use:

(i) Identify the affected local government(s)

(ii) Identify the applicable substantive criteria from the affected local government's acknowledged comprehensive plan and land use regulations that are required by the statewide planning goals and that are in effect on the date the application is submitted and describe how the proposed facility complies with those criteria;

(iii) Identify all Land Conservation and Development Commission administrative rules, statewide planning goals and land use statutes directly applicable to the facility under ORS 197.646(3) and describe how the proposed facility complies with those rules, goals and statutes;

(iv) If the proposed facility might not comply with all applicable substantive criteria, identify the applicable statewide planning goals and describe how the proposed facility complies with those goals; and

(v) If the proposed facility might not comply with all applicable substantive criteria or applicable statewide planning goals, describe why an exception to any applicable statewide planning goal is justified, providing evidence to support all findings by the Council required under ORS 469.504(2); and

(D) If the proposed facility will be located on federal land:

(i) Identify the applicable land management plan adopted by the federal agency with jurisdiction over the federal land;

(ii) Explain any differences between state or local land use requirements and federal land management requirements;

(iii) Describe how the proposed facility complies with applicable federal land management plan;

(iv) Describe any federal land use approvals required for the proposed facility and the status of application for each required federal land use approval;

(v) Provide an estimate of time for issuance of federal land use approvals; and

(vi) If federal law or the land management plan conflicts with any applicable state or local land use requirements, explain the differences in the conflicting requirements, state whether the applicant requests Council waiver of the land use standard described under paragraph (B) or (C) of this subsection and explain the basis for a waiver;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit K as follows:

> Paragraphs A and C apply. Paragraph B does not apply. Paragraph D applies only if there is federal land within the site boundary as defined in OAR 345-001-0010(53). Include a discussion of whether the proposed facility would be compatible with farm use, would not seriously interfere with accepted farm practices and would not significantly increase the cost of accepted farm practices.
>
> [Applicant requests] a Council determination regarding land use in accordance with ORS 469.504(1)(b). Because parts of the proposed facility are located in Gilliam County and other parts are located in Morrow County, the Council must consider the applicable substantive criteria from both counties. Both counties have been appointed as Special Advisory Groups, as required under ORS 469.480. The applicable substantive criteria are those in effect on the date the application is submitted. ORS 460.504(1)(b)(A). In addition, the application must identify any Land Conservation and Development Commission administrative rules and goals and any land use statutes that are not implemented in the counties' comprehensive plans and are therefore directly applicable to the facility under ORS 197.646.
>
> [Applicant] should contact the Gilliam and Morrow County Planning Departments to discuss the requirements for conditional use permits. [Applicant] should include information necessary to demonstrate compliance with the substantive criteria from the Gilliam and Morrow County codes and comprehensive plans that are applicable to issuance of the permits. As provided in ORS 469.401(3), if the Council issues a site certificate, the Counties will be bound to issue the conditional use permits, subject only to the conditions set forth in the site certificate.

Land Use and Statewide Planning Goals

Caithness Shepherds Flat, LLC elects to address the Council's land use standard by obtaining a Council determination under ORS 504(1)(b).

No federal lands are within the site boundary.

Affected local governments are Gilliam County and Morrow County. Applicant is presently consulting with both counties and will amend this Exhibit K upon the completion of consultations.

EXHIBIT L

IMPACTS ON PROTECTED AREAS

Information about the proposed facility's impact on protected areas, providing evidence to support a finding by the Council as required by OAR 345-022-0040, including:

(A) A map showing the location of the proposed facility in relation to the protected areas listed in OAR 345-022-040 located within the analysis area;

(B) A description of significant potential impacts of the proposed facility, if any, on the protected areas including, but not limited to, potential impacts such as:

(i) Noise resulting from facility construction or operation;
(ii) Increased traffic resulting from facility construction or operation;
(iii) Water use during facility construction or operation;
(iv) Wastewater disposal resulting from facility construction or operation;
(v) Visual impacts of facility structures, including cooling tower or other plumes, if any; and
(vi) Visual impacts from air emissions resulting from facility construction nor operation, including, but not limited to, impacts on Class 1 visual resources as described in OAR 340-204-0050;

Impacts on Protected Areas

Please see Figure L-1 for a map showing the Shepherds Flat Wind Farm (SFWF) in relation to protected areas.

Protected areas within the twenty mile radius analysis, and their potential for impacts from the construction or operation of the Shepherds Flat Wind Farm, are shown in the following table:

	Potential for Impacts									
Protected Area	Construction Noise	Operating Noise	Construction Traffic	Operating Traffic	Construction Water	Operating Water	Construction Wastewater	Operating Wastewater	Visual Impact	Air emissions
1. John Day River & Wildlife Refuge	N	N	N	N	N	N	N	N	N	N
2. Willow Creek Wildlife Area	P	N	N	N	N	N	N	N	P	N
3. Umatilla National Wildlife Refuge	N	N	N	N	N	N	N	N	N	N
4. Umatilla Fish Hatchery	N	N	N	N	N	N	N	N	N	N

Protected Area	Potential for Impacts									
	Construction Noise	Operating Noise	Construction Traffic	Operating Traffic	Construction Water	Operating Water	Construction Wastewater	Operating Wastewater	Visual Impact	Air emissions
5. Horn Butte BLM ACEC	P	N	N	N	N	N	N	N	P	N
6. J.S. Burres State Park	N	N	N	N	N	N	N	N	N	N
7. John Day State Scenic Waterway	N	N	N	N	N	N	N	N	N	N
8. Irrigon Fish Hatchery	N	N	N	N	N	N	N	N	N	N
9. Oregon Trail Interpretive Center	P	N	N	N	N	N	N	N	P	N

N=None
P=Potential

Protected areas with a potential for impact are discussed below:

Willow Creek Wildlife Area

Potential impact to the Willow Creek Wildlife Area is limited to the potential for noise during construction and the visual impact of the completed facility. The potential for noise during construction is limited to any blasting that may be necessary for the excavation of turbine foundations in the northern project area. Exhibit P discusses the limits to be imposed on this activity. It is expected that some turbines will be visible from the Wildlife Area, as are existing tall high-voltage transmission towers. The potential visibility of these turbines is not expected to adversely impact resident or transient wildlife.

Horn Butte BLM ACEC

The Horn Butte Area of Critical Environmental Concern (ACEC) is adjacent to the Shepherds Flat Wind Farm. Potential impacts include construction noise and the visual impact of the completed facility.

The Horne Butte ACEC was established in 1989 as the Horne Butte Curlew Area of Critical Environmental Concern. The curlew, also found in the northern portion of the project site, is discussed in Exhibit P, which also proposes mitigation measures for any noise during construction.

The primary project access route, Rhea Road/Lane is located to the north of the ACEC. The visual impact of the SFWF is not expected to adversely effect the nesting curlews.

Oregon Trail Interpretive Center

A feature of Four Mile Canyon is its Oregon Trail Interpretive Center, a roadside kiosk offering views of unspoiled Oregon Trail wagon wheel ruts to the west. During construction, it is possible that the sounds of any blasting required for turbine foundations in the northern section of the project area may be heard. While such sounds may interrupt the contemplation of the hardships faced by Oregon's early settlers, these sounds will not be more obtrusive than the noise of agricultural equipment or passing traffic on Four Mile Canyon Road. And the construction of the northern project area is limited. The SFWP turbines are not expected to be visible from the kiosk due to the area's topography. To the extent that they are, they may be considered no more obtrusive than the kiosk itself, or other man-made structures in the vicinity (silos, windmills for water pumping, cattle guards, etc.).

Figure L-1

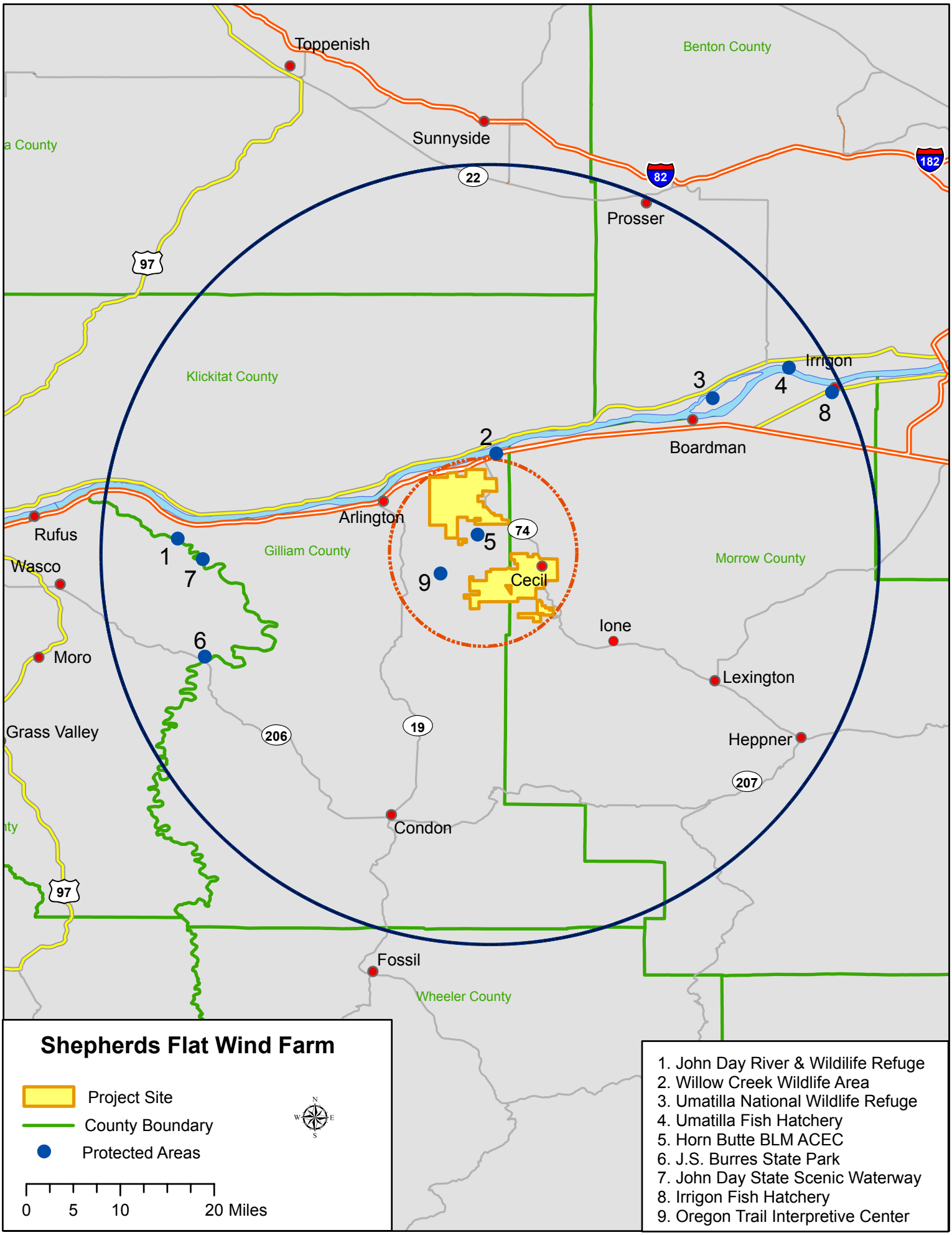

Toppenish
Benton County
Sunnyside
a County
22
82
182
Prosser
97
Klickitat County
Irrigon
3
4
8
2
Boardman
Arlington
Rufus
74
5
1
Gilliam County
Morrow County
Wasco
7
9
Cecil
Ione
6
Moro
Lexington
Grass Valley
206
19
Heppner
207
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Project Site
County Boundary
Protected Areas
0 5 10 20 Miles
1. John Day River & Wildilife Refuge
2. Willow Creek Wildlife Area
3. Umatilla National Wildlife Refuge
4. Umatilla Fish Hatchery
5. Horn Butte BLM ACEC
6. J.S. Burres State Park
7. John Day State Scenic Waterway
8. Irrigon Fish Hatchery
9. Oregon Trail Interpretive Center

EXHIBIT M

FINANCIAL CAPABILITY

Information about the applicant's financial capability, providing evidence to support a finding by the Council as required by OAR 345-022-050(2). Nothing in this subsection shall required the disclosure of information or records protected from public disclosure by any provision of state or federal law. The applicant shall include:

(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;

(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

(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;

Financial Capability

Counsel's opinion may be found on the following page.

Caithness Shepherds Flat, LLC's parent company's and affiliates' financial capability is demonstrated by credit ratings on the following debt:

- Caithness Coso Funding Corp. (240MW) $375,000,000 Senior Note
- Caithness Coso Funding Corp. (240MW) $90,000,000 Subordinate Note

Moody's credit rating increased from Baa3 to Baa2 on the Senior Note, and from Ba2 to Ba1 on the Subordinate Note on January 26, 2007. Fitch's current rating is BBB- on the Senior Note, and BB- on the Subordinate Note, both of which are on ratings watch positive for a potential upgrade.

- FPL Caithness Funding Corp. (160MW) $150,000,000

S&P rates the credit BBB, and the rating outlook is stable.

Caithness Shepherds Flat, LLC

c/o Caithness Corporation
565 Fifth Avenue, 29th floor
New York, New York 10017
Phone: (212) 921-9099
Fax: (212) 921-9239

January 29, 2007

Oregon Energy Facility Siting Council
625 Marion Street, N.E.
Salem, Oregon 97310

Re: Application of Caithness Shepherds Flat, LLC for Site Certificate

Dear Ladies and Gentleman:

I am an in house attorney for Caithness Shepherds Flat, LLC, a Delaware limited liability company (the "Applicant"), and have also acted as counsel to the Applicant.

In that connection, I have examined: (i) the Limited Liability Company Agreement of Applicant; (ii) the Delaware Certificate of Formation of Applicant; (iii) the Oregon Certificate of Registration of Applicant as a Foreign Limited Liability Company; and (iv) bond indenture provisions, if any (collectively, the "Constituent Documents").

In rendering this opinion expressed below, I have assumed (i) the authenticity of all documents submitted to me as originals and (ii) the conformity to original documents of all documents submitted to me as copies. As to factual matters, I have relied to the extent deemed proper, upon statements and certifications of officers and manager of the Applicant.

Based upon the foregoing, to the best of my knowledge, as of the date above I am of the opinion that, subject to the Applicant's 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 up to 750 megawatt (MW) name-plate capacity wind-powered electric generating project known as the Shepherds Flat Wind Farm located in Gilliam and Morrow Counties, Oregon (the "Project") that the Applicant proposes in its Application for Site Certificate to be filed with the Oregon Energy Facility Siting Council and in connection with which this opinion is rendered, without violating the Constituent Documents or similar agreements.

I am a member of the bar of the state of New York and New Jersey and do not hold myself out as an expert in, and do not express any opinion with respect to, the law of any jurisdiction other than the law of the states of New York and New Jersey.

The foregoing opinion is limited solely to whether the Applicant would place itself in violation of the Constituent Documents in undertaking construction and operation of the Project. I express no opinion as to the applicability of any federal, state or local laws (including all rules and regulations promulgated thereunder) to the construction and operation of the Project or as to the effects of the foregoing laws on such construction and operation or as to the Applicant's compliance or non-compliance with such laws. The foregoing opinion is intended to be relied upon solely by the Oregon Energy Facility Siting Council and the Oregon Department of Energy in their evaluation of the Application for Site Certificate for the Project and no third party is entitled to rely on this opinion.

Please contact me if you have any additional questions regarding this matter.

Very truly yours,

CAITHNESS SHEPHERDS FLAT, LLC

Michael Kowal
Legal Counsel

New York
William L. Hess
Managing Director
Corporate Finance Group
Moody's Investors Service
JOURNALISTS: 212-553-0376
SUBSCRIBERS: 212-553-1653

New York
A.J. Sabatelle
VP - Senior Credit Officer
Corporate Finance Group
Moody's Investors Service
JOURNALISTS: 212-553-0376
SUBSCRIBERS: 212-553-1653

Moody's upgrades Caithness Coso

Approximately $399 Million (Originally $465 Million) of Debt Securities Affected

New York, January 26, 2007 -- Moody's Investors Service upgraded Caithness Coso Funding Corp.'s (Caithness Coso). 5.489% senior secured bonds due 2019 to Baa2 from Baa3 and 6.263% subordinated secured notes due 2014 to Ba1 from Ba2. Caithness Coso's rating outlook remains stable.

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The upgrade reflects the project's relatively consistent operating and financial performance; strong debt service coverage ratios which are expected to be in excess of 2.0x for senior debt in each year and 1.50x for total debt in each year over the foreseeable future; the benefits to Caithness Coso's cash flows of receiving a higher fixed energy rate of 6.15 cents/kWh (escalated 1% per annum) beginning on May 1, 2007; the continued improvement in off-taker credit quality along with the more reliable regulatory environment that is evolving in California; and the announcement by Southern California Edison Company (SCE:A3 senior unsecured) that it had signed new 20 year contracts with the Coso partnerships. Upon the effectiveness of these new contracts, which still require state regulatory approval, the Coso partnerships' exposure to energy price risk will be largely mitigated.

Caithness Coso's ratings reflect the predictable cash flows generated from energy and capacity payments received under three power purchase agreements that currently expire at varying times though 2019 with SCE. The ratings incorporate the strong operating history of these plants, the experience of the operator, Coso Operating Company (COC), which has operated the plants since their inception in the 1980's and the

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experience of Caithness Energy, COC's parent, which obtained a controlling interest in these plants in 1999 and owns other geothermal plants.

The ratings further consider the importance of these geothermal assets to the California electric market, given the state's focus on renewable resources as a core component of their energy policy. The ratings further recognize the plants' very competitive operating cost profile relative to other generating resources within the region, as the Coso partnerships' variable costs of around 1.4 cents/kWh are below all fossil-fuel options in the western US, including base load coal.

The rating outlook is stable and incorporates an expectation of continued strong operating and financial performance due to COC's history of being able to effectively manage this geothermal resource, the existence of a predictable contracted cash flow over the intermediate term, and the prospects for the continuation of contracted cash flow over the life of the securities given the long-term contracts recently signed with SCE.

Upgrades:

..Issuer: Caithness Coso Funding Corp.

....Subordinate Regular Bond/Debenture, Upgraded to Ba1 from Ba2

....Senior Secured Regular Bond/Debenture, Upgraded to Baa2 from Baa3

Caithness Coso is a special purpose corporation owned entirely by the three Coso partnerships -- Coso Finance Partners (Navy I Partnership), Coso Energy Developers (BLM Partnership), and Coso Power Developers (Navy II Partnership) (Collectively "the Coso partnerships"). Each of the Coso partnerships guarantee, jointly and severally, on a senior secured basis, repayment of the senior secured bonds, and guarantee, jointly and severally, on a subordinated secured basis, repayment of the subordinated secured notes.

The Coso projects consist of three 80 megawatt (MW) geothermal power plants as well as their transmission lines, wells, gathering system and related facilities. The Coso projects are located near one another in the Mojave Desert approximately 150 miles northeast of Los Angeles, California, and have been generating electricity since the late 1980s.

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Caithness Energy L.L.C., through its affiliates, owns about 70% of the Coso partnerships. Caithness Energy is privately held and majority owned by Caithness Equities, which is headquartered in New York City.

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appropriateness of the opinion having regard to your own objectives, financial situation and needs.

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EXHIBIT N

NON-GENERATING FACILITY

If the proposed facility is a non-generating facility for which the applicant must demonstrate need under OAR 345-023-0005, information about the need for the facility, providing evidence to support a finding by the Council as required by OAR 345-023-0005, including:

(A) Identification of the rule in Division 23 of this chapter under which the applicant chooses to demonstrate need;

(B) If the applicant chooses to demonstrate need for the proposed facility under OAR 345-023-0020(1), the least-cost plan rule:

(i) Identification of the energy resource plan or combination of plans on which the applicant relies to demonstrate need;

(ii) The name, address, and telephone number of the person responsible for preparing each energy resource plan identified in subparagraph (i);

(iii) For each plan reviewed by a regulator agency, the agency's findings and final decision, including:

(I) For a plan reviewed by the Oregon Public Utility Commission, the acknowledgement order; or

(II) For a plan reviewed by any other regulatory agency, a summary of the public process including evidence to support a finding by the Council that the agency's decision process included a full, fair and open public participation and comment process as required by OAR 345-023-0020(1)(L), and the location of and means by which the Office of Energy can obtain a complete copy of the public record;

(iv) Identification of the sections(s) of the short-term action plan(s) that call(s) for the acquisition of the proposed facility or a facility substantially similar to the proposed facility; and

(v) The attributes of the proposed facility that qualify it as one called for in the short-term action plan of the energy resource plan or combination of plans identified in subparagraph (i) or a demonstration that a facility substantially similar to the proposed facility is called for in the plan(s);

(C) In addition to the information described in paragraph (B), if the applicant chooses to demonstrate need for the proposed facility under OAR 345-023-0020(1), the least-cost plan rule, and relies on an energy resource plan not acknowledged by the Public Utility Commission of Oregon:

(i) The names, addresses and telephone numbers of members of any public advisory groups that participated in the preparation and review of each plan identified in paragraph (B);

(ii) A discussion of how the plan or combination of plans conforms to the standards in OAR 345-023-0020(1)(a) through (L) including citations to relevant portions of the plan documents or other supporting evidence; and

(iii) The expected annual emissions in tons of nitrogen oxides, PM-10 particulate, sulfur dioxide, carbon dioxide and mercury and a discussion of other environmental impacts, as compared to resources in the applicable energy resources plan;

(D) In addition to the information described in paragraphs (B) and (C), if the applicant chooses to demonstrate need for a proposed natural gas pipeline or storage facility for liquefied natural gas under OAR 345-023-0020(1), the least-cost plan rule, and relies on an energy resource plan not acknowledged by the Public Utility Commission of Oregon, the applicant shall include the information described in paragraph (G) of this subsection if the energy resource plan or combination of plans does not contain that information, If the energy resource plan or combination of plans contains the information described in paragraph (G), the applicant shall provide a list of citations to the sections of the energy resource plan(s) that contain the information;

(E) In addition to the information described in paragraphs (B) and (C), if the applicant chooses to demonstrate need for a proposed electric transmission line under OAR 345-023-0020(1), the least-cost plan rule and relies on an energy resource plan not acknowledged by the Public Utility Commission of Oregon, the applicant shall include the information described in paragraph (F) of this subsection if the energy resource plan or combination of plans does not contain that information. If the energy resource plan or combination of plans contains the information described in paragraph (F), the applicant shall provide a list of citations to the sections of the energy resource plan(s) that contain the information;

(F) If the applicant chooses to demonstrate need for a proposed electric transmission line under OAR 345-023-0030, the system reliability rule:

(i) Load-resource balance tables for the area to be served by the proposed facility. In the tables, the applicant shall include firm capacity demands and existing and committed firm resources for each of the years from the date of submission of the application to at least five years after the expected in-service date of the facility.

(ii) Within the tables described in subparagraph (i), a forecast of firm capacity demands for electricity and firm annual electricity sales for the area to be served by the proposed facility. The applicant shall separate firm capacity demands and firm annual electricity sales into loads of retail customers, system losses, reserve margins and each wholesale contract for firm sale. In the forecast, applicant shall include a discussion of how the forecast incorporates reductions in firm capacity demand and firm annual electricity sales resulting from:

(I) Existing federal, state, or local building codes, and equipment standards and conservation programs required by law for the area to be served by the proposed facility;

(II) Conservation programs provided by the energy supplier;

(III) Conservation that results from responses to price; and

(IV) Retail customer fuel choice;

(iii) Within the tables described in subparagraph (i), a forecast of existing and committed firm resources used to meet the demands described in subparagraph (ii). The applicant shall included, as existing and committed firm resources, existing generation and transmission

facilities, firm contract resources and committed new resources minus expected resource retirements or displacement. In the forecast, the applicant shall list each resource separately;

(iv) A discussion of the reasons each resource is being retired or displaced if the forecast described in subparagraph (iii) includes expected retirements or displacements;

(v) A discussion of the annual capacity factors assumed for any generating facilities listed in the forecast described in subparagraph (iii);

(vi) A discussion of the reliability criteria the applicant uses to demonstrate the proposed facility is needed, considering the load carrying capability of existing transmission system facilities supporting the area to be served by the proposed facility; and

(vii) A discussion of reasons why the proposed facility is economically reasonable compared to the alternatives described below. In the discussion, the applicant shall include a table showing the amounts of firm capacity and firm annual electricity available from the proposed facility and each alternative and the estimated direct cost of the proposed facility and each alternative. The applicant shall include documentation of assumptions and calculations supporting the table. The applicant shall evaluate alternatives to construction and operation of the proposed facility that include, but are not limited to:

(I) Implementation of cost-effective conservation, peak load management, and voluntary customer interruption as a substitute for the proposed facility;

(II) Construction and operation of electric generating facilities as a substitute for the proposed facility;

(III) Direct use of natural gas, solar or geothermal resources at retail loads as a substitute for use of electricity transmitted by the proposed facility; and

(IV) Adding standard sized smaller or larger transmission line capacity;

(vii) The earliest and latest expected in-service dates of the facility and a discussion of the circumstances of the energy supplier that determine these dates; and

(G) If the applicant chooses to demonstrate need for a proposed natural gas pipeline or a proposed facility for storing liquefied natural gas under OAR 345-023-0040, the economically reasonable rule:

(i) Load-resource balance tables for the area to be served by the proposed facility. In the tables, the applicant shall include firm demands and resource availability for each of the years from the date of submission of the application to at least five years after the expected in-service date of the proposed facility. In the tables, the applicant shall list flowing supply and storage supply separately;

(ii) Within the table s described in subparagraph (i), a forecast of firm capacity demands for the area to be served by the proposed facility. The applicant shall separate firm capacity demands into firm demands of retail customers, system losses and each wholesale contract for firm sale. The applicant shall accompany the tables with load duration curves of firm capacity and interruptible demands for the most recent historical year, the year the facility is expected to be placed in service and the fifth year after the expected in-service date. In the forecast of firm capacity demands, the applicant shall include a discussion of how the forecast incorporated reductions in firm capacity demand resulting from:

(I) Existing federal, state, or local building codes and equipment standards and conservation programs required by law for the area to be served by the proposed facility;

(II) Conservation programs provided by the energy supplier;

(III) Conservation that results from responses to price; and

(IV) Retail customer fuel choice;

(iii) Within the tables described in subparagraph (i), a forecast of existing and committed firm resources used to meet the demands described in subparagraph (ii). The applicant shall include, as existing and committed firm capacity resources, existing pipelines, storage facilities, and scheduled and budgeted new facilities minus expected resource retirements or displacement. In the forecast, the applicant shall list each committed resource separately;

(iv) A discussion of the reasons each resource is being retired or displaced if the forecast described in subparagraph (iii) includes expected retirements or displacements;

(v) A discussion of the capacity factors assumed for any storage facilities listed in the forecast described in subparagraph (iii);

(vi) A discussion of the reliability criteria the applicant uses to demonstrate the proposed facility is needed, considering the capacity of existing gas system facilities supporting the area to be served by the proposed facility;

(vii) A discussion of reasons why the proposed facility is economically reasonable compared to the alternatives described in subparagraphs (viii) or (ix). In the discussion, the applicant shall include a table showing the amounts of firm capacity available from the proposed facility and each alternative and the estimated direct cost of the proposed facility and each alternative. The applicant shall include documentation of assumptions and calculations supporting the table;

(viii) In an application for a proposed natural gas pipeline, an evaluation of alternatives to construction and operation of the proposed facility including, but not limited to:

(I) Implementation of cost-effective conservation, peak load management, and voluntary customer interruption as a substitute for the proposed facility;

(II) Installation of propane storage systems, facilities to store liquefied natural gas and underground gas storage reservoirs as a substitute for the proposed facility;

(III) Direct use of electricity, solar or geothermal resources at retail loads as a substitute for use of natural gas supplied by the proposed facility; and

(IV) Adding standard sized smaller or larger pipeline capacity.

(ix) In an application for a proposed liquefied natural gas storage facility, an evaluation of alternatives to construction and operation of the proposed facility including, but not limited to:

(I) Implementation of cost-effective conservation, peak load management, and voluntary customer interruption as a substitute for the proposed facility;

(II) Installation of propane storage systems, natural gas pipelines and underground gas storage facilities as a substitute for the proposed facility;

(III) Direct use of electricity, solar or geothermal resources at retail loads as a substitute for use of natural gas supplied by the proposed facility; and

(IV) Adding smaller or larger liquefied natural gas storage capacity; and

(x) The earliest and latest expected in-service date of the facility and a discussion of the circumstances of the energy supplier that determine these dates;

Does not apply.

EXHIBIT O

WATER REQUIREMENTS

Information about the water requirements the applicant anticipates for construction and operation of the proposed facility. If the applicant has submitted any permit applications to the Office, as described in OAR 345-021-0000(4), that contain this information, the applicant may copy relevant sections of those documents into this exhibit or include in this exhibit cross-references to the relevant sections of those documents. The applicant shall include:

(A) A description of each source of water and the applicant's estimate of the amount of water the facility will need from each source under annual average and worst-case conditions;

(B) If a new water right is required, the approximate location of the points of diversion with the estimated quantity of water to be taken at each point;

(C) A description of how the water is to be used;

(D) A description of each avenue of water loss or output from the facility site, 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, including storm water;

(E) For operation, a water balance diagram, including the source of cooling water and the estimated consumptive use of cooling water, based on annual average conditions;

(F) If the facility does not require a groundwater permit, a surface water permit, or a water rights transfer, an explanation why no such permit or transfer is required for the construction and operation of the proposed facility;

(G)) Evidence to support Council findings that the Water Resources Department should issue a groundwater or a surface water permit under ORS Chapter 537 or should approve a transfer of a water use under ORS Chapter 540, including a discussion and evaluation of all relevant factors, including those listed in ORS 537.153(2) and (3), ORS 537.170(8) and OAR Chapter 690, Divisions 15 and 310;

(H) A discussion of any steps proposed by the applicant to reduce consumptive water use; and

(I) A discussion of any mitigation steps proposed by the applicant to address the impact of the applicant's water use on affected resources;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit O as follows:

> All paragraphs apply except (E) and, if no groundwater or surface water permit or transfer of a water use is needed, (G).

> [Applicant] should include information in the application to support a finding on whether a water right is or is not required. The application must identify the sources of water to be used by the facility, the water right under which the water would be provided, the quantity of water needed and the means of disposal of all water discharges from the facility. If a water right is required, the application must include information to support a finding for issuance of a groundwater or surface water permit under ORS Chapter 537 or transfer of a water use under ORS Chapter 540, including a discussion and evaluation of all relevant factors, including those factors listed in ORS 537.153(2) and (3), ORS 537.170(8) and OAR Chapter 690, Divisions 15 and 310. If a permit or transfer is needed, the Council will make the issuing decision in consultation with the Water Resources Department.

Water Requirements

Facility water requirements are limited to the construction period.

During construction, approximately 15 million gallons of water will be required for road construction, concrete, and dust suppression. Water will be delivered to the site by tanker.

Should applicant secure its concrete supplies from an of-site contractor, the water usage estimate will decrease. An analysis of this alternative is underway, and its conclusions will inform any required application for a transfer of water rights.

EXHIBIT P

FISH AND WILDLIFE HABITATS AND SPECIES

Information about the fish and wildlife habitats and the fish and wildlife species, other than the species addressed in subsection (q) that may be affected by the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0060. The applicant shall include:

(A) Identification and description of all habitat within the analysis area, classified by the habitat categories as set forth in OAR 635-415-0030;

(B) 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;

(C) A map showing the locations of the habitat identified in (A);

(D) A description of the nature, extent and duration of significant potential impacts on the habitat identified in (A) that may result from construction, operation and retirement of the proposed facility;

(E) A description of any measures the applicant proposes to avoid, reduce or mitigate potential adverse impacts;

(F) Evidence that the proposed facility, including any proposed mitigation, complies with the fish and wildlife habitat mitigation goals and standards in OAR 635-415-0030; and

(G) The applicant's proposed monitoring program, if any, for impacts to such fish and wildlife species and their habitats;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit P as follows:

> All paragraphs apply. The references in (A) and (G) are incorrect; the correct reference is OAR 635-415-0025. Identify all areas that may be Category 1 habitat due to the use of the area by Washington ground squirrels. [Applicant] should consult with ODFW on the proper classification of these areas as Category 1 or 2.
>
> The Oregon Department of Fish and Wildlife (ODFW) provides technical review and recommendations on compliance with Council standards. ODFW will base its review and recommendations on state wildlife policy (ORS 496.012).
>
> OAR Chapter 635, Division 415, classifies habitat into six categories and establishes a mitigation goal for each category. [Applicant] must identify the appropriate habitat category for all areas affected by the proposed facility and provide the basis for each category designation. [Applicant] must show how it would comply with the habitat mitigation goals and standards by appropriate monitoring and mitigation.

Response to Public Concerns

The Oregon Department of Energy received several public comment letters raising concerns about the potential impacts of the facility on wildlife, particularly avian species. The comments addressed:

- the need for baseline surveys of wildlife use of the area within the site boundary
- consideration of regional cumulative impacts of wind facilities
- micrositing of turbine placement to reduce avian impacts
- reducing the impact on higher value wildlife habitat
- the need for monitoring of bird and bat fatalities during facility operation
- mitigation of electrocution risks
- the need for a plan to reduce fire risk and respond to fires that occur

Response to Agency Concerns

The Oregon Department of Energy received a comment letter from the U. S. Fish and Wildlife Service recommending:

- a cumulative analysis of impacts to birds and bats
- inclusion of a monitoring program addressing long-term fatalities to birds and bats
- inclusion of an agreement to ensure that proposed mitigation measures are complied with, monitored, and effective
- bat surveys to develop a regional perspective on risk to bats, migratory patterns, their movement through the area, and their response to turbines
- marking of guy wires
- co-location of buried transmission, electric and communication lines with roads
- down-shielding of security lighting
- construction activity occur outside of migratory bird breeding seasons
- siting of turbines close to existing roads
- reduction of risk to raptors from electrocution hazards
- monitoring of the condition and proper installation of power line bird protection devices
- monitoring of raptor electrocutions and wire strikes
- the use of comparable fatality monitoring metrics
- documentation of the project decommissioning process
- establishment of a fire plan, and addressing fire control, abatement and effects

The Oregon Department of Energy received a comment letter from the Oregon Department of Fish and Wildlife (ODFW) recommending:

- inclusion of maps that show vegetation classifications and habitat categories, active and inactive raptor nests and sensitive species sightings
- assistance of ODFW in turbine micrositing
- pre-construction studies of avian and wildlife use of the project area

- surveys for Washington ground squirrel habitat within 1,000 feet of ground-disturbing activities
- raptor nest surveys within a 2-mile radius of the project area
- construction activity limitations within 0.5 miles of active raptor nests during nesting season
- ODFW and Oregon Department of Energy review of and comment on the draft mitigation and monitoring plans
- permission for ODFW to conduct wildlife surveys in the project area
- consideration of habitat mitigation through easements on or acquisition of property containing habitats similar to those altered or degraded by the project, and inclusion of provisions for success monitoring, land management activities, habitat improvement, wildlife surveys or research activities

Habitat and Habitat Classification

The project boundaries contain two areas with very different characteristics and use, primarily a consequence of soil depth. The north area of the project is situated south of the Columbia River, and some sections within the project boundaries contain portions of the bluffs along the river. The upland area is characterized by shallow soils, and used primarily for grazing of sheep. Sheep are typically present on the site from November until they are transported to lambing pens in mid January, and they are returned to the site two months later. Low rainfall levels in the area result in limitations in forage by late spring, and sheep are transported to off-site pastures in May for continued grazing. The area is crossed by a large number of unimproved roads and off-road vehicle tracks as well as several electrical transmission line corridors. Some portions are highly disturbed from congregation of sheep around watering and transport sites. Areas of bare sand, exposed rock, and soil left bare due to wildfires are also frequently encountered. Cheatgrass (bromus tectorum, an alien species) is found throughout the area and is usually the predominant grass species, but the native species Sandberg's bluegrass (poa secunda), needle and thread grass (hesperostipa comata), bluebunch wheatgrass (pseudoroegneria spicata) and six-weeks fescue (vulpia octoflora) also occur in many locations. Within the project boundaries in the north area also lie portions of Willow Creek and Eightmile Canyons (Figure P-1). In most years, Willow Creek contains water year-round, and the canyon contains some riparian vegetation as well as flat land in irrigated agriculture. Eightmile Canyon has an ephemeral stream, is not cultivated, and contains a diverse blend of native riparian and dryland plant species, as well as the ubiquitous cheatgrass. Although residences within the north area project boundaries are few, many outbuildings, structures and facilities are present that are related to the tending and housing of sheep, sheepdogs and sheepherders.

Land in the south area of the project contains deeper soils and is largely devoted to the cultivation of dryland wheat. Small portions of the south property are in the Conservation Reserves Program (CRP), and some slopes that are too steep to cultivate contain stands of big sagebrush (artemisia tridentata) in good condition. Both Willow Creek and Fourmile Canyons pass through the south area. Fourmile Canyon (an offshoot of Eightmile Canyon) also has an ephemeral stream, and a diversity of plant species are present. More residences, shops and farm equipment storage areas are present within the project boundaries in the south area than are in the north.

Habitat Category 1

According to OAR 635-415-0025, this is irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population or unique assemblage.

Habit within the project boundaries Applicant considers to be Category 1:

- Vernal pools, wetlands and riparian habitat types, regardless of their current use by wildlife or plant species.
- Structures in use for raptor nesting, such as cliffs, trees, barns and power poles.
- Areas with Washington ground squirrel burrowing activity.
- Estimation of acreage pending wetland survey results.

Habitat Category 2

According to OAR 635-415-0025, this is essential habitat for a fish or wildlife species, population, or unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population or unique assemblage.

Habit within the project boundaries Applicant considers to be Category 2:

- Natural structures suitable for raptor nesting but unoccupied, including the bluffs above the Columbia River and rock faces in Willow Creek, Eightmile and Fourmile Canyons.
- A buffer of 1000 feet from active Washington ground squirrel burrows.
- The portion of the floors of Eightmile, Fourmile and Willow Creek Canyons that are not Category 1 (riparian areas, in-use nesting structures), Category 5 (cultivated fields) or Category 6 (roads and buildings).
- Approximately 3200 acres.

Habitat Category 3

According to OAR 635-415-0025, this is essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited on either a physiographic province or site-specific basis, depending on the individual species or population.

Habit within the project boundaries Applicant considers to be Category 3:

- Areas of shrub-steppe with substantial sage stands.
- Grasslands with a high proportion of cover provided by native species and evidence of low to moderate grazing pressure.
- A band across the northernmost project area used by large numbers of long-billed curlews, extending from the north project boundaries south for a distance of approximately 2½ miles from the bluffs above the Columbia River, excluding sheep transport, feed and watering stations, roads and structures (Category 6), wetlands or other aquatic resources (Category 1) and expanses of exposed rock (Category 4). Sandberg's

bluegrass, rather than cheatgrass, is predominant; the area also contains some needle and thread grass and six-weeks fescue.
- Approximately 8000 acres.

Habitat Category 4

According to OAR 635-415-0025, this is important habitat for fish and wildlife species.

Habit within the project boundaries Applicant considers to be Category 4:
- Weedy grasslands, some containing scattered rabbitbrush, bitterbrush, sage, juniper, or an occasional tree. CRP lands and previously cultivated areas generally fall into this category, as well as areas with higher grazing pressure.
- Exposed rock and bare sand.
- Approximately 9500 acres.

Habitat Category 5

According to OAR 635-415-0025, this is habitat for fish and wildlife having a high potential to become either essential or important habitat.

Habit within the project boundaries Applicant considers to be Category 5:
- Dryland wheat.
- Fields in irrigated agriculture.
- The verges of agricultural fields and roadways that show low plant species diversity or poor plant condition due to impacts from herbicide applications.
- Approximately 10900 acres.

Habitat Category 6

According to OAR 635-415-0025, this habitat has a low potential to become essential or important habitat for fish and wildlife.

Habit within the project boundaries Applicant considers to be Category 6:
- Roadways and parking areas for equipment and vehicles.
- Farmyards, residences and outbuildings, along with their associated areas of disturbance, excluding structures used for raptor nesting (Category 1).
- Quarries.
- Feeding stations, feedlots and animal holding pens, excluding those close to or containing Washington ground squirrel activity (Categories 1 and 2).
- Approximately 300 acres.

Biological and Botanical Surveys

Special Status Species Review

Correspondence from the U.S. Fish and Wildlife Service (USF&WS) (Attachments Q-1 and Q-2), databases and reports from the USF&WS Threatened and Endangered Species System,[1] the USF&WS Oregon Fish and Wildlife Office,[2] the Oregon Department of Fish and Wildlife (ODFW),[3] the Oregon Department of Agriculture Plant Division,[4] and the Oregon Natural Heritage Information Center[5] were surveyed to determine the species listed or considered as special status species within the project boundaries. These determinations were updated for the project site in January 2007. The criteria for species selection were: species listed as threatened or endangered at the federal or state level and species proposed for or candidates for listing as threatened or endangered at the federal or state level, and those listed as species of concern at the federal or state level; and species with historical or current records as having occurred in either Morrow or Gilliam County within the Columbia Basin ecoregion.[6, 7, 8] Where the species is a listed, proposed or candidate species or a species of concern in an ecoregion other than the Columbia Basin, it was not included. Anadromous fish, traveling the Columbia River to the north of the project, were not considered in this exhibit as they do not occur within the project boundaries; they are addressed in Exhibit Q.

Wildlife Surveys

Avian and mammalian surveys on the project site commenced September 2002 and ended in October 2004. The initial surveys, from September 2002 to mid-November 2002, were performed by Northwest Wildlife Consultants, Inc., Pendleton, Oregon. The remaining surveys were performed by two wildlife biologists, Rick Welch and Lana Schleder, from Energy Northwest Environmental Services, Richland, Washington. Their qualifications for the work include participation in evaluation of botanical, avian, mammalian and aquatic resources for during siting of the uncompleted nuclear power plant at Satsop, Oregon, and the three nuclear plants proposed to be built north of Richland, Washington. One of these, the Columbia Generating Station, was completed, and the two still perform assessments of environmental impacts from operation of the facility.

Avian surveys included: point counts for avian use, with fixed-point circular plots, a survey duration of 20 minutes, and a viewing radius of approximately 800 meters; examination of suitable habitat and structures for raptor nests; and a breeding bird survey primarily of passerine species. Point count survey plots were located throughout the project area. Several plots were

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[1] http://ecos.fws.gov/tess_public/StartTESS.do
[2] http://www.fws.gov/oregonfwo/Species/EndSpeciesMainPage.asp
[3] http://www.dfw.state.or.us/wildlife/diversity/index.asp
[4] http://www.oregon.gov/ODA/PLANT/CONSERVATION/statelist.shtml
[5] http://oregonstate.edu/ornhic/data.html
[6] Oregon Natural Heritage Program (2001). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon.
[7] Oregon Natural Heritage Program (2004). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon.
[8] NatureServe (2006). NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia: http://www.natureserve.org/explorer

sited outside of or at the edge of the project boundaries in the upland areas of the site and one plot was located in Willow Creek Canyon; these provided an assessment of avian use adjacent to as well as within the project boundaries (Figure P-2). Twenty-seven point count plots were surveyed for a full year, and were surveyed only during the fall of 2004. Analysis of avian use studies indicates that surveys of one season duration, particularly during the spring or fall, are sufficient to assess year-round avian use in areas where substantial seasonal use data are available, as is the case for the project site.[9] While traveling to and from the project area from Richland, and while in transit between survey locations, any observations of special status bird species were recorded. The project site and a buffer of approximately 2 miles beyond the boundaries were searched for raptor nests or nesting activity in spring of 2003 and 2004. In May and June 2003, surveys for breeding birds were performed in Eightmile Canyon, an area with significantly higher habitat resources than the upland portion of the project site. Eightmile Canyon includes riparian vegetation as well as sagebrush and juniper tree stands larger than are seen on the balance of the project area.

Any sightings of special status mammals at avian point count plots were also recorded, as were incidental mammal observations while in transit to and from the project site and between survey plots. On March – June 2003 and March – May 2004, suitable habitat on the project site was surveyed for Washington ground squirrel or western burrowing owl activity.

Observations from all surveys and survey locations were use to compose a list of individual bird species observed on and around the project site. Point count data from all survey sites except for the one in Willow Creek Canyon were used to determine the number of observations of each species per survey, mean use (mean number of the species observed per survey), the number of surveys in which a member of each species was observed, and the percent of surveys in which a member of the species was observed. These were tabulated for the entire project area and separately for the north and south portions of the project area. Summaries for each bird group (passerines, raptors, waterbirds, waterfowl, upland gamebirds and doves) were prepared showing mean use, composition (the mean use of the group divided by the total mean use of all groups) and the percent of surveys in which a member of a group was observed. These summaries were prepared for the total project area, and separately for the north and south portions of the project area. These summaries included results by season and by all seasons combined (Attachments P-1 – P-3).

The Willow Creek site was not included in the analysis of avian use of the project site. A riparian area with considerably different habitat characteristics, avian use of the Willow Creek site is not representative of the project area, no construction disturbance corridors are located in Willow Creek Canyon, and birds there are unlikely to be at risk from project activities. Upland point count sites were capable of detecting birds from Willow Creek using the area of the project in which construction will occur.

[9] Erickson W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay and K. Sernka (2002). Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wild Developments. WEST, Inc., Cheyenne, Wyoming.

Botanical Surveys

In November and December 2002, Dr. Steven Link of Environmental Solutions, Richland, Washington, and a team from Energy Northwest Environmental Services performed an assessment of the vegetative characteristics of the north area of the project site. Dr. Link is an acknowledged expert in inland Pacific Northwest native and invasive plant species, and is a faculty member of Washington State University. Nine survey locations were selected (Figure P-3), representative of the general area in which they occurred.

Within a 100-meter radius of each survey location, all plants present within an area of 0.1 meter^2 were identified to the species level at 21 sites. A species inventory was also developed around each survey location in a circular area with a radius of approximately 200 meters. Plant cover was estimated by identifying the tallest entity appearing at 1 meter intervals along a 100-meter transect from the survey location.

All native and alien plant species observed were tabulated. For each survey location, the presence or absence of each species, the species richness (total number of different species present), percent of species present that were native, and the average observation frequency of native and alien plants were determined. Species cover of each location was calculated for native and alien species, and the proportion of each site that could be considered to represent good or poor condition determined (Attachment P-4).

Determination of Habitat Types

Habitat types within the project boundaries were assessed by reviewing the results of the vegetative characteristics study in conjunction with review of aerial photographs of the project site. In 2003, color photographs were taken with a 6 inch focal length, 9 inch format mapping camera. There were a total of 6 flight lines, resulting in 38 exposures at a scale of 1 inch = 1,650 feet. These photographs were used to determine boundaries of habitat types. Habitat types were evaluated in consultation with Rick Welch and Lana Schleder of Energy Northwest Environmental Services, who participated in the review of the aerial photography. They became intimately familiar with the project area during two years of surveys on and around the site. The location and frequency of observation of sensitive and listed species were also reviewed. The Umatilla and Willow Creek Assessment[10] was consulted, to evaluate habitat occurring on the project site that was considered critical or essential to selected species in that assessment. Where habitat category selection within the ODFW standards (OAR 635-415-0025) was uncertain, the highest category reasonably expected to apply was assigned.

Results of Surveys

Special Status Species

Of the 13 federal or state listed, candidate or proposed species historically occurring in the Columbia Basin ecoregion of Gilliam and Morrow Counties (Table P-1), only the American

[10] Kagan J.S., R. Morgan and K. Blakeley (September 2000). Umatilla and Willow Creek Basin Assessment for Shrub Steppe, Grasslands, and Riparian Wildlife Habitats. EPA Regional Geographic Initiative.

peregrine falcon, bald eagle, golden eagle and Washington ground squirrel are likely to be observed within the project boundaries. During surveys of the project area, only the bald eagle was observed, and only one individual.

The nearest known occurrences of sessile mousetail are within five miles, to the west of the project site near the regional landfill. The southernmost edge of the greater sage-grouse range in Washington State lies approximately five miles from the northern project boundary, across the Columbia River in Klickitat County. The nearest known occurrences of Laurence's milkvetch are approximately 20 miles to the southeast of the project site, near the town of Heppner. The closest sightings of the Canada lynx are in the Blue Mountains, further to the southeast. The remaining plant species have no known current occurrences in either Gilliam or Morrow County, and the remaining mammals are not currently known to occur in Oregon. These species are addressed individually in Exhibit Q.

Table P-1: Listed, Candidate and Proposed Species Occurring in the Project Area

Scientific Name	Common Name	Federal Status[1]	State Status
Plants			
Camissonia pygmaea	Dwarf evening-primrose	SoC	Candidate
Mimulus evanescens	Disappearing monkeyflower	SoC	Candidate
Mimulus jungermannioides	Hepatic monkeyflower	None	Candidate
Myosurus sessilis	Sessile mousetail	SoC	Candidate
Astragalus collinus var. laurentii	Laurence's milk-vetch	SoC	Threatened
Birds			
Falco peregrinus anatum	American peregrine falcon	None	Endangered
Haliaeetus leucocephalus	Bald eagle	Threatened	Threatened
Centrocercus urophasianus	Greater sage-grouse	Candidate	SV
Mammals			
Canis lupus	Gray wolf	Threatened	Endangered
Spermophilus washingtoni	Washington ground squirrel	Candidate	Endangered
Lynx Canadensis	Canada lynx	Threatened	None
Ursus arctos horribilis	Grizzly bear	Threatened	None

1. **SoC:** Species of Concern
   SV: Species of Concern, Vulnerable

For federal or state protected species or species of concern, there are two invertebrate species, two vascular plant species, three amphibian species, four reptile species, twenty bird species and nine mammal species historically or currently known in the Columbia Basin ecoregion of Gilliam or Morrow County, or whose distribution in Oregon is unknown (Table P-2). Surveys were not performed to evaluate the occurrence of invertebrate, amphibian or reptile species in the project area.

Table P-2: Species of Concern Occurring in the Project Area, or whose Distribution is Unknown

Scientific Name	Common Name	Species of Concern		Oregon Category[1]
		Federal	State	
Invertebrates				
Gomphus lynnae	Lynn's clubtail dragonfly	X		
Lepidostoma goedeni	Goedon's lepidostoman caddisfly	X		
Vascular plants				
Allium robinsonii	Robinson's onion	X		
Myosurus minimus apus	Little mousetail	X		
Amphibians				
Rana pipiens	Northern leopard frog		X	Critical
Bufo woodhousii	Woodhouse's toad		X	Peripheral
Bufo boreas	Western toad		X	Vulnerable
Reptiles				
Chrysemys picta	Painted turtle		X	Critical
Crotalus viridis	Western rattlesnake		X	Vulnerable
Sceloporus graciosus	Sagebrush lizard		X	Vulnerable
Sceloporus graciosus graciosus	Northern sagebrush lizard	X		
Birds				
Riparia riparia	Bank swallow		X	Unknown
Bucephala islandica	Barrow's goldeneye		X	Unknown
Amphispiza bilineata	Black-throated sparrow		X	Peripheral
Bucephala albeola	Bufflehead		X	Unknown
Speotyto cunicularia	Burrowing owl		X	Critical
Tympanuchus phasianellus columbianus	Columbian sharp-tailed grouse	X		
Buteo regalis	Ferruginous hawk	X	X	Critical
Ammodramus savannarum	Grasshopper sparrow		X	Vulnerable
Aquila chrysaetos	Golden eagle	Protected		
Melanerpes lewis	Lewis' woodpecker	X	X	Critical

Scientific Name	Common Name	Species of Concern		Oregon Category[1]
		Federal	State	
Lanius ludovicianus	Loggerhead shrike		X	Vulnerable
Numenius americanus	Long-billed curlew		X	Vulnerable
Oreortyx pictus	Mountain quail	X		
Accipiter gentiles	Northern goshawk	X	X	Critical
Dryocopus pileatus	Pileated woodpecker		X	Vulnerable
Amphispiza belli	Sage sparrow		X	Critical
Centrocercus urophasianus	Sage-grouse		X	Vulnerable
Buteo swainsoni	Swainson's hawk		X	Vulnerable
Athene cunicularia hypugaea	Western burrowing owl	X		
Empidonax traillii adastus	Willow flycatcher		X	Unknown
Icteria virens	Yellow-breasted chat	X		
Mammals				
Antrozous pallidus	Pallid bat	X		
Corynorhinus townsendii pallescens	Pale western big-eared bat	X		
Euderma maculatum	Spotted bat	X		
Lepus townsendii	White-tailed jackrabbit		X	Unknown
Myotis ciliolabrum	Western small-footed myotis	X	X	Unknown
Myotis evotis	Long-eared myotis	X	X	Unknown
Myotis yumanensis	Yuma myotis	X		
Ovis canadensis California	California bighorn sheep	X		
Ovis canadensis nelsoni	Desert bighorn sheep	X		

1. **Critical:** Listing pending or appropriate
   Vulnerable: Listing not imminent
   Peripheral or Naturally Rare: Oregon populations are on the edge of their range
   Undetermined: Status is unclear
   Protected: Protected by the federal Bald and Golden Eagle Protection Act

Neither invertebrate species of concern is expected to be present within the uplands portion of the project boundaries, as they require aquatic resources not present. Neither plant species of concern was observed during the survey of the site's vegetative characteristics; one grows near the Columbia River and the other requires alkaline vernal pools. Aquatic resources needed by the amphibious species and by one of the reptiles are also absent in the upland areas within the project boundaries. Two reptile species probably occur on or near the project site although they were not observed. Of the 20 avian protected species or species of concern, 10 were observed on or near the project site during wildlife studies; three others were not observed but may be rare visitors to the site. Only one mammal species of concern was observed, the white-tailed jackrabbit. Six of the remaining mammals are bat species, all of which may occur on or near the project site. It is unlikely the conducted wildlife surveys would have detected bat species. The remaining mammals are two bighorn sheep species not observed on or near the project site; they are not inconspicuous, and it is doubtful they would have been missed during the surveys.

Invertebrates

Lynn's clubtail dragonfly	Known current distribution is well to the south of the project site, with sightings along the John Day and Owyhee Rivers south and east of Gilliam and Morrow Counties.[11] Unlikely to occur in upland areas within the project boundaries due to the absence of aquatic resources needed by the species, but may appear in Willow Creek Canyon.
Goedon's lepidostoman caddisfly	Distribution unknown. Unlikely to occur in upland areas within the project boundaries due to the absence of aquatic resources needed by the species. Oregon Natural Heritage Information Center rejected consideration of the species for taxonomic reasons.[12]

Plants

Robinson's onion	Not observed on the site, and unlikely to occur within the project boundaries. Uses sand and gravel deposits along the Columbia River.
Little mousetail	Not observed on the project site. May occur if alkaline vernal pools are present. Often accompanies sessile mousetail; the nearest known location of sessile mousetail is to the west, within five miles of the project boundary.

Amphibians

Northern leopard frog	Not observed on the site, and unlikely to occur within the project boundaries except in or near Willow Creek. Habitat is marshes, wet meadows, ponds and reservoirs with quiet water.
Woodhouse's toad	Not observed on the site, and unlikely to occur within the project boundaries as the current Oregon distribution does

[11] Pacific Biodiversity Institute Endangered Species Information Network: http://www.pacificbio.org/ESIN/OtherInvertebrates/LynnsClubtail/LynnsClubtail_pg.html
[12] Oregon Natural Heritage Program (2001), op. cit.

	not include Gilliam or Morrow County. Only partly terrestrial and requiring permanent aquatic resources for breeding, Willow Creek may provide suitable habitat.
Western toad	Not observed on the site, and is unlikely to occur within the upland portions of the project boundaries. Although can use arid landscapes, seasonal water is required for breeding, and the project uplands are most likely too distant from these. The species probably occurs around Willow Creek, and possibly occurs in Eightmile or Fourmile Canyons.
Reptiles	
Painted turtle	Not observed on the site, and is unlikely to occur within the uplands portions of the project boundaries. Uses sites with still or slow-moving water with abundant aquatic vegetation, and Willow Creek may be suitable.
Western rattlesnake	Not observed, but probably occurs on or near the project site. Uses desert scrub, grassland and open pine.
Northern sagebrush lizard	Not observed, but probably occurs on or near the project site. Uses sage steppe and open stands of pine or juniper.
Birds[13]	
Bank swallow	Isolated individuals and flocks observed on and near the project site during all portions of the wildlife survey. Most observations were made in Willow Creek Canyon. Uses grassland, pasture or agricultural areas near surface water; uses vertical dirt embankments for nest burrows.
Barrow's goldeneye	Not observed in the project area, and is expected to be an extremely rare visitor within the project boundaries. Uses lakes in forested areas, and a few may appear on inland waters in the winter.
Black-throated sparrow	Not observed in the project area, and is expected to be a rare visitor to the project area. Uses arid shrublands.
Bufflehead	Not observed in the project area, and is unlikely to occur within the project boundaries. Uses mountain and low elevation lakes in forested areas, absent from the project area.
Columbian sharp-tailed grouse	Not observed in the project area, and is unlikely to occur within the project boundaries. No longer present in Oregon, although the project site is within the historic range.[14] Uses prairie, shrub and grassland.

[13] Peterson Field Guides (1989). A Field Guide to Western Birds. Houghton Mifflin Company, Boston, Massachusetts and New York, New York.

[14] Ramsey R.D., T.A. Black, E. Edgley and N. Yorgason (1999). Use of GIS and Remote Sending to Map Potential Columbian Sharp-Tailed Grouse Habitat in Southeastern Idaho. Utah State University Landscape Ecology: Modeling and Analysis Center, Logan, Utah.

Ferruginous hawk	Observed on and near the project site during all portions of the wildlife study other the point count surveys in Willow Creek Canyon. One active nest found near the site outside the project boundaries. Uses open juniper woodlands, sagebrush flats or grasslands.
Grasshopper sparrow	One observed on the project site while in transit between wildlife survey locations. Uses grasslands, hayfields and prairies.
Golden eagle	Observed on and near the site during all portions of the wildlife study. One active golden eagle nest was found on or near the project site. Uses open habitat in mountains, foothills and plains.
Lewis' woodpecker	Three observations within and outside of the project boundaries during the wildlife study. Uses logged or burned forests, wooded watersides.
Loggerhead shrike	Observed on and near the project site in small numbers during all portions of the wildlife study. Uses sagebrush and juniper steppe.
Long-billed curlew	Observed on and near the project site during all portions of the wildlife study other the point count surveys in Willow Creek Canyon. The vast majority of observations were in the north project area, and all were during spring and summer. Spring and summer habitat includes plains and rangeland.
Mountain quail	Not observed in the project area, and is unlikely to occur within the project boundaries. Uses open ponderosa pine forest.
Northern goshawk	Not observed in the project area, and is unlikely to occur within the project boundaries. Uses mature forested areas.
Pileated woodpecker	Not observed in the project area, and is unlikely to occur within the project boundaries. Uses mature fir or mixed conifer forested areas.
Sage sparrow	One observed within the project boundaries during avian point counts in the north project area. Uses arid brush, sage or chaparral areas.
Swainson's hawk	Observed on and near the project site during all portions of the wildlife survey. No active nests found on or near the project area. Uses open juniper woodlands, sagebrush flats or grasslands.
Western burrowing owl	Rarely occurs within the project boundaries. One observed within the project boundaries in the north project area during avian point count surveys; two additional observations within and outside of project boundaries during other wildlife study activities. None was present during breeding season, and no active nesting burrows were found. Uses sagebrush, grasslands or pastures. The lack of

	suitable soil depths for burrowing in uncultivated areas is probably the primary limitation to their use of the site.
Willow flycatcher	Not observed on or near the project site during avian point count surveys, one observed outside of project boundaries during other wildlife study activities. May be a rare visitor within the project boundaries. Uses willow or other tall shrubs at the edges of streams, springs, seeps, marshes or meadows.
Yellow-breasted chat	May occur in Willow Creek Canyon, but expected to occur extremely rarely, if at all, within the project boundaries. Uses stream thickets.
<u>Mammals</u>	
Pallid bat	Not observed during wildlife studies, which were not likely to detect bats. Uses areas of open pine, juniper or sagebrush, and roosts in crevices, caves, mines or buildings.
Pale western big-eared bat	Not observed during wildlife studies, which were not likely to detect bats. Uses any type of vegetation, and roosts in crevices, bridges, mines or buildings.
Spotted bat	Not observed during wildlife studies, which were not likely to detect bats. Uses pines or desert vegetation, and roosts in crevices in cliffs or canyon walls.
White-tailed jackrabbit	One observation in the upland area outside of the project boundaries. Uses open grassland, pastures and fields.
Western small-footed myotis	Not observed during wildlife studies, which were not likely to detect bats. Not known to currently occur as residents of either Gilliam or Morrow County,[15] it could occur during migration. Uses coniferous forests or arid shrubland, and roosts in crevices, caves and mines.
Long-eared myotis	Not observed during wildlife studies, which were not likely to detect bats. Uses deciduous or coniferous forests or arid shrubland, and roosts in crevices, caves, mines, bridges, hollow trees or loose bark.
Yuma myotis	Not observed during wildlife studies, which were not likely to detect bats. Uses pine and fir forests and arid grasslands with nearby open water, and roosts in caves, tunnels and buildings.
California bighorn sheep	Not observed during wildlife studies, and is unlikely to currently occur within the project boundaries. Uses open areas or sparsely populated woodlands, preferably near precipitous slopes, and does use sagebrush-bitterbrush-

[15] Deschutes & Ochoco National Forests, Crooked River National Grassland. Bats: http://www.fs.fed.us/r6/centraloregon/wildlife/species/mammals/bats.shtml

	bunchgrass scrub.[16] Currently occur in Oregon primarily in the southeast part of the state.
Desert bighorn sheep	The project area may lie within the historic range. Not observed during wildlife studies, and is unlikely to occur within the project boundaries. This subspecies does not currently occur in Oregon.[17]

Results of Avian Surveys

Eighty different species of birds were observed on or near the project site (Table P-3). Of these, twelve were special status species (Figure P-4). Eighteen species were observed only during breeding bird surveys, at the Willow Creek site, or while performing other activities. These included the grasshopper sparrow and willow flycatcher, special status species. No numbers for mean use of the project site or other quantitative comparisons were calculated for these species.

Table P-3: Individual Bird Species Observed During Wildlife Surveys

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
Passerine						
Horned lark	*Eremophila alpestris*	X	X	X	X	X
Western meadowlark	*Sturnella neglecta*	X	X	X	X	X
Loggerhead shrike	*Lanius ludovicianus*	X	X	X	X	X
Black-billed magpie	*Pica pica*	X	X	X	X	X
Brewer's blackbird	*Euphagus cyanocephalus*	X	X	X	X	X
Red-winged blackbird	*Agelaius phoeniceus*	X	X	X	X	X
Common raven	*Corvus corax*	X	X	X	X	X
Barn swallow	*Hirundo rustica*	X	X	X	X	X
Bank swallow	*Riparia riparia*	X	X	X	X	X
Cliff swallow	*Hirundo pyrrhonota*	X	X	X	X	X
White-crowned sparrow	*Zonotrichia leucophrys*	X	X	X		X
Lark sparrow	*Chondestes grammacus*	X	X	X	X	X
Golden-crowned sparrow	*Zonotrichia atricapilla*		X			
Savannah sparrow	*Passerculus sandwichensis*	X	X			X
House sparrow	*Passer domesticus*	X		X		X
Sage sparrow	*Amphispiza belli*	X				X
Song sparrow	*Melospiza melodia*	X		X	X	X
Western kingbird	*Tyrannus verticalis*	X	X	X	X	X
Say's phoebe	*Sayornis saya*	X	X		X	X
American robin	*Turdus migratorius*	X	X	X	X	X
American goldfinch	*Carduelis tristis*	X	X	X		X
House finch	*Carpodacus mexicanus*	X	X	X		X

[16] US Fish and Wildlife Service (2003). Draft Recovery for the Sierra Nevada Bighorn Sheep (*Ovis canadensis californiana*). Region 1, US Fish and Wildlife Service, Portland, Oregon.

[17] US Department of the Interior (1995). Our Living Resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems. National Biological Service, Washington, District of Columbia.

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
Sage thrasher	*Oreoscoptes montanus*		X			
Eurasian starling	*Sturnus vulgaris*	X	X	X	X	X
Northern flicker	*Colaptes auratus*	X	X			X
Rock wren	*Salpinctes obsoletus*	X			X	X
American pipit	*Anthus spinoletta*	X				
Lark bunting	*Calamospiza melanocorys*	X				
Common nighthawk	*Chordeiles minor*	X			X	X
Townsend's solitaire	*Myadestes townsendii*	X				
Mountain bluebird	*Sialia corrucoides*	X				X
Lewis' woodpecker	*Melanerpes lewis*		X			X
Bullock's oriole	*Icterus bullockii*		X		X	
Golden-crowned kinglet	*Regulus satrapa*			X		
Yellow rumped warbler	*Dendroica coronata*			X	X	X
Wilson's warbler	*Wilsonia pusilla*			X		
Winter wren	*Troglodytes troglodytes*					X
Grasshopper sparrow	*Ammodramus savannarum*					X
Calliope hummingbird	*Stellula calliope*				X	X
Willow flycatcher	*Empidonax traillii*					X
Brown-headed cowbird	*Molothrus ater*				X	X
Northern rough-winged swallow	*Stelgidopteryx serripennis*				X	X
Chipping sparrow	*Spizella passerina*				X	
Western tanager	*Piranga ludoviciana*				X	
American crow	*Corvus brachyrhynchos*					X
Raptor						
Sharp-shinned hawk	*Accipter striatus*	X				
Ferruginous hawk	*Buteo regalis*	X	X		X	X
Swainson's hawk	*Buteo swainsoni*	X	X	X	X	X
Red-tailed hawk	*Buteo jamaicensis*	X	X	X	X	X
Rough-legged hawk	*Buteo lagopus*	X	X	X		X
Bald eagle	*Haliaeetus leucocephalus*	X				X
Golden eagle	*Aquila chrysaetos*	X	X	X	X	X
American kestrel	*Falco sparverius*	X	X	X	X	X
Northern harrier	*Circus cyaneus*	X	X	X	X	X
Prairie falcon	*Falco mexicanus*	X	X			X
Turkey vulture	*Cathartes aura*	X	X			X
Merlin	*Falco columbarius*		X			X
Great horned owl	*Bubo virginianus*	X				X
Burrowing owl	*Speotyto cunicularia*	X				X
Long-eared owl	*Asio otus*					X
Osprey	*Pandion haliaetus*					X
Waterbird						
Great blue heron	*Ardea herodias*	X		X		X
Long-billed curlew	*Numenius americanus*	X	X		X	X

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
Sandhill crane	*Grus canadensis*	X	X	X		X
Ring-billed gull	*Larus delawarensis*	X		X		X
California gull	*Larus californicus*	X				X
Killdeer	*Charadrius vociferus*	X		X	X	X
Belted kingfisher	*Ceryle alcyon*	X				
Great egret	*Ardea alba*				X	X
Virginia rail	*Rallus limicola*				X	
Western gull	*Larus occidentalis*			X		X
Waterfowl						
Redhead	*Aythya americana*			X		X
Mallard	*Anas platyrhynchos*		X	X	X	X
Canada goose	*Branta canadensis*	X	X			X
Upland Gamebird						
California quail	*Callipepla californica*	X	X	X	X	X
Ringnecked pheasant	*Phasianus colchicus*	X		X	X	X
Chukar	*Alectoris chukar*	X	X		X	X
Gray partridge	*Perdix perdix*		X			X
Dove						
Morning dove	*Zenaida macroura*	X	X	X	X	X
Rock dove	*Columba livia*		X	X		X
Total		**54**	**43**	**39**	**40**	**67**

1. **NP** – Observed at point count sites in the northern portion of the site
   SP – Observed at point count sites in the southern portion of the site
   P5 – Observed at the point count site in Willow Creek Canyon
   BB – Observed during breeding bird surveys
   Other – Observed incidentally, while in transit, during raptor nest surveys, or during surveys for ground squirrels and burrowing owls

The total number of individuals observed, the mean number of individuals of the species observed per survey, and the percent of surveys in which an individual of the species was observed were tabulated for the entire upland project area, and separately for the north and south areas (Table P-4).

Ten special status species were observed during point count surveys. The burrowing owl, bald eagle and sage sparrow were represented by one individual each, and consequently have very low site use and observation frequencies. All were observed at point count sites only in the north area of the project. The Swainson's hawk with 104 individuals, and the long-billed curlew with 254 individuals, had the highest counts of special status species. In comparison, there were 4014 individual horned larks observed during the course of the point counts. For some species, observations varied highly by season: the long-billed curlew was only observed during spring and summer surveys, while the loggerhead shrike, ferruginous hawk and Swainson's hawk were absent from the site during winter surveys. The golden eagle was the only special status species observed in each season, although summer was represented by only one individual. The golden

Table P-4: Special Status Species Observed During Point Count Surveys

	Fall			Winter			Spring			Summer		
Species	**# Obs[1]**	**Use**	**Freq**	**# Obs**	**Use**	**Freq**	**# Obs**	**Use**	**Freq**	**# Obs**	**Use**	**Freq**
Entire site												
Loggerhead shrike	4	0.012	0.9%				5	0.022	2.2%	3	0.015	1.0%
Bank swallow	1	0.003	0.3%				2	0.009	0.4%	27	0.13	6.9%
Sage sparrow										1	0.005	0.5%
Lewis' woodpecker							2	0.009	0.4%			
Ferruginous hawk	1	0.003	0.3%				10	0.043	3.4%	9	0.044	3.0%
Swainson's hawk	60	0.18	5.3%				23	0.099	7.3%	21	0.10	6.4%
Bald eagle				1	0.004	0.4%						
Golden eagle	13	0.038	3.5%	11	0.042	4.2%	11	0.047	4.7%	1	0.005	0.5%
Burrowing owl										1	0.005	0.5%
Long-billed curlew							179	0.77	40.5%	75	0.37	12%
North Area												
Loggerhead shrike	2	0.011	1.1%				2	0.013	1.3%	3	0.021	1.4%
Bank swallow							2	0.013	0.6%	20	0.14	5.7%
Sage sparrow										1	0.007	0.7%
Ferruginous hawk	1	0.005	0.5%				7	0.044	3.1%	7	0.050	2.9%
Swainson's hawk	1	0.005	0.5%				9	0.056	4.4%	7	0.050	4.3%
Bald eagle				1	0.006	0.6%						
Golden eagle	11	0.060	5.5%	10	0.059	5.9%	7	0.044	4.4%			
Burrowing owl										1	0.007	0.7%
Long-billed curlew							170	1.1	54%	66	0.47	14%
South Area												
Loggerhead shrike	2	0.013	0.6%				3	0.042	4.2%			
Bank swallow	1	0.006	0.6%							7	0.11	9.5%
Lewis' woodpecker							2	0.028	1.4%			
Ferruginous hawk							3	0.042	4.2%	2	0.032	3.2%
Swainson's hawk	59	0.37	11%				14	0.19	14%	14	0.22	11%
Golden eagle	2	0.013	1.3%	1	0.011	1.1%	4	0.056	5.6%	1	0.016	1.6%
Long-billed curlew							9	0.12	9.7%	9	0.143	6.3%

1. **# Obs:** number of individual birds observed
   Use: mean number of birds observed per survey
   Freq: percent of surveys in which a member of the species was observed

Table P-5: Species Groups Observed During Point Count Surveys

	Fall			Winter			Spring			Summer			All Seasons		
	Use[1]	Comp	Freq	Use	Comp	Freq	Use	Comp	Freq	Use	Comp	Freq	Use	Comp	Freq
Entire site															
Passerines	8.0	84%	84%	8.7	58%	79%	3.9	68%	95%	3.4	77%	80%	6.4	70%	84%
Raptor	0.55	5.8%	30%	0.32	2.1%	25%	0.44	7.8%	34%	0.49	11%	32%	0.46	5.0%	30%
Waterbird	0.73	7.7%	2.6%	1.9	13%	1.1%	1.2	21%	43%	0.48	11%	15%	1.1	12%	14%
Waterfowl	0.15	1.5%	0.6%	3.9	26%	7.6%	0.043	0.8%	1.7%	0.010	0.2%	0.5%	1.0	12%	2.6%
Upland Gamebird	0.044	0.5%	2.6%	0.095	0.6%	1.5%	0.065	1.1%	1.7%				0.053	0.6%	1.6%
Dove	0.085	0.9%	2.6%	0.034	0.2%	1.1%	0.039	0.7%	2.6%	0.049	1.1%	3.4%	0.055	0.6%	2.4%
All bird groups	**9.5**			**15**			**5.7**			**4.4**			**9.1**		
North area															
Passerines	7.8	79%	80%	5.1	54%	76%	4.1	72%	98%	3.8	79%	79%	5.3	70%	83%
Raptor	0.34	3.4%	25%	0.21	2.2%	18%	0.31	5.5%	27%	0.39	7.9%	27%	0.31	4.0%	24%
Waterbird	1.4	14%	4.9%	3.0	32%	1.8%	1.2	22%	56%	0.62	13%	18%	1.6	21%	19%
Waterfowl	0.28	2.8%	1.1%	1.1	12%	5.9%	0.013	0.2%	0.6%				0.36	4.7%	2.0%
Upland Gamebird	0.071	0.7%	4.4%	0.012	0.1%	0.6%	0.006	0.1%	0.6%				0.025	0.3%	1.5%
Dove	0.033	0.3%	2.2%	0.006	0.1%	0.6%	0.013	0.2%	1.3%	0.021	0.4%	2.1%	0.018	0.2%	1.5%
All bird groups	**9.9**			**9.3**			**5.7**			**4.9**			**7.6**		
South area															
Passerines	8.1	80%	88%	15	60%	84%	3.4	61%	88%	2.5	71%	82%	8.1	70%	86%
Raptor	0.80	8.8%	35%	0.53	2.1%	38%	0.74	13%	49%	0.71	20%	43%	0.71	6.2%	40%
Waterbird							1.1	19%	14%	0.16	4.5%	7.9%	0.23	2.0%	3.9%
Waterfowl				9.3	36%	11%	0.11	2.0%	4.2%	0.032	0.9%	1.6%	2.2	20%	3.6%
Upland Gamebird	0.013	0.1%	0.6%	0.25	1.0%	3.3%	0.19	3.4%	2.8%				0.10	0.9%	1.6%
Dove	0.14	1.6%	3.1%	0.087	0.3%	2.2%	0.097	1.7%	5.6%	0.11	3.2%	6.3%	0.12	1.0%	3.9%
All bird groups	**9.1**			**26**			**5.6**			**3.5**			**11**		

1. **Use:** mean number of group members observed per survey
   Comp: Mean use of the group divided by the total mean use of all groups
   Freq: percent of surveys in which a member of the group was observed

eagle was also the most numerous of special status species sightings in winter, with the bald eagle the only other special status species observed.

There was also some variability in the locations in which some special status species were observed. Long-billed curlews were infrequently seen in the south area of the project, with 84% of sightings in the north area, and most of these were sighted on Hurlburt flats. The Swainson's hawk was observed most frequently in the south area of the project, with 84% of observations located there. The substantial majority Swainson's hawk observations were in the fall. Prey abundance, and ease of prey location in wheat stubble or in newly cultivated or seeded fields, probably account for this difference in use. The ferruginous hawk and golden eagle had approximately a 1:2 preference for the north area of the project site.

Ten active raptor nests were located within the project boundaries and a 2-mile area around it (Figure P-5). Six red-tailed hawk nests were distributed fairly evenly throughout the surveyed area, one outside of the project boundaries. One golden eagle nest, one ferruginous hawk nest and two great horned owl nests were located, all outside of the project boundaries.

A summary of species group use of the total project site and the north and south areas includes all avian species (Table P-5). In all seasons and in both project areas, passerine species had the highest number of individuals and highest percent of surveys in which a species member was observed, and accounted for the majority of mean species use (70% overall). This is largely due to the number of passerine species observed relative to the number of different species within other the groups, and to extremely high numbers of horned lark observations. The order of group mean use, following passerines, varied considerably among seasons and between locations. The mean number of different species observed during each survey, a measure of avian diversity on and near the project site, ranged from 2.6 species per survey in the spring to 1.5 species per survey in the winter. There was no substantial difference between avian diversity in the north and south areas of the project.

Mammal observations

One observation of a special status species occurred, of a white-tailed jackrabbit outside of the project boundaries in the upland area. Other mammals observed on or near the project site but not tabulated were black-tailed jackrabbits, antelope, mule deer, coyote, yellow-bellied marmot, badger and agricultural pests such as pocket gophers.

Vegetative Characteristics

Thirty-six different plant species were identified in vegetative surveys of the north project area, eleven of which were alien species (Attachment P-4). The number of different species found at each survey location, a measure of the location's vegetative diversity, ranged from 11 to 23, and includes alien species. The percent of separate species identified at each survey location that were native ranged from 55 – 83%, while the frequency of individual native plants among the total number of plants present at each survey location was only 7 – 16%. Although there may be many native plant species on the site, they are substantially outnumbered by aliens that are fewer in number of species but higher in number of plants. One measure of this is the percent of cover provided by alien or native species, an indication of the condition of the plant community. Good

condition encompasses native plant cover, bare soil and soil cryptogram. Poor condition includes alien plants and litter. The proportion of cover indicating good condition ranged from 12 – 66%. The predominant cover is provided by the alien species cheatgrass (bromus tectorum), covering 8 to 68% of the surveyed areas. Following in coverage are four native grasses – Sandberg's bluegrass (poa secunda), needle and thread grass (hesperostipa comata), bluebunch wheatgrass (pseudoroegneria spicata) and six-week fescue (vulpia cf octoflora).

Impacts to Identified Habitats

Temporary and Permanent Habitat Loss

Habit loss includes destruction of plants, displacement of mobile wildlife, and destruction of burrowing wildlife. Habitat could be temporarily lost in laydown areas, from the widening of roads during construction, and through similar construction-related activity. Habitat could also be permanently lost, as from the footprint of new roads, turbine towers and transformer pads. Although the facility may eventually be decommissioned, in relation to the lifetimes of most of the plant and animal species affected, the loss would essentially be permanent. Secondary impacts include reduction of foraging, courting and breeding habitat for wildlife.

Disturbance from Project Activities

Noise during construction or decommissioning may be the predominant source of disturbance to wildlife. Additionally, the presence of project staff and vehicular activity, the presence of structures such as the turbines, and the motion and noise of the turbine blades or nacelles could be sources of wildlife disturbance. Disturbance could cause displacement of wildlife from nesting, burrowing, breeding or foraging sites, but would not impact plants. Secondary impacts include the loss of eggs or young if nests, burrows or similar sites were abandoned while young or eggs are present, and the added risk to reproductive success if mating wildlife or pregnant mammals were displaced to other locations. Disturbance caused by decommissioning of the project are anticipated to be equivalent to construction disturbance.

Flying Wildlife Collision with or Electrocution by Overhead Power Lines or Guy Wires

Collisions and electrocutions, potentially causing the death of the individual involved, could occur for birds and bats. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Collision of Flying Wildlife with Turbines or Towers

Turbine and tower collisions, potentially causing the death of the individual involved, could occur for insects, birds and bats. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Collision with Vehicles

Vehicular collisions could affect all wildlife species present within the project boundaries, and could cause impacts to plants as well during off-road travel. These collisions would have the potential to cause the death of the individual involved. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Dust

Dust, from vehicular traffic or wind movement of soil in disturbed areas could impact water quality and affect aquatic wildlife, reduce photosynthesis or transpiration in plant species, and reduce air quality for all wildlife species. Secondary effects may include dust production as a cause of disturbance to and subsequent displacement of wildlife.

Runoff Water Quality

Impairment of water quality, from particulate material or other contaminants from project construction and operation, could impact aquatic plants and wildlife in the receiving waters. Impacts could include wildlife displacement or wildlife and plant death. Secondary effects could be loss of or disadvantage to the young of wildlife species, if one or both parents were displaced, impaired or killed while the young were still dependants.

Wildfires

Potentially caused by project construction and operation vehicles or by other project-related activities, wildfires could impact plant and wildlife species throughout the project area and its vicinity. Impacts could include impairment or death of individual plants and animals, reduction of habitat quality in terrestrial and aquatic habitats even in areas that are not burnt, increased soil loss through wind or water erosion where plant cover was destroyed, and displacement of wildlife from the burned areas due to loss of food resources, appropriate habitat types or cover. Secondary effects include loss of or disadvantage to the young of wildlife species, if one or both parents were displaced, impaired or killed while the young were still dependants.

Proposed Mitigation Measures

Habitat Loss

Most of the habitat within the project boundaries, and the vast majority of habitat within the disturbance corridors of the project, is category 3 – 5. Calculation of acres and final mapping of habitat categories disturbed by the project awaits the results of the wetlands survey and jurisdictional delineation. Although difficult to quantify, some project components are expected to improve habitat quantity and quality within the project boundaries, such as the presence of graveled project access roads and the steps taken to prevent project-related soil erosion and contamination of stormwater runoff.

The project layout will avoid areas of Washington ground squirrel activity, wetlands and aquatic resources, and trees or other structures with active raptor nests. All are considered to be Category 1 habitat, and no loss of Category 1 habitat will occur. No disturbance of canyon floors or bluff and cliff faces is planned. Every attempt will be made in siting and construction to avoid loss of any of the few trees present on the site. Locations of habitat to be avoided during construction will be flagged for the duration of construction activities in the area, and the construction contractor instructed of their locations and the need for avoidance. Minimal loss of Category 2 habitat is anticipated, and the project goal is to avoid any loss.

Temporary Habitat Loss

Temporary disturbance during project construction is estimated at 442 acres of the 32,100-acre area within the project boundaries, 1.4% of the total. The Applicant proposes to mitigate for temporary habitat loss by minimizing the area affected and by restoration. Grading will be kept to the minimum feasible. Communication and electrical lines will be buried within the area disturbed by temporary road widening. Plants in disturbed areas will be crushed rather than removed whenever possible, to allow possible re-emergence of perennial species. Areas temporarily disturbed during project construction will be returned to original or better condition as soon as possible. Restoration includes return to agricultural use or reseeding with an appropriate native plant seed mixture, depending on the landscape in which the disturbed areas occur. Seeding mixtures will be determined through consultation with the landowners, and discussions with the Oregon Departments of Fish and Wildlife, Energy, and Agriculture. Noxious weeds, should any appear in reseeded areas, will be controlled using methods recommended by the Oregon Department of Agriculture Plant Division.

Permanent Habitat Loss

Permanent disturbance from the project is estimated at 254 acres of the 32,100-acre area within the project boundaries, 0.79% of the total. Applicant proposes to mitigate for permanent habitat loss by minimizing the area affected, and by replacement of the impacted area by development and protection of habit of equivalent or better categories. Planned project access roads will take maximum advantage of existing unimproved farm and ranch access roads whenever possible while still avoiding sensitive areas. Turbine and transformer pads will abut the project roads, reducing both temporary and permanent site disturbance. Final project roadways will be returned to the minimum width consistent with safe travel, reducing the permanent facility footprint.

The north area of the project site is crisscrossed by unimproved roads, used for such activities as fighting wildfires, accessing stock feeding and watering stations, transporting sheep and herder camps, hunting, and servicing transmission lines. There are also many tracks from off-road vehicle use. Graveled project roads will be available for use by landowners. Project roads will be more easily traversed than remaining unimproved roads, particularly in wet weather or in snow, and maintenance of project roads will be the responsibility of the facility. The availability of better roads, and the opportunity for landowners to suspend maintenance of many remaining unimproved roads, could result in abandonment of some farm or ranch roads, reclamation of habitat in some existing roadways, and reduction of off-road travel.

Habitat Replacement

Under OAR 635-415-0025, the mitigation goals for categories of habitat are:

Habitat Category 1: no loss of either habit quantity or quality
Habitat Category 2: no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality
Habitat Category 3: no net loss of either habitat quantity or quality
Habitat Category 4: no net loss in either existing habitat quantity or quality
Habitat Category 5: provide a net benefit in habitat quantity or quality
Habitat Category 6: minimize impacts

No loss of Habitat Category 1 is anticipated. Because mitigation goals for Habitat Categories 2 – 4 include no net loss of habit quantity, the Applicant deemed establishment of conservation easements on or purchase and protection of land containing equivalent amounts of these habitat categories will not prevent net loss. Changes in land ownership do not alter the depletion of regional resources available to plants and wildlife that would be caused by construction of the proposed project.

The Applicant proposes to mitigate for losses of these habitats by the purchase of a parcel of land that is predominantly Category 5 habitat, and which is equal in area to that permanently lost from development of the facility, estimated to be approximately 254 acres. Ideally, this would be cropland with low agricultural productivity contiguous with areas of high-quality habitat, such as dryland wheat adjacent to an area of shrub steppe, or irrigated agriculture adjacent to grasslands or riparian areas. This property would be maintained, monitored and protected for the lifetime of the project. The Applicant proposes to complete parcel acquisition and develop a habitat conversion program for submission to the Siting Council prior to issuance of the site certificate.

The processes for conversion of the site to higher habitat categories will be developed in consultation with the Oregon Departments of Agriculture, Energy, and Fish and Wildlife. Seeding with native plant species is anticipated, and eventual planting of shrubs such as sage may be appropriate depending on the characteristics of adjacent habitat. Surplus unimproved roads could be removed, and graveled roads allowing site access for management and monitoring constructed in areas with the lowest potential for conversion to higher quality habitat. This may result in reduction of Category 6 habitat on the parcel. Livestock grazing, except when it may prove useful in early vegetation management, would be excluded. Methods for control or management of inappropriate wildfires, noxious weeds, and invasive alien plants and animals would be included in the conversion program.

Artificial enhancement of the site could include installation of raptor nesting platforms or a small feedlot in appropriate sites on the parcel; both could assist in development of Category 1 and 2 habitats. Structures suitable for raptor nesting are rare in the area, and may be more limiting to their local abundance than is the availability of prey species. Platforms would be placed in portions of the parcel removed from roadways and other sources of disturbance. In the area around the project site, Washington ground squirrel burrows are frequently associated with livestock feedlots. Adding one, particularly on Warden soil should any be present, may encourage establishment of burrows on the habitat mitigation property. Considerations for

feedlot placement, in addition to soil type, would be proximity to field verges and other uncultivated portions of the parcel.

General Disturbance from Project Activities

Displacement of avian species from nesting sites and Washington ground squirrels from burrows are probably the most serious of potential disturbance impacts. The Applicant proposes to mitigate disturbance impacts by limitations in the timing of construction activities and the establishment of buffers around Washington ground squirrel burrows, raptor nests, and the Category 3 habitat associated with curlew nesting. During the nesting season, suitable raptor nest structures will be resurveyed in areas scheduled for construction. Construction activities will not proceed within 0.5 miles of identified active raptor nests or long-billed curlew nesting areas during nesting season, and construction activities will not take place within 1000 feet of identified Washington ground squirrel activity. These distances from identified resources will be flagged, either seasonally for raptor nests and curlew nesting areas, or continually for Washington ground squirrel activity. The construction contractor will be informed of the location of flagged areas and instructed on their avoidance.

Flying Wildlife Collision with or Electrocution by Overhead Power Lines or Guy Wires

The Applicant proposes to mitigate the risk to avian and bat species from wire strikes and electrocution through minimization of above ground lines, installation of protective devices on power poles, and institution of project speed limits. Un-guyed weather stations and turbine towers will we installed. The majority of electrical and communication lines will be buried underground. All above ground project electrical poles will have all avian protective devices installed to necessary to make them APLIC compliant,[18] to reduce the potential for avian electrocutions. The literature on avian wire strikes indicates that in some locations vehicular traffic is a component of that problem, when automobile traffic startles birds into panicked flight.[19] Additional driving precautions have been effective in reducing avian deaths from wire strikes in those locations. Construction and operation speed limits will be imposed, and should help reduce wire strikes in the proposed facility as well. Additional training of project personnel will address vehicle-related wire strikes to ensure compliance with the project speed limit. During the spring season when project personnel may encounter fledgling raptors still learning controlled flight, personnel will be instructed to use particular care on project roads. In the event that the project causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

Collision of Flying Wildlife with Turbines or Towers

For mitigation of impacts from turbine or tower collision, the Applicant proposes to use modern turbines and towers, minimize site lighting, employ industry and wildlife research siting guidance, and institute project speed limits. The turbines and towers used will incorporate all design improvements considered to help in reduction of wildlife collisions. The most infamous

[18] Avian Powerline Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS). 2005. Avian protection plan (APP) guidelines. Edison Electric Institute. Washington, D.C.

[19] Avian Powerline Interaction Committee. 1994. Mitigating bird collisions with powerlines: the state of the art in 1994. Edison Electric Institute. Washington, D.C.

example of avian fatalities caused by collision with wind turbines or towers is in the Altamont Pass California Wind Resource Area, where several thousand small, older turbines with rapidly turning blades are sited in an area of extremely high avian abundance. The impacts at the site are exacerbated by the presence of guyed weather stations, overhead power lines and non-compliant power poles, adding wire strike and electrocution to the toll. Wind facilities and turbine manufacturers have made significant changes in siting, construction and design of turbines and towers to address these factors, with the result that no modern wind power conversion facilities experience the level of avian fatalities seen in the Altamont.

Changes in turbine design include elimination of all exterior structures and appurtenances permitting birds to perch or construct nests on the turbine itself. Towers are no longer lattice structures, a design that previously allowed perching and nesting to take place in and on the towers. Modern turbines are in an 'upwind' configuration, where the orientation of the nacelle during operation places the blades on the side from which the wind is coming. Modern turbines are taller, placing the blades above the flight height of several species. Turbine blades are larger as well, and their rate of rotation much slower, allowing better detection and avoidance of moving blades by birds. Changes in wind turbine siting have also taken place.

As a full understanding of the effect lighting has on collision rates at lighted structures is lacking, the aviation safety lighting required by the Federal Aviation Administration will be the only external lighting on the turbines or towers, and the number of lights will be the minimum required. Aviation safety lighting will be red only, and operate only at night. No security or other lighting of the project site will be installed.

Turbine siting will conform to the industry's best siting practices, the siting recommendations in the project's wildlife reports, and to current turbine siting recommendations backed by scientific evidence. Wildlife biologists survey sites prior to turbine siting, and topographical configurations that tend to increase avian impacts are avoided. Turbines are generally set back from the edges of cliffs or bluffs, areas extensively used by raptors for soaring. Some topographic features tend to funnel flight paths through constricted areas, and wildlife surveyors take notice of these to prevent placement of turbines within a constricted flight path (Attachment P-2). All of these precautions have resulted in significant reductions in avian fatalities at modern wind power conversion facilities. Comments from the Oregon Department of Fish and Wildlife regarding the siting of turbines are invited and will be considered during the final siting process. Institution of speed limits and personnel vehicle operation training may also help reduce incidences of panicked flight that may lead to turbine collisions. In the event that the project causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

A cumulative effects analysis of the environmental impact of the proposed facility has been commissioned by the Applicant, which, when completed, will be submitted to the Siting Council. The analysis will be of impacts to wildlife, focusing primarily on bats and birds. Cumulative effects analysis will include the proposed facility, and other existing and proposed wind power conversion facilities throughout north-central and southern Washington.

Collision with Vehicles

The Applicant proposes to mitigate impacts from wildlife collisions with vehicles by imposition of construction and operation speed limits of 20 miles per hour, the common speed limit in Oregon for school zones. Speed limit signs will be posted throughout the project roads. In addition, project personnel will be trained in the importance of cautious driving practices while on project roads. As vehicle strikes on sheep and sheep dogs are also of great concern (with these quite abundant in the north portion of the project during much of the year), use of safe driving practices by construction and project personnel will be enforced. In the event that the project causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

Dust

The Applicant proposes to mitigate impacts from dust deposition through water applications to disturbed ground during construction, by graveling of permanent roadways, by erosion control, and by imposition of construction and operation speed limits of 20 miles per hour. Spraying of water on disturbed ground is an effective dust deterrent, as is reduction of speeds on graveled roads. Water application to disturbed areas and vehicle speed limit impositions are expected to reduce dust during construction to levels without significant impact to vegetation or wildlife species. Upon completion of construction, many of the unimproved roads on the project site previously used for access to the area will have been graveled. Existence of these roads should significantly reduce traffic on the many unimproved roads and 4-wheel drive tracks now within the project boundaries. It is likely that overall dust production from vehicular traffic in the project area will be reduced from current conditions.

Runoff Water Quality

The Applicant proposes mitigation of impairment to the water quality of stormwater runoff by compliance with the discharge standards of the NPDES. The requirement for obtaining an NPDES permit will depend upon the outcome of the delineation of jurisdictional waters. Regardless of the requirements for a permit, stormwater pollution prevention and erosion control plans will be established for project construction and operation. These may include establishment of erosion and siltation control measures (baffles, silt traps, netting, straw ground cover) in appropriate locations. Suspended particulate material from soil erosion and dust deposition are the only impacts to water quality expected. Lubricants and fluids used in turbines and transformers have low potential for toxicological impacts, and spill control reservoirs are incorporated in turbine and transformer design. Aside from stormwater runoff, no other water discharges from the project will occur.

Wildfires

The Applicant proposes to mitigate for project-caused fires by graveling of project roads, equipping project vehicles with fire extinguishers and shovels, by training of project personnel in fire avoidance and response, and by establishing a fire plan for the project. Many of the farm and range access roads are comprised of two ruts with vegetation in the middle, adding to the risk of vehicle-caused fire. Graveled project access roads will be available to the landowners and

emergency personnel. Project access roads will provide protection against vehicle-caused fires, allow easier access to the site for firefighting, and serve as firebreaks, all of which may reduce the number and limit the extent of wildfires on the property. The role of wildfires in habitat quality has many uncertainties; however, wildfires are known to encourage cheatgrass in replacement of perennial native grass species, and can cause extirpation of big sage from burned areas.

Proposed Monitoring Program

The Applicant proposes no monitoring programs for individual listed, proposed or candidate species other than for the Washington ground squirrel, and that only if areas of activity are identified.

The Applicant proposes to develop a plan for monitoring the success of habitat conversion on the habitat replacement parcel (see habitat replacement, above) after the parcel to be purchased is identified. The plan would be amended to include Washington ground squirrel monitoring should any be attracted to the parcel.

Monitoring of Avian Species

Although bat species would not be excluded, the monitoring program proposed by the Applicant is targeted primarily at avian species, and presented in brief, below. The first component is designed to look for information about population-level impacts to the studied species, and the second, a contingency plan, provides for standard fatality counts to which fatality counts from other wind power conversion facilities can be compared. The Applicant will fully develop and submit the program to the Siting Council prior to issuance of the site certificate.

Primary Avian Monitoring Program

It is proposed that annual spring raptor and long-billed curlew nesting surveys and annual fall horned lark censuses take place for a period of ten years, in the hope of providing an indication of impacts to populations, rather than of impacts to individuals, from facility construction and operation. These surveys, proposed to commence upon issuance of the site certificate, will provide pre- and post-construction information about avian use of the project area, and local population changes for the surveyed species. One year of use surveys and two years of raptor nesting surveys have been performed within and around the project boundaries. Facility construction is anticipated to be a phased operation, and portions of the project area will remain available for gathering additional pre-construction use and nesting information. The bald eagle and American peregrine falcon are present on the project site too infrequently to use for analysis of population impacts. Raptor species and the long-billed curlew encompass many federal and state avian species of concern found in surveys of the project area. The horned lark (the most abundant avian species found on the site) may be an appropriate sentinel species for passerines, and a good surrogate species for estimation of impacts to those species less frequently observed.

In addition to the described studies, a life-of-the-project Wildlife Response and Reporting System (WRRS) is proposed. This system would be similar to that accepted for Klondike III.[20]

[20] http://www.oregon.gov/ENERGY/SITING/docs/KWPOA.pdf

These programs provide reasonably accurate information about fatality levels for large avian species, including large hawks and owls, eagles, and geese. The programs are less precise for estimation of bat or small bird fatalities unless the fatality incident involves large numbers. The WRRS will be capable of indicating unexpected levels of avian or bat fatalities, even of small species. If such should occur, the studies proposed under the primary program can be terminated and those proposed for the contingency plan can commence.

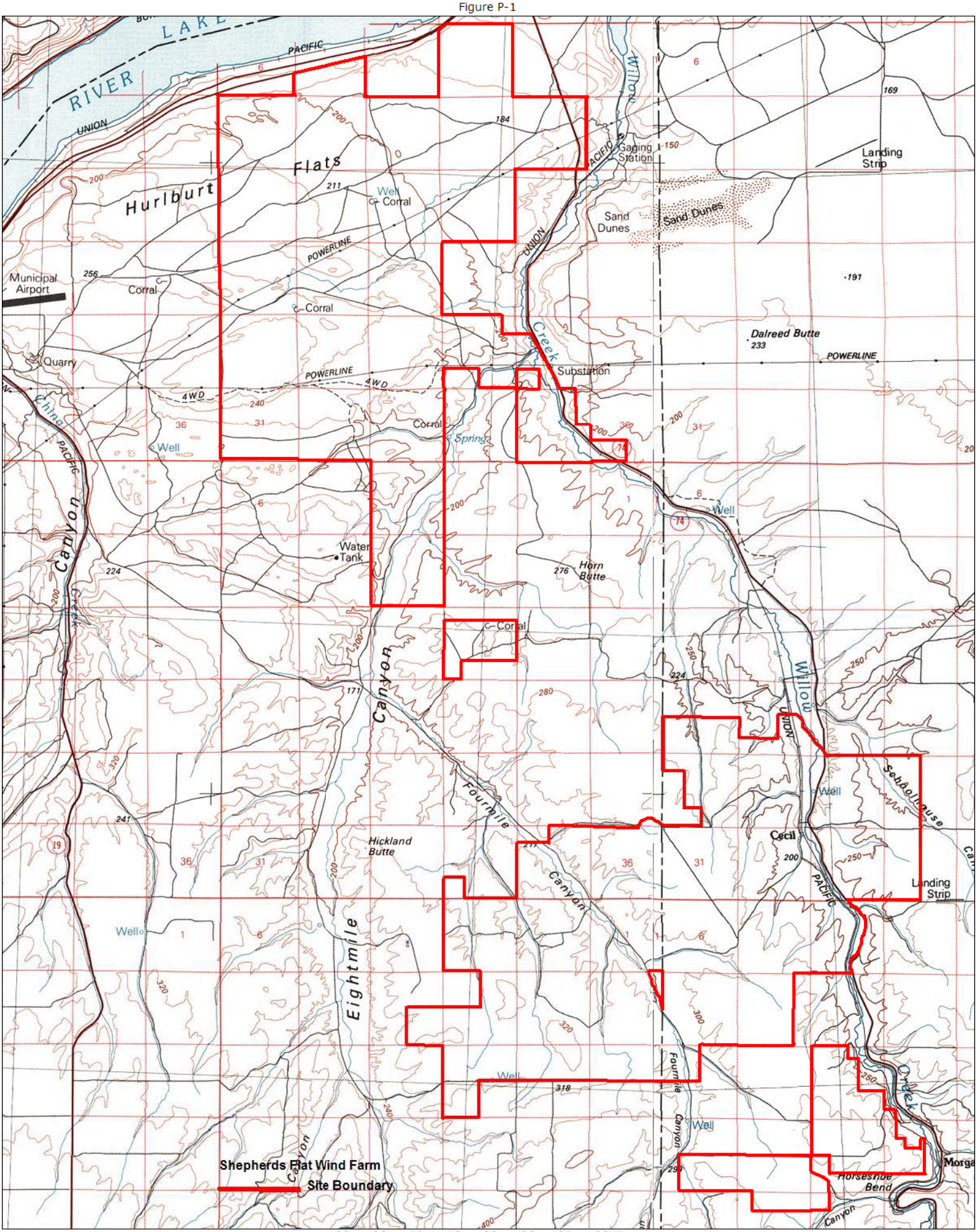
Avian Monitoring Contingency Plan

This plan includes those studies standard to monitoring of wind power conversion facilities: avian and bat fatality monitoring through standard carcass searches of a statistically representative subset of turbines, including studies of sampling bias; and standard avian use studies. Both are proposed to last for a period of two years. In addition, two years of raptor nesting surveys are proposed (adjusted for those that may have already taken place while the primary plan was in effect), followed by nesting surveys at five-year intervals for the life of the project. As in the primary program, the WRRS would continue. The contingency plan would provide information about the impact of project construction and operation on individual birds and bats, and would give a more accurate fatality count than would the primary program. This would aid in assessment of relative fatality rates, by allowing comparison on a fatalities-per turbine or -per megawatt basis to bird and bat fatalities at other wind power conversion facilities.

Responses to Public and Agency Comments not Addressed in the Exhibit

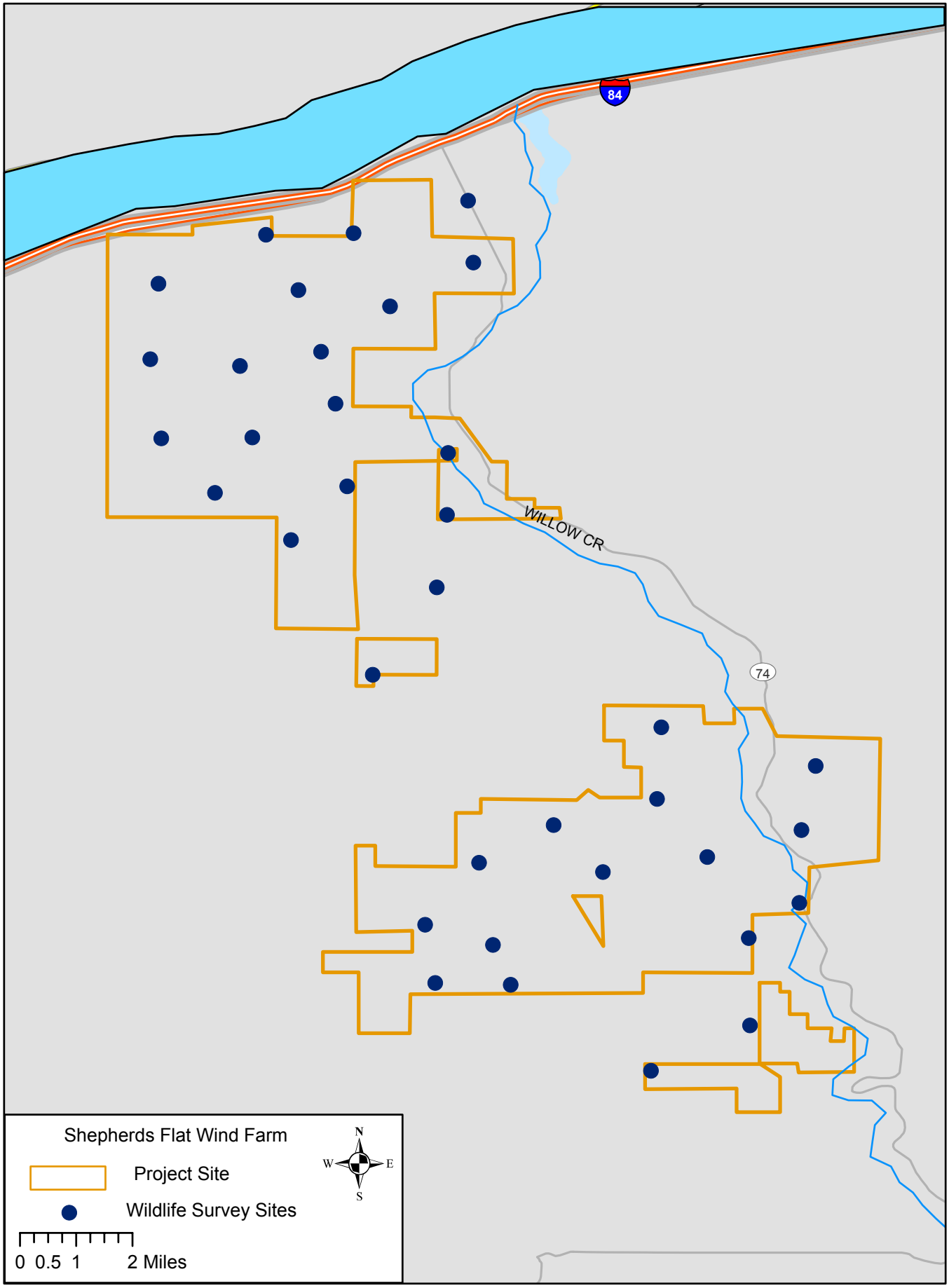
Although the Oregon Department of Fish and Wildlife has expressed an interest in obtaining permission to conduct wildlife surveys in the project area, the Applicant's wind project ground leases do not allow the Applicant authority to grant third party access to private lands.

Figure P-1



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure P-2


84
WILLOW CR
74
Shepherds Flat Wind Farm
Project Site
Wildlife Survey Sites
N
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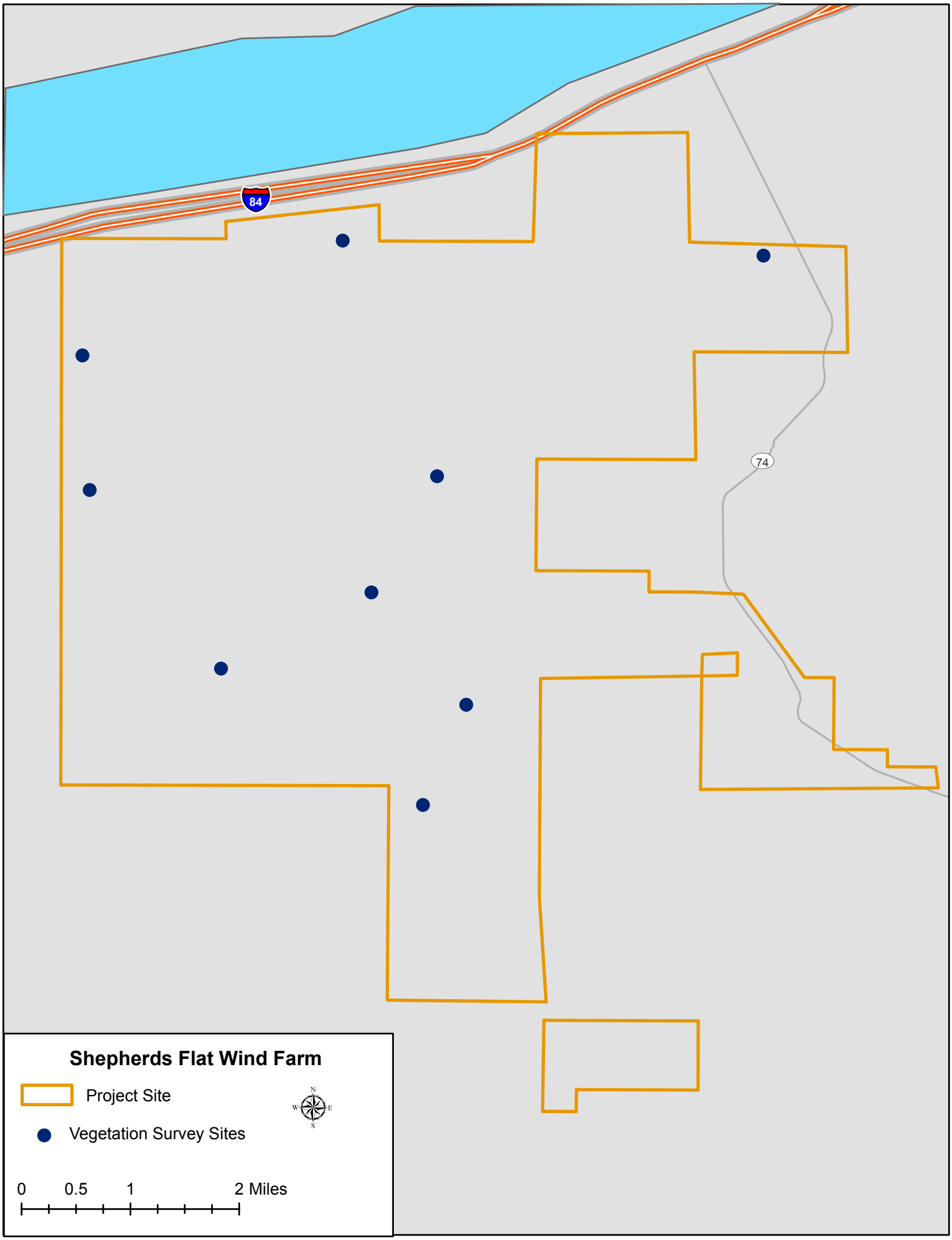
0 0.5 1 2 Miles

Figure P-3


84
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Shepherds Flat Wind Farm
Project Site
Vegetation Survey Sites
N
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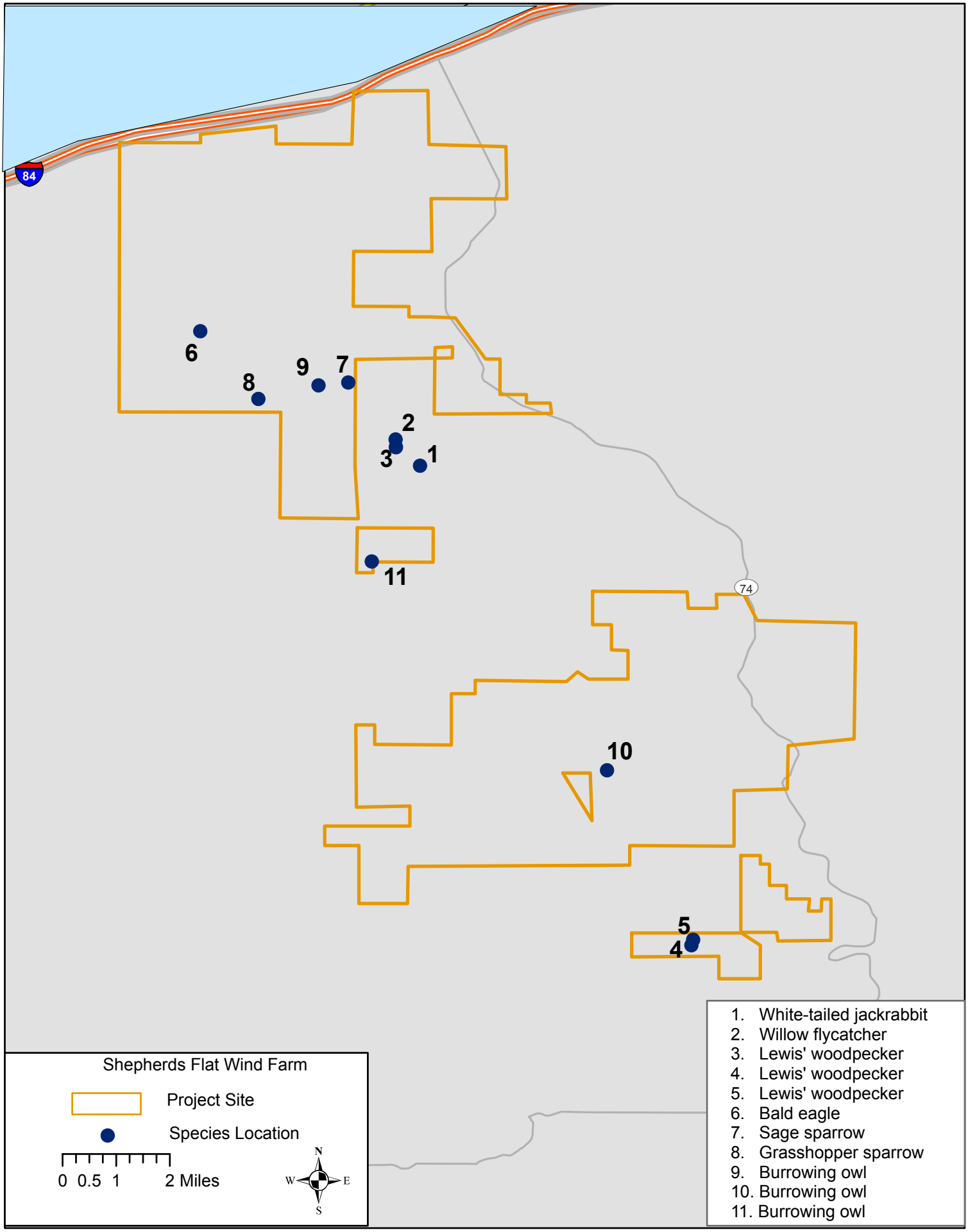
2 Miles

Figure P-4


84
74
6
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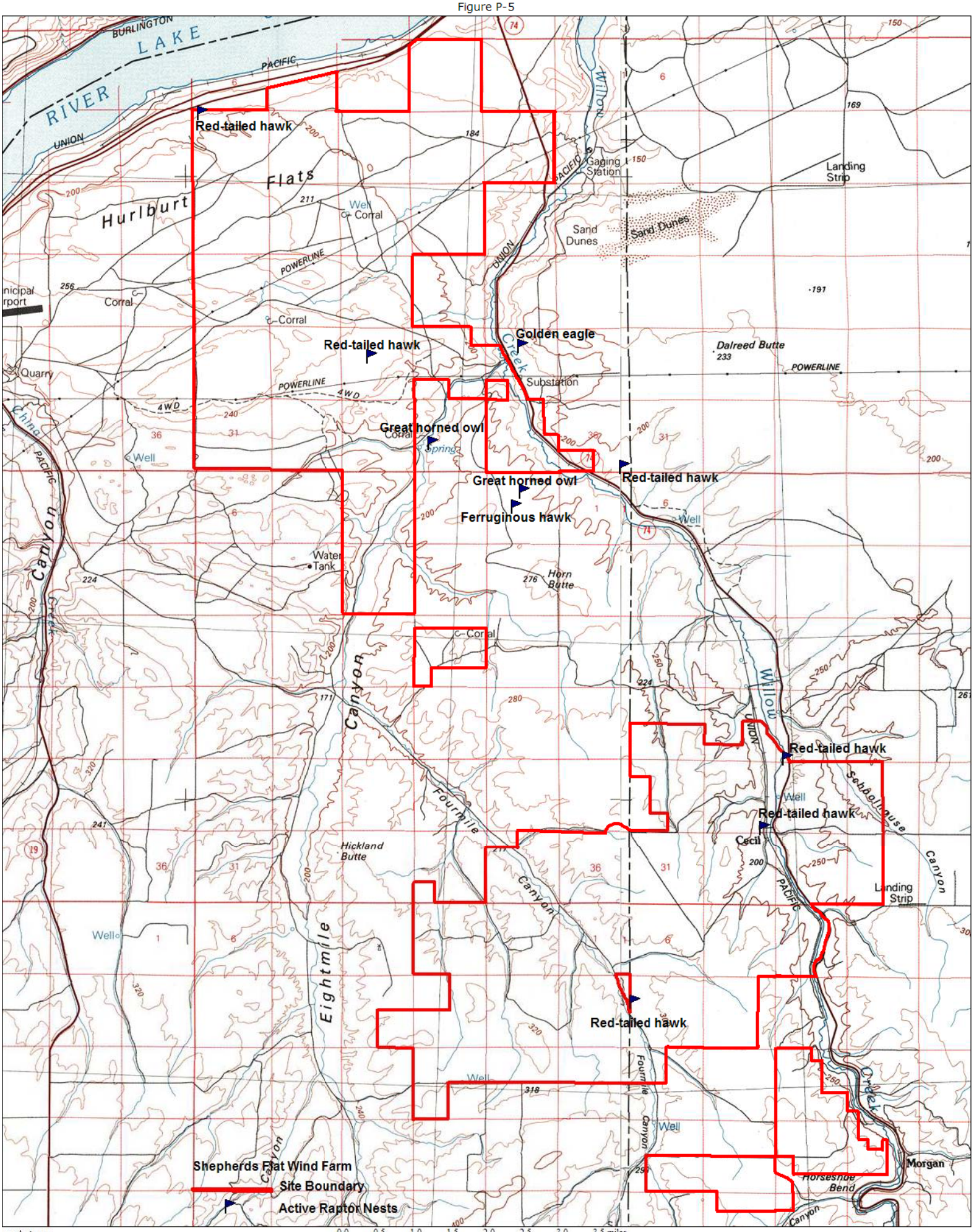
4
Shepherds Flat Wind Farm
Project Site
Species Location
0 0.5 1 2 Miles
N
W
E
S
1. White-tailed jackrabbit
2. Willow flycatcher
3. Lewis' woodpecker
4. Lewis' woodpecker
5. Lewis' woodpecker
6. Bald eagle
7. Sage sparrow
8. Grasshopper sparrow
9. Burrowing owl
10. Burrowing owl
11. Burrowing owl

Figure P-5



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

EXHIBIT Q

THREATENED AND ENDANGERED SPECIES

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:

(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;

(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;

(C) For each species identified under (A), a description of measures proposed by the applicant, if any, to avoid or reduce adverse impact;

(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);

(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;

(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; and

(G) The applicant's proposed monitoring program, if any, for impacts to threatened and endangered species;

In its Project Order dated October 16, 2006, the Oregon Department of Energy expanded upon the requirements of Exhibit Q as follows:

> [Applicant] should include in its application a list of both state- and federally-listed endangered, threatened, and candidate plant species that have potential to occur in the analysis area [defined as [t]he area within the site boundary and 5 miles from the site boundary]. [Applicant] should identify these species based on a review of literature,

consultation with knowledgeable individuals and reference to the list of species on the Oregon Natural Heritage Program.[1]

[Applicant] should include in its application a description and the results of a field survey for the listed plant species. The survey must be conducted by a person with expertise in field botany, plant taxonomy and biological conservation. The survey should be conducted during the time of year when it is possible to identify any listed plants (usually when these plants are in flower and fruit). The field survey report should include written descriptions of the survey methods and areas surveyed. [Applicant] should consult with the Oregon Department of Agriculture, Native Plant Conservation Program, regarding field survey methods, appropriate survey seasons, qualifications of field survey personnel and the information to be included in the survey report.

The Oregon Department of Fish and Wildlife (ODFW) provides technical review and recommendations on compliance with Council standards. ODFW will base its review and recommendations on threatened and endangered species policy (ORS 496.171 - .192).

State-listed threatened or endangered plant species that may be affected by the proposed facility are subject to the requirements of OAR 603-073-0090(5)(d)(A)-(E).

Threatened or Endangered Species

The project site straddles the county line between Gilliam and Morrow Counties, and lies within the Columbia Basin ecoregion of Oregon. Selection of species occurring within Gilliam and Morrow Counties in the Columbia Basin ecoregion includes a margin beyond the project site within Oregon greater than the required analysis area of five miles (Figure Q-1).

Correspondence from the U.S. Fish and Wildlife Service (USF&WS) (Attachments Q-1 and Q-2), databases and reports from the USF&WS Threatened and Endangered Species System,[2] the USF&WS Oregon Fish and Wildlife Office,[3] the Oregon Department of Fish and Wildlife (ODFW),[4] the Oregon Department of Agriculture Plant Division,[5] and the Oregon Natural Heritage Information Center[6] were surveyed to determine the species' listed for the project site. These determinations were updated for the project site and analysis area in January 2007. A

[1] OAR 345-022-0070 applies only to state-listed plant and animal species. Nevertheless, OAR 345-021-0010(1)(q) requires applicants to consider plant and animal species listed as endangered or threatened under both state and federal law. This requirement applies because the Council, in making its decision, must be mindful of possible adverse impacts to federally listed species. Note also that OAR 345-022-0070 applies to all lands affected by a proposed facility, including state, federal and private lands.

[2] http://ecos.fws.gov/tess_public/StartTESS.do

[3] http://www.fws.gov/oregonfwo/Species/EndSpeciesMainPage.asp

[4] http://www.dfw.state.or.us/wildlife/diversity/index.asp

[5] http://www.oregon.gov/ODA/PLANT/CONSERVATION/statelist.shtml

[6] http://oregonstate.edu/ornhic/data.html

review of federal threatened, endangered, proposed or candidate species within the analysis area in Washington State did not add any species to this list. The criteria for species selection were: species listed as threatened or endangered at the federal or state level and species proposed for or candidates for listing as threatened or endangered at the federal or state level; and species with historical or current records as having occurred in either Morrow or Gilliam County within the Columbia Basin ecoregion.[7, 8, 9] Where the species is a listed, proposed or candidate species in an ecoregion other than the Columbia Basin, it was not included. Species occurring in Oregon within the analysis area that are federally listed in other states but not listed in Oregon were included.

Individual Species Accounts

Plants

Non-vascular Plants

There are no Listed, Candidate or Proposed non-vascular plant species in the analysis area.

Vascular Plants

Five vascular plants are listed, candidate or proposed species currently or historically occurring within the Columbia Basin ecoregion in Gilliam or Morrow County. Of these, there are current observation records of one plant species within the analysis area but not within the project boundaries. None of the other species has been observed within the analysis area or on the project site, and none is expected to occur. All are discussed, below, as there is the potential for their eventual reintroduction to the site should their current ranges expand.

The south area of the project site is largely cultivated, used for growing dryland wheat. The north area of the project site has been used for the grazing of sheep since at least 1917. The vegetative characteristics of the north area of the project site were assessed as part of the review of wildlife habitat on the site (Exhibit P). Nine locations were surveyed (Figure Q-2), and at 21 sites within a 100-meter radius from the survey location, the species of all plants present was identified. Although the study was not designed as a survey for the presence of specific plant species, it did provide an opportunity to detect members of listed, proposed or candidate plant species in the unlikely event any are currently present on the project site.

Laurence's Milkvetch (astragalus collinus var. laurentii)

Federal Status: Species of Concern
Oregon State Status: Listed Threatened

[7] Oregon Natural Heritage Program (2001). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon.

[8] Oregon Natural Heritage Program (2004). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon.

[9] NatureServe (2006). NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia: http://www.natureserve.org/explorer

The historic or current distribution of Laurence's milkvetch includes both Morrow and Gilliam Counties. Habitats in which the plant can occur include basaltic grassland, sagebrush desert, and dry slopes. The plant is a perennial; were it to occur on the site it would be present year-round. Although the northern portion of the project area includes appropriate habitats, no plants were found during the survey of vegetative characteristics (Attachment P-4). Although the timing of the survey was not optimal for identification of Laurence's milkvetch, the more commonly observed wooly-pod milkvetch (astragalus purshii) was identified on the site. Primary threats to Laurence's milkvetch are roadside herbicide spraying and livestock grazing. Appearance of the species on the property is unlikely, as its current occurrences are at higher elevations. Whether from sheep grazing, agricultural practices or altitude limitations, recent (post-1980) known occurrences of Laurence's milkvetch are considerably south and east of the project site,[10] and outside of the analysis area. Impacts from construction and operation of the project would be the loss of suitable habitat from disturbance of areas occupied by turbine and transformer footprints, and from construction of new roads or widening of existing roads. The project is not anticipated to result in changes to current grazing or herbicide application practices. As it is unlikely that Laurence's milkvetch plants are currently present in the project area, no impacts to the species from project construction or operation are expected.

Dwarf Evening-Primrose (camissonia pygmaea)

Federal Status: Species of Concern
Oregon State Status: Candidate for Listing

The historic distribution of dwarf evening-primrose includes Gilliam County. There appear to be no records of current detections in either Morrow or Gilliam Counties, nor was the plant found during botanical surveys of the north area of the project site. The plant is a perennial, so if it occurs on the site it would be present year-round. Habitats in which the plant can occur include sagebrush uplands, and it is typically found in open areas of loose, rubbly substrate. The project area includes appropriate habitat. Impacts from the construction would be disturbance from temporary road widening and temporary staging areas. Impacts from operation of the project would be limited to the loss of suitable habitat from permanent disturbance of ground occupied by turbines, transformers and widened or new roads. Should dwarf evening-primrose become reestablished in the area, the amount of habitat on the site suitable for its use would be slightly diminished by the presence of the project. As it is unlikely that dwarf evening-primrose plants are currently present in the project area, no impacts to plants from project construction or operation are expected.

Disappearing Monkeyflower (mimulus evanescens)

Federal Status: Species of Concern
Oregon State Status: Candidate for Listing

[10] Kagan J.S., R. Morgan and K. Blakeley (September 2000). Umatilla and Willow Creek Basin Assessment for Shrub Steppe, Grasslands, and Riparian Wildlife Habitats. EPA Regional Geographic Initiative.

The historic distribution of disappearing monkeyflower includes Gilliam County. The plant is an annual, so if it occurs on the site, it would be present only during the growing season and its location could change from year to year. There appear to be no records of current detections in either Morrow or Gilliam Counties, nor was the plant found during botanical surveys of the north area of the project site. The plant grows in sagebrush-juniper plant associations, and requires seeps, riparian or seasonally moist areas. Because the presence of disappearing monkeyflower plants on the site is unlikely, no impacts to the species is expected from project construction. Potential impacts from operation of the project would be loss of suitable habitat occupied by project roads and turbine sites. Loss of suitable habitat for the plant is unlikely, as roads and turbine sites will avoid all wetlands, seeps and riparian areas in the project area that are identified while determining the site's wetlands and jurisdictional waters.

Hepatic Monkeyflower (mimulus jungermannioides)

Federal Status: None
Oregon State Status: Candidate for Listing

The historic and current distribution of hepatic monkeyflower includes Gilliam County. The plant grows on wet seep areas in steep basalt canyon walls, and may occur in appropriate areas of the project site, such as on the basalt walls of the Columbia River at the north end of the project site. No examples of this species were discovered during botanical surveys of the project site; however, the cliff faces were not surveyed. The only known current occurrence in the Umatilla Basin is in the Umatilla River Canyon,[11] outside of the analysis area. Neither construction nor operation of the project is expected to impact any plants that may occur in basalt cliffs, as no cliff areas of the site will be disturbed. It is unlikely that any plants are currently on the project site, and no impacts to hepatic monkeyflower plants or habitat is anticipated.

Sessile Mousetail (myosurus sessilis)

Federal Status: Species of Concern
Oregon State Status: Candidate for Listing

The historic and current distribution of sessile mousetail includes Gilliam County. The plant grows in alkaline vernal pools, and may occur in appropriate areas of the project site. None was found during vegetative surveys, although the surveys did not take place during the optimum season for detection of the plant. Sites at which the plants are known in Oregon are southwest of Arlington, next to the regional landfill.[12] These sites are outside of the project boundaries but within the analysis area. Project roads and turbine sites will avoid all wetlands in the project area that are identified while determining the site's wetlands and jurisdictional waters. As no impacts to wetlands or vernal pools are anticipated from construction or operation of the project, and it is unlikely that any plants are currently on the project site, no impacts to sessile mousetail plants or habitat is anticipated.

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[11] Ibid.

[12] Ibid.

Invertebrates

There are no Listed, Candidate or Proposed invertebrate species in the analysis area.

Vertebrates

There are three fish, three birds and four mammals that are listed, candidate or proposed species currently or historically occurring within the Columbia Basin ecoregion in Gilliam or Morrow County. The fish are confined to the Columbia River and environs, outside of the project boundaries but within the analysis area. Of the birds, one is currently observed within the analysis area only in Kittitas County, Washington, but not within the project boundaries or the analysis area on the Oregon side of the river. The other birds are expected to be rare visitors to the site. Of the mammals, one is currently present within the analysis area and may be present within the project boundaries, and there are no current observations of the remaining three mammals within the analysis area or the project boundaries.

Wildlife observations in the project area commenced in September 2002 and ended in October 2004. All project areas other than a small parcel of the northern property were surveyed for an entire year; the remaining parcel was surveyed during fall 2004. Observations included surveys of avian use at 39 locations throughout the project area (Figure Q-3), raptor nesting and breeding bird surveys on the project site and in its vicinity, and surveys for signs of burrowing owl and Washington ground squirrel activities. Observations of mammal species were also collected while the field biologists were at bird use sites, and collected for both birds and mammals while in transit to or around the project property.

Fish

The three listed fish species occurring in Morrow or Gilliam Counties are anadromous species that travel the Columbia River north of the project site within the analysis area (species are detailed, below). There are no perennial streams within the project boundaries that can support the presence of these fish or their habitat. No fish, listed or unlisted, were found on the project site during surveys of the project area. No listed, proposed or candidate fish species are anticipated to occur within the project boundaries, no water will be removed from their habitats, and any project-related rainwater runoff discharged to streams leading to their habitats will meet the standards of the National Pollutant Discharge Elimination System (NPDES). No impact on proposed, candidate or listed fish or their habitats is expected to occur from construction or operation of the facility.

Chinook Salmon (oncorhynchus tshawytscha)

Population Listed: Snake River, fall run
Federal Status: Listed Threatened
Oregon State Status: Listed Threatened

Population Listed: Snake River, spring/summer run
Federal Status: Listed threatened
Oregon State Status: Listed Threatened

Steelhead (oncorhynchus mykiss)

Population Listed: Middle Columbia River
Federal Status: Listed Threatened
Oregon State Status: Sensitive Species, Critical

Population Listed: Snake River Basin
Federal Status: Listed Threatened
Oregon State Status: Sensitive Species, Vulnerable

Sockeye Salmon (oncorhynchus nerka)

Population Listed: Snake River
Federal Status: Not Listed in Oregon; Idaho stock Listed Endangered wherever found
Oregon State Status: None

Amphibians

There are no Listed, Candidate or Proposed amphibian species in the analysis area.

Reptiles

There are no Listed, Candidate or Proposed reptile species in the analysis area.

Birds

Greater Sage-Grouse (centrocercus urophasianus)

Ecoregion in which Listed: Columbia Basin
Federal Status: Candidate for Listing
Oregon State Status: Sensitive Species, Vulnerable

The historic distribution of the greater sage-grouse includes Gilliam County. There appear to be no records of current detection in either Morrow or Gilliam Counties, nor was the bird observed during wildlife studies of the project site. The analysis area may intercept the very southern portion of the greater sage-grouse range in Klickitat County, Washington. Although historically present throughout the Columbia Basin, nearly all current observations of the species in Oregon are outside of this ecoregion.[13] Habitat for the species includes foothills, plains and mountain slopes where sagebrush is present; although extremely limited, appropriate areas exist on the project site. No impact to greater sage-grouse is anticipated from construction of the project as the species is not currently present on the site. Generally, sage grouse avoid tall structures;

[13] US Fish and Wildlife Service (2003). Candidate Assessment and Listing Priority Assignment Form for the Greater Sage Grouse: http://ecos.fws.gov/docs/candforms_pdf/r1/B06W_V01.pdf

construction of the facility may reduce the potential for reestablishment of greater sage-grouse populations on portions the project area.

Bald Eagle (haliaeetus leucocephalus)

Federal Status: Listed Threatened
Oregon State Status: Listed Threatened

The historic and current distribution of the bald eagle includes Gilliam and Morrow Counties. Generally wintering along the Columbia River to the north, the bald eagle is a rare visitor to the project area. Only one observation was recorded on the site during the entire wildlife study period (Attachment P-1). Although the occasional sheep carcasses that occurs on the site should provide an acceptable food source, no local bald eagles appear to take advantage of them – there appear to be ample preferred food resources elsewhere. No evidence of any bald eagle nests was found on or near the project site during nesting and breeding bird surveys. Construction of the project is not anticipated to cause any impact to this species due to the rarity of its appearance on the site. The most likely construction-related impact would be from loss of nesting structures, and there are no suitable structures within the project boundaries that will be removed during construction. There is a potential for operational impacts to birds from striking the turbine or tower. However, no bald eagles have been among avian fatalities reported at any of the regional wind power conversion facilities similarly sited.

American Peregrine Falcon (falco peregrinus anatum)

Federal Status: None
Oregon State Status: Listed Endangered

The historic distribution of the American peregrine falcon includes Gilliam and Morrow Counties. There appear to be current observations of the falcon in Gilliam County but not in Morrow County. No individuals of this species were observed on or off the project site during the entire wildlife study period, nor were any peregrine falcon nests discovered on or near the site during nesting and breeding bird studies. One preferred nesting location is on ledges or in holes on cliff faces. The bluffs along the Columbia River north of the project, and cliff faces within Eightmile Canyon (located in the southern portion of the north project area) were examined for raptor nests and none were found. No American peregrine falcon activity was observed from survey locations near the bluff or cliff edge that would indicate nesting locations. Construction of the project is not anticipated to cause any impact to the species, as the frequency of its appearance on the site appears to be extremely low. The most likely construction-related impact would be from loss of nesting habitat. There is none suitable on the project site other than the faces of bluffs and cliffs; those will not be disturbed. There is a potential for operational impacts to birds from striking the turbine or tower. However, no American peregrine falcons have been among avian fatalities reported at any of the regional wind power conversion facilities similarly sited.

Mammals

Canada Lynx (lynx Canadensis)

Federal Status: Listed Threatened
Oregon State Status: None

The historic distribution of the Canada lynx includes Morrow County. There appear to be no current observations of the lynx in either Morrow or Gilliam County, and none was observed during wildlife surveys on the project site. Most current sightings of the Canada lynx are from the Cascade Range and the Blue Mountains. Given the species' preference for coniferous or mixed forests, it is unlikely that the historic range in Morrow County included the project site. Although use of the Columbia Basin ecoregion is listed for the species, it is most likely the portion of the Basin adjacent to the Blue Mountain ecoregion in southern Morrow County. No impact to the species from construction or operation of the facility is expected, as Canada lynx are highly unlikely to appear on the site even if they reoccupy their historic range.

Gray Wolf (canis lupus)

Federal Status: Listed Threatened
Oregon State Status: Listed Endangered

The historic distribution of the gray wolf includes Gilliam and Morrow Counties. There appear to be no current observations of natural populations of the wolf in either county or in the state, and no wolves were observed during wildlife studies of the site. An experimental population may be reintroduced in Oregon on or near the project site, although there are no members of experimental populations currently present. Impacts to the species from construction of the project would be limited to vehicle strikes if species reintroduction occurs before completion of construction. Otherwise, there would be no impacts to the species from construction since no members are present. Operational impacts would similarly be limited to the possibility of strikes from project vehicles, and only if the species is reintroduced or naturally expands to reoccupy its original range.

Grizzly Bear (ursus arctos horribilis)

Federal Status: Listed Threatened
Oregon State Status: None

The historic distribution of the grizzly bear includes Gilliam and Morrow Counties. There appear to be no current observations of the bear in either county or in the state, and no bears were observed during wildlife surveys of the project site. Oregon contains none of the six ecosystems suitable for grizzly bears in which the U.S. Fish and Wildlife Service plans to focus efforts to restore species populations.[14] As the species is not currently present, and as future presence is unlikely, no impacts to grizzly bears are anticipated from construction or operation of the project.

[14] Servheen C. (1993). Grizzly Bear Recovery Plan. US Fish and Wildlife Service, Missoula, Montana.

Washington Ground Squirrel (spermophilus washingtoni)

Federal Status: Candidate for Listing
Oregon State Status: Listed Endangered

The historic and current distribution of the Washington ground squirrel includes Gilliam and Morrow Counties. A non-migratory species, any present on the project site would be present year-round. Although associated with sagebrush-grasslands, of particular importance to the species' range is soil type. The squirrel occupies burrow systems requiring deep soils with high silt contents. In Oregon, this is predominantly Warden soils,[15] although Roloff soils may also be suitable. The south area of the project site, where deeper soils are found, is covered by dryland wheat except in the few areas too steep to cultivate. Wheat farming is precluded in the north area of the project site, where soils are generally too shallow and rocky for cultivation. Although the southern portion may contain adequate depths of appropriate soils, Washington ground squirrel burrows are not compatible with agricultural cultivation. No Washington ground squirrels were observed within the project boundaries, nor were any observed on any portion of the project area during wildlife studies. No sign (scat, burrows) of Washington ground squirrels was observed during searches of all appropriate areas within planned turbine and road corridors, including searches of the unplowed verges of dryland wheat fields in the south area of the project site.

Except for one avian point count site in Willow Creek Canyon, wildlife survey locations were placed in the upland project areas where construction and operation of the facility is planned. Surveys for Washington ground squirrel activity did not take place in the lowland areas where some colonies are expected to occur outside of the project boundaries. Washington ground squirrels are known to occur within the analysis area, but none within the corridors of project construction or construction-related disturbance in the current site plan.

The increase in agricultural use of the species' historic range is one the primary reasons posited for its decline. Intensive grazing is another reason cited for its decline, although in the areas of the project where sheep grazing currently occurs, it is grazed primarily because the soils are too shallow for agricultural productivity and thus for Washington ground squirrel burrows. Warden soils exist in a small portion of the north project area, along with larger areas of Roloff soils (Figure Q-4). It is doubtful that areas of Roloff rock outcrop complex are suitable for burrow use by Washington ground squirrels.

Construction of the facility is the primary activity that could impact the species, through destruction of existing burrows or placement of turbines or access roads in areas of suitable habitat. During final turbine micrositing prior to construction of the project, unplowed areas where project access roads or turbine sites are planned for areas of Warden and Roloff soils, soil depths will be assessed within disturbance corridors. Where burrow depths are recorded, Washington ground squirrel burrows occur at depths greater than 1 meter.[16] Areas in which soil

[15] Oregon Fish and Wildlife Office (2004). Washington Ground Squirrel Endangered Species Fact Sheet, US Fish and Wildlife Service Oregon Fish and Wildlife Office.

[16] US Fish and Wildlife Service (2005). Species Assessment and Listing Priority Assignment Form for the Washington Ground Squirrel: http://ecos.fws.gov/docs/candforms_pdf/r1/A0HE_V01.pdf

depths are 0.6 meters or more will either be surveyed during the appropriate season for signs of Washington ground squirrel activity, or project components will be relocated to avoid the area. No roads or turbines will be sited in areas in which the species is active.

Proposed Mitigation Measures

Impacts to Plants

Although the survey of vegetative characteristics of the north area of the project site took place in 2002, much of the property subsequently experienced wildfires, particularly during the summer of 2004. Due to these fires, plant diversity and native species richness on the project site is expected to have declined in the intervening years. Of the listed, proposed or candidate plant species, none is expected to occur on the project site and only one, sessile mousetail, currently occur in the analysis area. Direct impacts to plants arise from destruction of existing individuals of the species occupying portions of the site disturbed by temporary construction areas, widening of existing roads, construction of new access roads, and disturbance of the space occupied by turbine or transformer footprints. Indirect impacts to plant species include removal of suitable habitat for future populations to occupy, or reduction of photosynthesis and transpiration in existing individuals from dust deposited on plant surfaces during construction or post-construction vehicular activity.

No disturbance of basaltic cliff faces, seeps, wetlands or riparian areas is anticipated during construction or operation of the facility. Surface waters will not be used during construction, and all project-related water discharges to the site will meet NPDES standards. No water will be taken from or discharged to the site during operation of the project. As no changes in current surface water conditions on the site are anticipated, no direct impacts to future disappearing monkeyflower, hepatic monkeyflower or sessile mousetail individuals, or to their populations or habitats, are expected from project construction or operation.

Neither Laurence's milkvetch nor dwarf evening primrose has been observed on the project site, and the presence of either is unlikely. Direct impacts to perennial plants present will be reduced by leaving intact the root systems of plants temporarily disturbed during construction, allowing possible plant regeneration after construction. Mitigation proposed for habitat loss (Exhibit P) should also mitigate for any lost habitat for Laurence's milkvetch and dwarf evening primrose.

Indirect impacts to vegetation from construction or operational dust deposition will be mitigated through water applications to disturbed ground during construction, by graveling of permanent roadways, and by imposition of construction and operation speed limits of 20 miles per hour. Spraying of water on disturbed ground is an effective dust deterrent, as is reduction of speeds on unimproved roads. Water application to disturbed areas and vehicle speed limit impositions are expected to reduce dust during construction to levels without significant impact to vegetation. Upon completion of construction, many of the unimproved roads on the project site previously used for access to the area will have been graveled. These roads will be available for use by the landowners, and should significantly reduce traffic on the many unimproved roads and 4-wheel drive tracks within the project boundaries. It is likely that overall dust production from vehicular traffic in the project area will be reduced from current conditions.

Impacts to Invertebrates, Fish, Amphibians or Reptiles

No impacts are anticipated, as no species within the selection criteria occur on the project site, nor will any construction or operation activities impact those off the project site.

Impacts to birds

Direct impacts to birds on the site during construction of the facility include vehicle strikes and loss of occupied nests (destruction of ground nests, removal of nesting structures, or disturbance leading to nest abandonment). Direct operational impacts include bird strikes on turbines or towers, strikes of birds by vehicles, bird strikes on guy wire or power lines, and power line-related electrocutions. Indirect avian impacts include loss of courting or nesting habitat, and redistribution or reduction of food resources – prey species avoidance of construction activity, loss of botanical resources previously produced in areas occupied by project components after construction, and reduction of prey species relying on the lost botanical resources. The only listed, candidate or proposed species historically appearing in Gilliam and Morrow Counties are the greater sage-grouse, bald eagle and American peregrine falcon. The bald eagle is a rare visitor to the project site, and the American peregrine falcon has not been seen on or near the property but can be expected to be an extremely rare visitor.

The greater sage-grouse, although historically resident, is not expected to reoccupy the project area unless extensive habitat alterations occur; no such alterations are planned or anticipated, as current grazing and agricultural practices are expected to continue. Historically, the project area contained substantial stands of big sagebrush over much of the site.[17] Now primarily cultivated or grassland, big sage exists in isolated, small pockets unlikely to sustain greater sage-grouse populations. The primary impact to greater sage-grouse from construction or operation of the facility the is the tendency for avoidance of tall structures observed in the family. However, the project site is currently unsuitable for occupation by the greater sage-grouse, and it is unlikely to become so. No mitigation is proposed for potential greater sage-grouse avoidance of portions of the project site.

Due to the rare occurrence of bald eagles and American peregrine falcons on the project site, the potential for vehicle strikes is extremely low. Methods for mitigation of vehicle strikes for birds on the project site include imposition of construction and operation speed limits of 20 miles per hour, and training of project personnel on the importance of cautious driving practices while on project roads.

Although no bald eagle or peregrine falcon nests were found on or near the site, no structures suitable for use in nest construction by any raptor species will be removed during construction of the facility. Abandonment of occupied nests will be reduced by avoidance of construction activity during nesting season within 0.5 miles of identified nest areas. There are no indications that operation of wind power conversion facilities significantly alters raptor use of a site, and no other mitigation is proposed for nesting impacts.

[17] Kagan et al. (2000), op. cit.

The only impact to animals from the turbines at wind power conversion facilities has been fatalities of birds and bats caused by strikes on the turbine or tower. The most infamous example for avian fatalities is in the Altamont Pass California Wind Resource Area, where several thousand small, older turbines with rapidly turning blades are sited in an area of extremely high avian abundance. The impacts at the site are exacerbated by the presence of guyed weather stations, overhead power lines and non-compliant power poles, adding wire strike and electrocution to the toll. Wind facilities and turbine manufacturers have made significant changes in siting, construction and design of turbines and towers to address these factors, with the result that no modern wind power conversion facilities experience the level of avian fatalities seen in the Altamont.

Changes in turbine design include elimination of all exterior structures and appurtenances permitting birds to perch or construct nests on the turbine itself. Towers are no longer lattice structures, a design that previously allowed perching and nesting to take place in and on the towers. Modern turbines are in an 'upwind' configuration, where the orientation of the nacelle during operation places the blades on the side from which the wind is coming. Modern turbines are taller, placing the blades above the flight height of several species. Turbine blades are larger as well, and their rate of rotation much slower, allowing better detection and avoidance of moving blades by birds. Changes in wind turbine siting have also taken place. Wildlife biologists survey sites prior to turbine siting, and topographical configurations that tend to increase avian impacts are avoided. Turbines are generally set back from the edges of cliffs or bluffs, areas extensively used by raptors for soaring. Some topographic features tend to funnel flight paths through constricted areas, and wildlife surveyors take notice of these to prevent placement of turbines within a constricted flight path (Attachment P-2). All of these precautions have resulted in significant reductions in avian fatalities at modern wind conversion facilities.

Some avian species are less susceptible to impacts from wind conversion facilities in relationship to their abundance or use of the facility area. These include American crows, turkey vultures and most owls, which appear to be too canny, and species such as the burrowing owl, which flies too low. Neither the bald eagle nor American peregrine falcon has experienced significant fatalities at modern wind power conversion facilities. Few sightings and no fatalities have been reported at regional facilities.[18, 19, 20, 21] We do not know if the absence of fatalities is because presence of these species on the types of terrain occupied by these facilities is extremely rare, or if the species are less susceptible to impact from modern facilities. No mitigation measures are proposed, other than use of modern turbines and towers and the siting precautions already mentioned. Should a project-related fatality of either species occur, USF&WS, who has

[18] Erickson W.P., G.D. Johnson, M.D. Strickland and K. Kronner (2000). Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon. Western EcoSystems Technology, Inc, Cheyenne, Wyoming.

[19] Erickson W., K. Kronner and B. Gritski (2003). Nine Canyon Wind Power Project Avian and Bat Monitoring Report. WEST, Inc., Cheyenne, Wyoming and Northwest Wildlife Consultants, Inc., Pendleton, Oregon.

[20] Western EcoSystems Technology and Northwest Wildlife Consultants (2004). Stateline Wind Project Wildlife Monitoring Final Report. Western EcoSystems Technology, Inc, Cheyenne, Wyoming and Walla Walla, Washington, and Northwest Wildlife Consultants, Inc., Pendleton, Oregon.

[21] Young D., K. Bay and V. Poulton (2006). Cumulative Impacts Analysis or Avian Resources from Proposed Wild Projects in Sherman County, Washington. Western EcoSystems Technology, Inc, Cheyenne, Wyoming.

jurisdiction over take of these species, will be notified. In addition, ODFW and the Oregon Department of Energy will be notified. Mitigation measures will be discussed with these agencies if any fatalities were to occur.

The risk to avian species from wire strikes will be mitigated by installation of unguyed weather stations and turbine towers. The majority of electrical and communication lines will be buried underground. Any above ground project electrical poles will be APLIC compliant,[22] to reduce the potential for avian electrocutions. The literature on avian wire strikes indicates that in some locations vehicular traffic is a component of that problem, when automobile traffic startles birds into panicked flight.[23] Additional driving precautions have been effective in reducing avian deaths from wire strike in those locations. The imposed construction and operation speed limits should help reduce wire strikes in the proposed facility as well, and additional personnel training will address vehicle-related wire strikes. During the spring season when project personnel may encounter fledgling raptors still learning controlled flight, personnel will be instructed to use particular care along project roads. Speed limits and personnel training may also help reduce incidences of panicked flight leading to turbine collisions.

The bald eagle and American peregrine falcon are carnivores and piscivores. Impacts to these species from prey species redistribution during their avoidance of construction activities are expected to be minimal due to the rarity of their use of the project site. Prey species generally reestablish themselves quickly when construction is completed in an area, and only portions of the project will be under construction at any one time. No mitigation is proposed for bald eagle or American peregrine falcon prey species redistribution during construction or reduction of species through loss of habitat occupied by project components.

Impacts to Mammals

Direct impacts to mammals on the site during construction or operation of the project include vehicle strikes for all species, and loss of Washington ground squirrel burrows or individuals during ground disturbing activities. Indirect impacts to mammals include redistribution or reduction of food resources – prey species avoidance of construction activity, loss of botanical resources previously produced in areas occupied by project components after construction, and reduction of prey species relying on the lost botanical resources. Of the listed, candidate or proposed species historically appearing in Gilliam and Morrow Counties, the Washington ground squirrel is the only mammalian species currently expected in the project area. The gray wolf may become a future resident of the area, but it is highly unlikely future individuals or populations of Canada lynx or grizzly bear will occur on or near the project site.

Mitigation for vehicle strikes of the Washington ground squirrel and the gray wolf includes imposition of construction and operation speed limits of 20 miles per hour, the common speed limit in Oregon for school zones. In addition, project personnel will be trained on the importance of cautious driving practices while on project roads. As vehicle strikes on sheep and sheep dogs

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[22] Avian Powerline Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS). 2005. Avian protection plan (APP) guidelines. Edison Electric Institute. Washington, D.C.

[23] Avian Powerline Interaction Committee. 1994. Mitigating bird collisions with powerlines: the state of the art in 1994. Edison Electric Institute. Washington, D.C.

are also of great concern (with these quite abundant on a large portion of the project site during much of the year), use of safe driving practices by project personnel will be enforced.

Impacts to the gray wolf from prey species redistribution during prey avoidance of construction activities are unlikely unless an experimental population is introduced in the area prior to completion of construction. Prey species generally reestablish themselves quickly when construction is completed in an area, and only portions of the project will be under construction at any one time. No mitigation is proposed for redistribution of gray wolf prey species. Reduction of gray wolf prey species through loss of habitat occupied by project components will be mitigated as described in Exhibit P.

In the southern project area, only the verges of cultivated fields are potential areas for use by Washington ground squirrels. In the northern project area, soils are generally too shallow for burrow activity, but some areas of appropriate soil types (Warden, Roloff) exist. Surveys of field edges and proposed turbine locations during the season in which Washington ground squirrels are active located no signs of their occurrence, nor were any incidentally observed on the project site during the two years wildlife biologists spent on and around the project property. Although unlikely, Washington ground squirrel burrows may still exist undetected in disturbance corridors within the project boundaries. During final turbine micrositing prior to construction of the project, unplowed areas where project access roads or turbine sites are planned in areas of appropriate soils, soil depths will be assessed within disturbance corridors. Areas in which soil depths are 0.6 meters or more will either be surveyed during the appropriate season for signs of Washington ground squirrel activity, or project components will be relocated to avoid the area. No areas with Washington ground squirrel activity will be disturbed during construction or operation of the project. Loss of potential habitat or reduction of food resources from occupation of a portion of the project site by facility components will be mitigated as described in Exhibit P.

Plant Protection and Conservation

There is no plant protection and conservation program for the site adopted by the Oregon Department of Agriculture. The project will have no impact to plants or their critical habitats outside of the project area. The project is expected to have no potential significant impact on the continued existence or critical habitat of any plant species outside of the project area, and the project is expected to cause no significant reduction in the likelihood of off-site plant species survival or recovery.

Listed, proposed or candidate plant species that are unlikely to exist on the project site but may reestablish at a later time include Laurence's milkvetch, dwarf evening-primrose, sessile mousetail, hepatic monkeyflower and disappearing monkeyflower.

Of these, disappearing monkeyflower, hepatic monkeyflower and sessile mousetail require seeps, riparian areas or vernal pools. None of these features will be disturbed on the project site, nor will surface water resources or water quality be diverted or altered. With the addition of dust suppression, the project is expected to have no potential significant impact on the continued existence or critical habitat of these species, and the project is expected to cause no significant reduction in the likelihood of survival or recovery of these species.

On the northern portion of the project site, there are suitable substrates for growth of Laurence's milkvetch and dwarf evening primrose that will be disturbed during project construction and lost to the species through occupation by facility components. The area of the project site that will be temporarily disturbed totals 442 acres, representing 1.4% of the total 32,100-acre project area. The permanent footprint of the facility will be 255 acres, 0.8% of the project area. The project proposes to mitigate the permanent 255-acre loss of habitat as described in Exhibit P: restoration of an equivalent area through establishment of agreements with regional landowners for enhancements of habitat (reduction or redirection of grazing), conversion of cultivated land to more native landscapes, or purchase of an equal area of land and restoring it to equivalent habitat quality. Agreements and/or land purchases would be maintained for the life of the project.

Neither the permanent nor temporary area disturbed by the project represents a significant portion of the total. It is unlikely that either Laurence's milkvetch or dwarf evening primrose is currently present on the property to be damaged during construction. No net loss of suitable habitat will occur, by enhancing and conserving land to replace that permanently disturbed. This conserved land could be used by either plant species should they become reestablished in the vicinity of the project. With habitat replacement and the dust suppression measures described, above, the project is expected to have no potential significant impact on the continued existence or critical habitat of these species, and the project is expected to cause no significant reduction in the likelihood of survival or recovery of these species.

Animal Protection and Conservation

The project is expected to have no potential significant impact on the continued existence or critical habitat of any animal species outside of the project area, and the project is expected to cause no significant reduction in the likelihood of off-site animal species survival or recovery.

Listed, proposed or candidate animal species that may currently exist on the project site are the bald eagle, American peregrine falcon and Washington ground squirrel. Of these, only the bald eagle has been observed on the project site. The gray wolf is the only listed, proposed or candidate animal species expected to return to the site, initially most probably as an experimental population.

No sites of Washington ground squirrel activity will be disturbed during construction or operation of the facility, and sites with no activity occupied by the permanent footprint of the facility will be replaced by habitat of equivalent quality as described in Exhibit P and briefly, above. With habitat replacement, avoidance of locations with ground squirrel activity and imposition of speed limits, the project is expected to have no potential significant impact on the continued existence or critical habitat of the Washington ground squirrel, and the project is expected to cause no significant reduction in the likelihood of species survival or recovery.

As rare visitors with no reports of fatalities caused by regional wind projects similarly sited, there is a very low probability for adverse impacts to the bald eagle or the American peregrine falcon from construction and operation of the facility. Low use of the project property indicates there are no resources present at the site upon which members of either species rely. With modern wind turbine and tower design, turbine locations set back from cliff edges and outside of flight corridors, burial of the majority of power and communication lines, absence of guyed

weather stations or turbine towers, APLIC-compliant power poles, speed limit restrictions, nest structure preservation and limitation of construction to periods outside of the breeding season near identified nesting areas, the project is expected to have no potential significant impact on the continued existence or critical habitat of the bald eagle or American peregrine falcon, and the project is expected to cause no significant reduction in the likelihood of survival or recovery of these species.

Potential impacts to the gray wolf from project construction or operation are limited to the risk of vehicle strikes and the redistribution or reduction of prey species. Redistribution of prey species is expected to be highly local and temporary. The small reduction in the number of prey species available on the project site will be balanced by the increase in prey through habitat enhancement or restoration on the land replacing habitat lost to facility components. With the addition of project speed limits, the project is expected to have no potential significant impact on the continued existence or critical habitat of the gray wolf, and the project is expected to cause no significant reduction in the likelihood of survival or recovery of this species.

Monitoring Program

No monitoring programs are projected for listed, proposed or candidate species other than for birds. Although bat species would not be excluded, monitoring is targeted primarily at avian species, and presented in brief, below. The first component is designed to look for information about population-level impacts to the studied species, and the second, a contingency plan, provides for standard fatality counts to which fatality counts from other wind power conversion facilities can be compared. These will be fully developed and submitted to the Siting Council prior to issuance of the site certificate.

Primary Program

It is proposed that annual spring raptor and long-billed curlew nesting surveys and annual fall horned lark censuses take place for a period of ten years, in the hope of providing an indication of impacts to populations, rather than of impacts to individuals, from facility construction and operation. These surveys, proposed to commence upon issuance of the site certificate, will provide pre- and post-construction information about avian use of the project area, and local population changes for the surveyed species. One year of use surveys and two years of raptor nesting surveys have been performed within and around the project boundaries. Facility construction is anticipated to be a phased operation, and portions of the project area will remain available for gathering additional pre-construction use and nesting information. The bald eagle and American peregrine falcon are present on the project site too infrequently to use for analysis of population impacts. Raptor species and the long-billed curlew encompass many federal and state avian species of concern found in surveys of the project area. The horned lark (the most abundant avian species found on the site) may be an appropriate sentinel species for passerines, and a surrogate species for estimation of impacts to those species less frequently observed.

In addition to the described studies, a life-of-the-project Wildlife Response and Reporting System (WRRS) is proposed. This system would be similar to that accepted for Klondike III.[24] These programs provide reasonably accurate information about fatality levels for large avian

[24] http://www.oregon.gov/ENERGY/SITING/docs/KWPOA.pdf

species, including large hawks and owls, eagles, and geese. The programs are less precise for estimation of bat or small bird fatalities unless the fatality incident involves large numbers. The WRRS will be capable of indicating unexpected levels of avian or bat fatalities, even of small species. If such should occur, the studies proposed under the primary program can be terminated and those proposed for the contingency plan can commence.

Contingency plan

This plan includes those studies standard to monitoring of wind power conversion facilities: avian and bat fatality monitoring through standard carcass searches of a statistically representative subset of turbines, including studies of sampling bias; and standard avian use studies. Both are proposed to last for a period of two years. In addition, two years of raptor nesting are proposed (adjusted for those that may have already taken place while the primary plan was in effect), followed by nesting surveys at five-year intervals for the life of the project. As in the primary program, the WRRS would continue. The contingency plan would provide information about the impact of project construction and operation on individual birds and bats, and would give a more accurate fatality count than would the primary program. This would aid in assessment of relative fatality rates, by allowing comparison on a fatalities-per turbine or -per megawatt basis to bird and bat fatalities at other wind power conversion facilities.

Figure Q-1

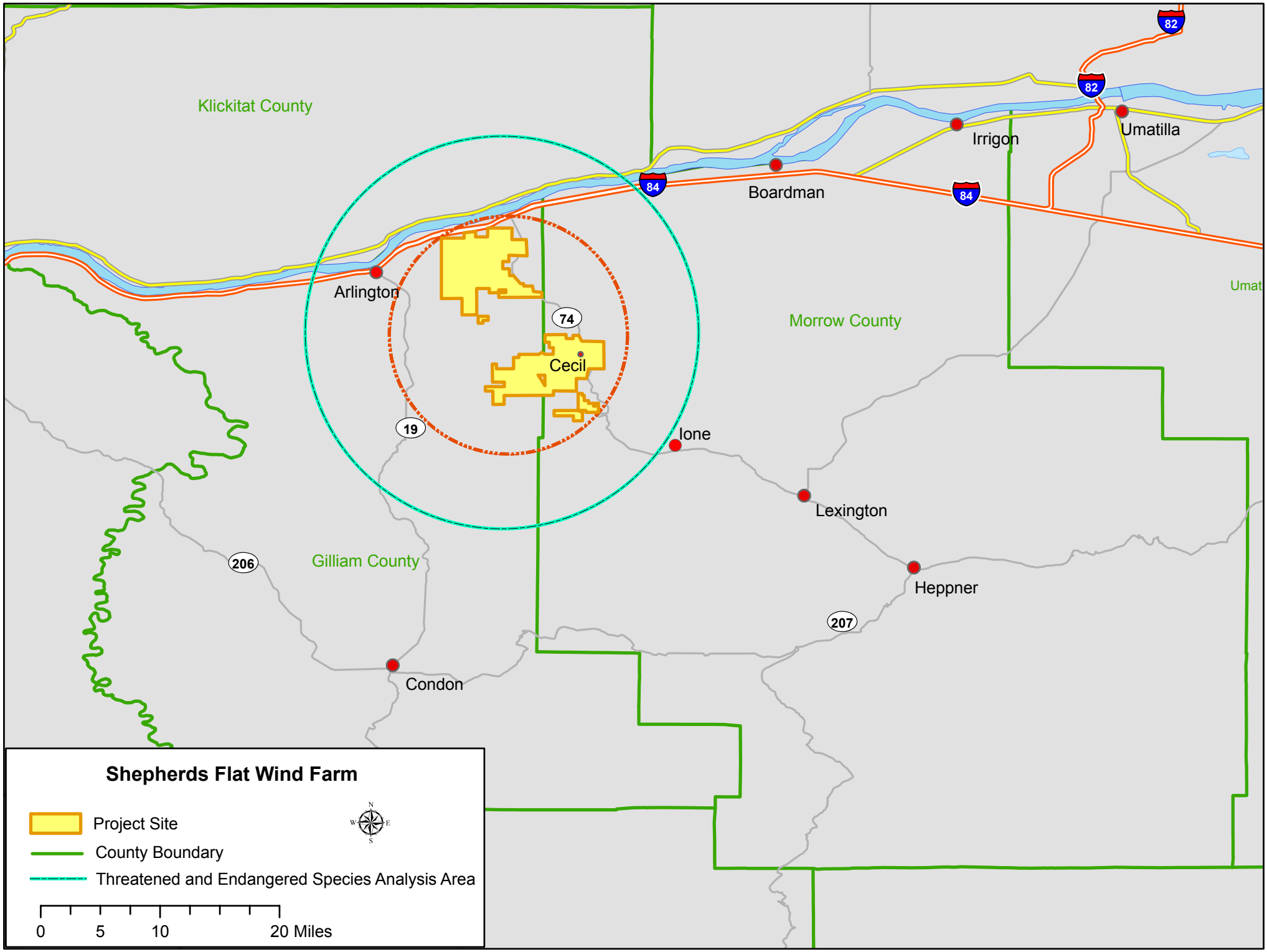
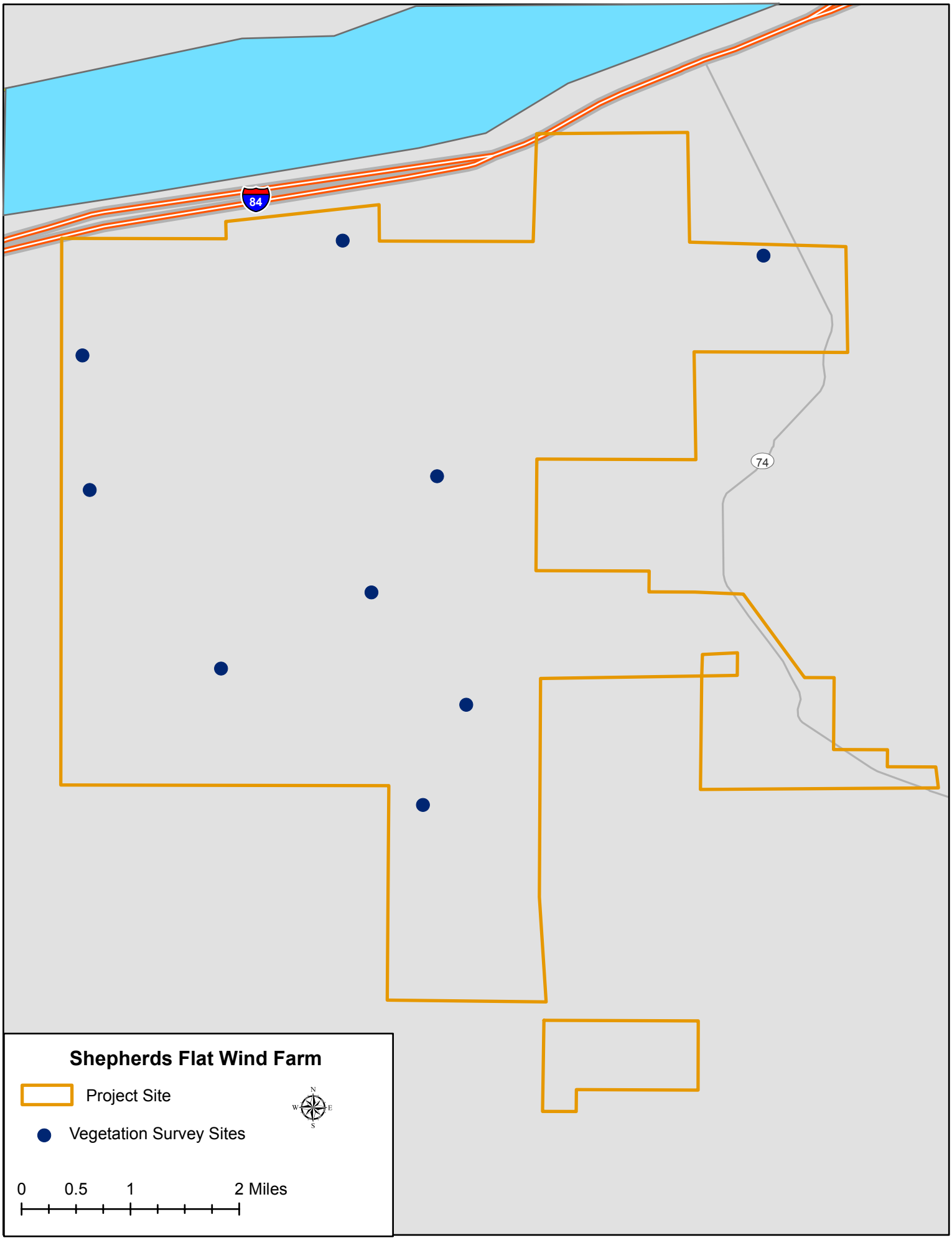

Klickitat County
Morrow County
Gilliam County
Umat
Arlington
Boardman
Irrigon
Umatilla
Cecil
Ione
Lexington
Heppner
Condon
82
84
74
19
206
207
Shepherds Flat Wind Farm
Project Site
County Boundary
Threatened and Endangered Species Analysis Area
N
W
E
S
0
5
10
20 Miles

Figure Q-2


84
74
Shepherds Flat Wind Farm
Project Site
Vegetation Survey Sites
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W
E
S
0
0.5
1
2 Miles

Figure Q-3

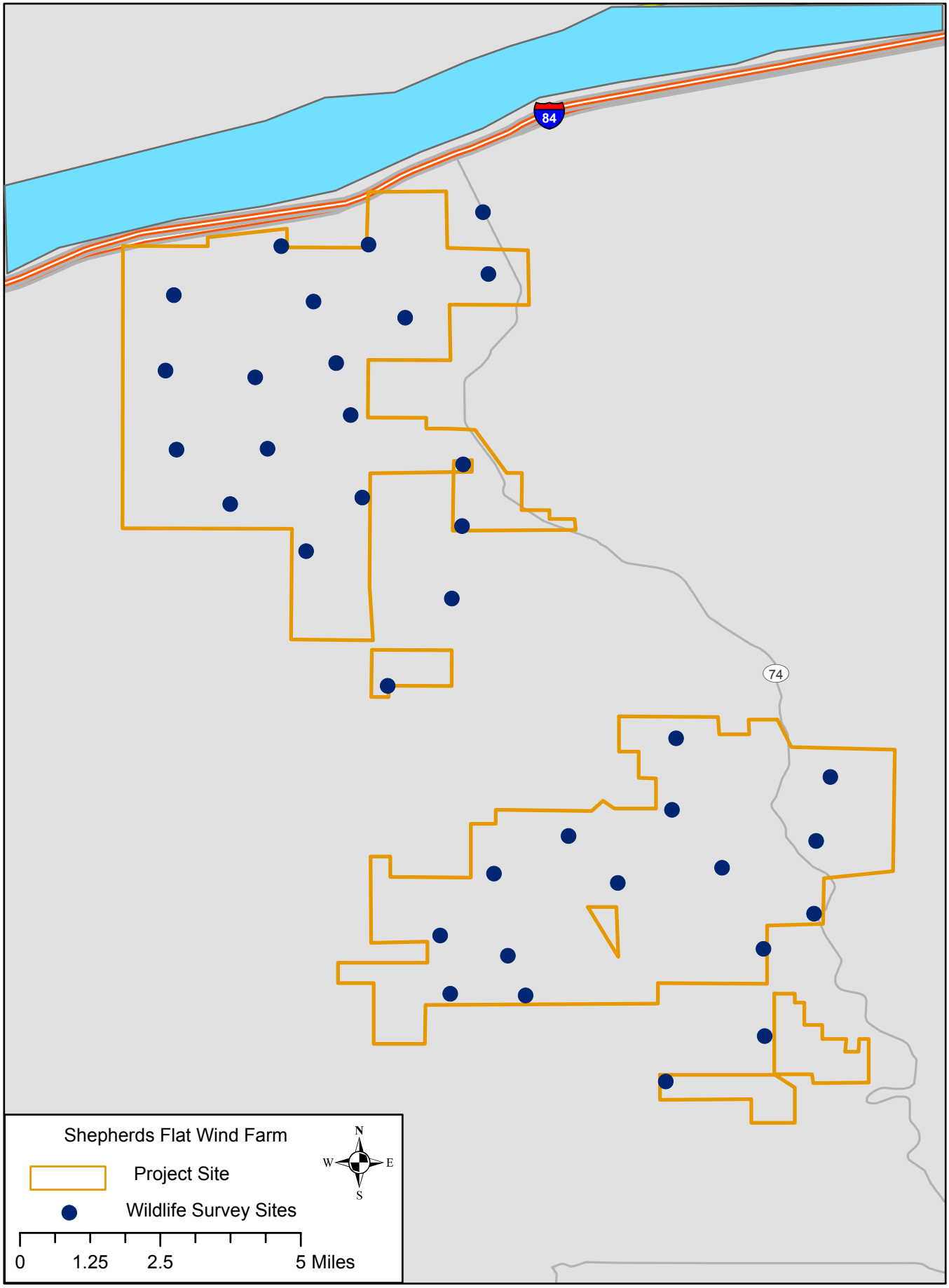
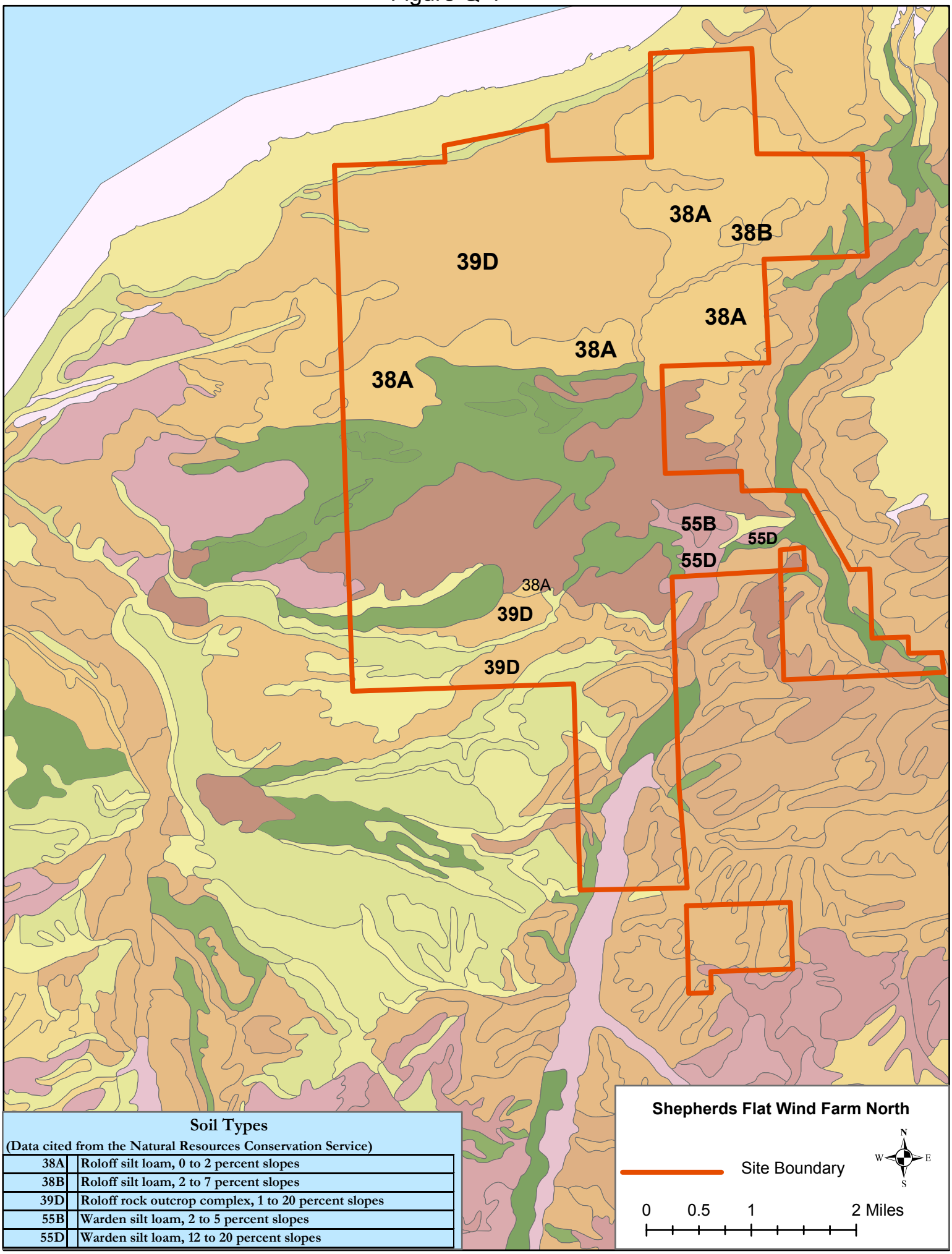

84
74
Shepherds Flat Wind Farm
Project Site
Wildlife Survey Sites
N
W
E
S
0
1.25
2.5
5 Miles

Figure Q-4



Soil Types

(Data cited from the Natural Resources Conservation Service)

38A	Roloff silt loam, 0 to 2 percent slopes
38B	Roloff silt loam, 2 to 7 percent slopes
39D	Roloff rock outcrop complex, 1 to 20 percent slopes
55B	Warden silt loam, 2 to 5 percent slopes
55D	Warden silt loam, 12 to 20 percent slopes

EXHIBIT R

SCENIC AND AESTHETIC VALUES

An analysis of significant potential impacts of the proposed facility, if any, on scenic and aesthetic values identified as significant or important in applicable federal land management plans or in local land use plans for the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0080, including:

(A) Identification of the applicable federal land management plans and local use plans;

(B) Identification and description of the scenic and aesthetic values identified as significant or important in the applicable plans;

(C) A description of significant potential adverse impacts to the scenic and aesthetic values identified in (B), including, but not limited to, potential impacts such as:

(i) Loss of vegetation or alteration of the landscape as a result of construction or operation;

(ii) Visual impacts of facility structures, including cooling tower or other plumes, if any; and

(iii) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class 1 visual resources as described in OAR 340-031-0120;

(D) The measures the applicant proposes to avoid, reduce or otherwise mitigate any significant adverse impacts;

(E) A map or maps showing the location of the visible scenic and aesthetic values analyzed under (B); and

(F) The applicant's proposed monitoring program, if any, for impacts to scenic and aesthetic values;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit R as follows:

> All paragraphs apply. The reference in (C)(iii) is incorrect; the correct reference is OAR 340-204-0050.

<u>Scenic and Aesthetic Values</u>

The thirty mile area for scenic and aesthetic analysis is shown in Figure R-1. Approximately one third of the analysis area is within the state of Washington, which is not considered in this Exhibit (although it is noted that Klickitat County, Washington hosts wind turbine installations along the Columbia River).

Federal land management plans

The analysis area includes the John Day River, which is designated a National Wild and Scenic River. No facility structures will be visible from the John Day River. The federal area of jurisdiction extends to a buffer zone which is at its maximum one mile from the river. No facility structures will be visible from within this buffer zone.

The Oregon Trail runs through the project site itself, and there is an Oregon Trail Interpretive Center in Four Mile Canyon, adjacent to the project site. The Oregon Trail Historic Site at Four Mile Canyon has been designated a Special Management Area by the federal Bureau of Land Management. The potential for the Shepherds Flat Wind Farm (SFWF) to impact the Oregon Trail is discussed in Exhibit S, and the potential for the facility to impact the Oregon Trail Interpretive Center in Four Mile Canyon is discussed in Exhibit L.

Local land use plans

The analysis area covers portions of Sherman, Wheeler and Umatilla Counties in addition to Gilliam and Morrow Counties within which the project site is located. Project structures will not be visible from locations in Wheeler and Umatilla Counties.

Sherman County

The *Sherman County Comprehensive Land Use Plan* identifies important landscape features (trees, rock outcroppings and its river canyons). The SFWF, if visible at all from Sherman County, will appear on the far eastern horizon. The most noticeable visual impact is likely to be the nighttime aircraft hazard lighting required by the Federal Aviation Administration (FAA). The SFWF will work with the FAA to minimize visual impact through lighting placement and fixture selection.

The Sherman County Plan also encourages the development of renewable resources, and the county hosts wind turbine installations at Klondike.

Gilliam County

The *Gilliam County Comprehensive Land Use Plan* also identifies important landscape features, which include rock outcroppings and the John Day River corridor. The SFWF compatibility with the Gilliam County Plan is addressed in Exhibit CC.

Morrow County

The *Morrow County Comprehensive Land Use Plan* does not designate any sites or areas as high in scenic-resource value. The SFWF compatibility with the Morrow County Plan is addressed in Exhibit CC.

The *City of Boardman Comprehensive Plan* notes that there are limited scenic views, none of which could be considered outstanding.

Significant Potential Adverse Impacts to Scenic and Aesthetic Values

Vegetation is already sparse in the project area, and vegetative loss will be limited to project roads and turbine pads. This change will only be apparent within the project site, due to topography. The overall landscape, however, will be altered by the installation of the project's turbine towers.

The scenic and aesthetic values analysis area is framed by the McNary Dam with its 980 MW powerhouse to the west, and the John Day Dam with its 2,160 MW powerhouse to the east. Rows of high-voltage transmission towers, sometimes five abreast, cross the Columbia River and run along its shores to connect these two facilities. Four separate rows of these tall towers cross the SFWF site.

The 550 MW Boardman Coal Plant with its smokestacks and plumes is visible on the horizon from most of the eastern half of the analysis area. The two Coyote Springs natural gas combined-cycle turbines (503 MW total) emit steam and are located on Lake Umatilla.

There are whose who find wind turbines a graceful addition to the rural landscape, as well as to the generating capacity identified above. And there are those who do not. The important or significant values contained in the federal land management plans and local comprehensive land use plans considered in Exhibit R do not address this difference of opinion nor discourage the proposed change to the landscape.

Therefore, no impact on scenic and aesthetic values identified as significant or important in applicable federal land management plans or in local land use plans is anticipated. Neither mitigation nor monitoring is proposed.

Figure R-1

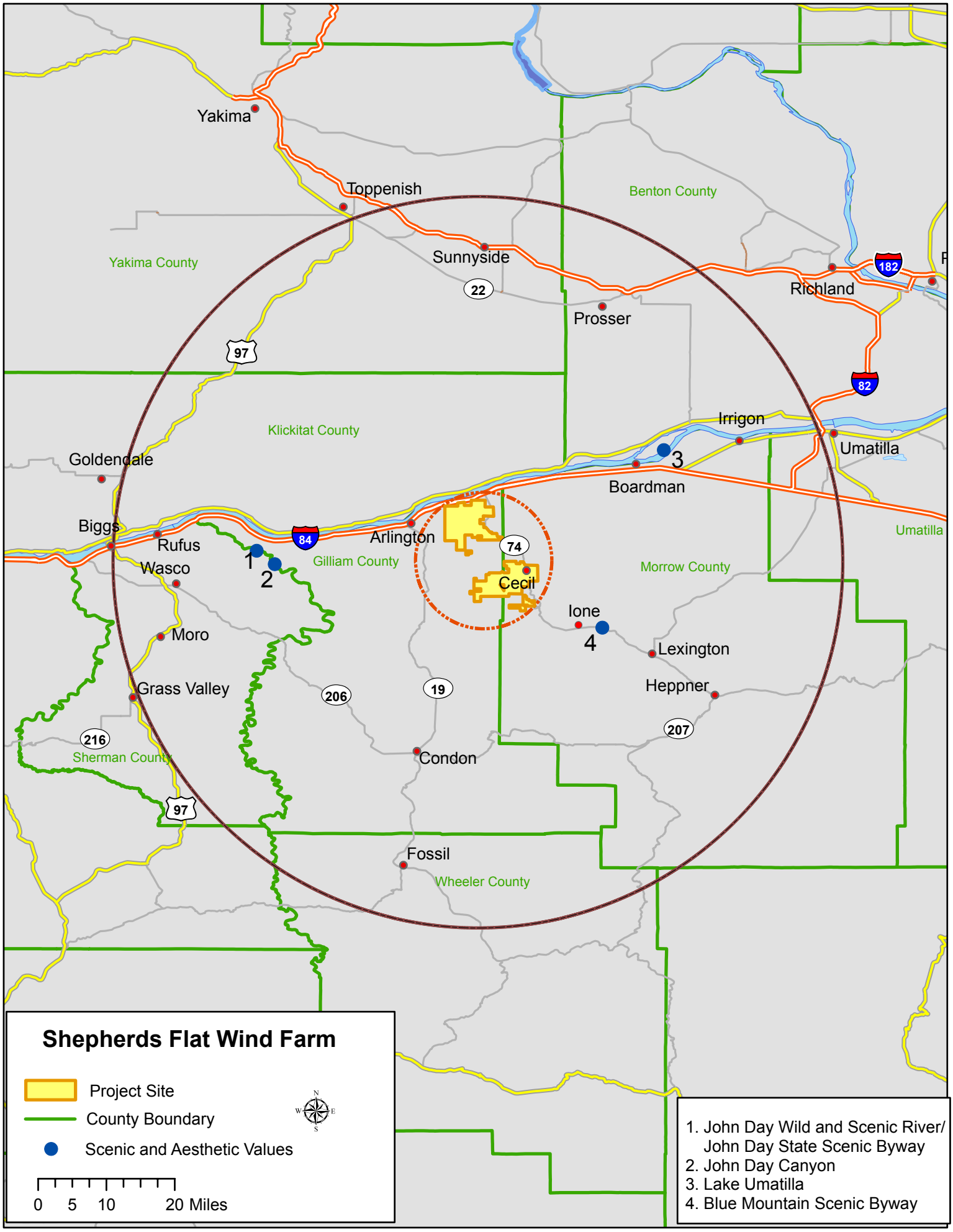

Yakima
Toppenish
Benton County
Yakima County
Sunnyside
22
Richland
182
Prosser
97
82
Klickitat County
Irrigon
Umatilla
Goldendale
3
Boardman
Biggs
Rufus
84
Arlington
74
Umatilla
Wasco
1
2
Gilliam County
Morrow County
Cecil
Ione
4
Moro
Lexington
Grass Valley
206
19
Heppner
207
216
Sherman County
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Project Site
County Boundary
Scenic and Aesthetic Values
0 5 10 20 Miles
1. John Day Wild and Scenic River/ John Day State Scenic Byway
2. John Day Canyon
3. Lake Umatilla
4. Blue Mountain Scenic Byway

EXHIBIT S

HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

Information about historic, cultural and archaeological resources providing evidence to support a finding by the council as required by OAR 345-022-090, including:

(A) 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;

(B) For private lands, archaeological objects, as defined in ORS 359.905(1)(a), and archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area;

(C) For public lands, archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area;

(D) The significant potential impacts, if any, of the construction, operating 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:

(i) A description of any discovery measures, such as surveys, inventories, and limited subsurface testing work, recommended by the Stat 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);

(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;

(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

(iv) A completed copy of any permit applications submitted pursuant to ORS 358.320. 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; and

(E) The applicants proposed monitoring program, if any, for impacts to historic, cultural and archaeological resources during construction, operation and retirement of the proposed facility;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit S as follows:

> All paragraphs except (C) apply.
>
> The application should include evidence of consultation with affected tribes, including the Confederated Tribes of Umatilla and the Confederated Tribes of Warm Springs, regarding archaeological and cultural sites and materials within the site boundary. The affected tribes provide technical review and recommendations in reference to the Council's Historic, Cultural and Archaeological Resources Standard (OAR 345-022-0090).
>
> The Oregon Parks and Recreation Department provides technical review and recommendations on compliance with Council standards.
>
> The State Historic Preservation Office (SHPO) within the Oregon Parks and Recreation Department provides technical review and recommendations in reference to the Council's Historic, Cultural and Archaeological Resources Standard (OAR 345-022-0090). The application should include an archaeological and cultural survey conducted by a qualified archaeologist.
>
> **Note:** Information concerning the location of archaeological sites or objects may be exempt from public disclosure under ORS 192.501(11). Please do not include specific location information in the text of site certificate application. Such information, including archaeological survey reports, should be provided only after consultation with the Department.

Response to Concerns

The Oregon Parks and Recreation Department, Oregon Historic Trails Advisory Council has expressed concerns with respect to the potential impact of the facility on Oregon Trail sites.

National Register of Historic Places

There are no resources within the project boundaries that are currently listed on the National Register of Historic Places. Two resources within the boundaries may be eligible: the Cecil store and post office, and a portion of the Oregon Trail with wagon ruts still visible. Both of these are within or near the community of Cecil, in Willow Creek Canyon in the south area of the project site. The Wells Springs Segment of the Oregon Trail is listed, situated south of Boardman to the east of the project.

One known archeological site, 35GM19, is located within the boundaries in the north area of the project site. The site is an extensive lithic scatter with artifacts. Prior to dam construction and the filling of Lake Umatilla, surveys along the Columbia River identified prehistoric sites on or near the shoreline. Some remain and many have been inundated. In the course of archaeological surveys in the project area, 6 identified sites remain along the Columbia on the Oregon side of the river and 10 on the Washington side. These are directly north of the project and outside of the

project boundaries. A site was also identified in Willow Creek Canyon in the vicinity of but outside the northeast corner of the project boundaries.

Resources Surveys

To provide a background for pending archeological field studies, a cultural resource overview of the site was conducted in March 2006 by Archaeological Investigations Northwest, Inc. (AINW), Portland, Oregon. AINW performed a comprehensive survey of the records and literature and examined the results of previous studies on the project site or in the immediate vicinity. Locations within the project boundaries at which archeological or historical resources are likely to occur were identified for periods pre- and post European settlement. Two previous archeological field surveys had been conducted within the project boundaries in portions of the north project area. One survey, covering several hundred acres, identified the site known to occur within the project boundaries. The second, a survey for a transmission line corridor that included an area within the project boundaries, located no resources. No surveys have been performed on or near the south area of the project, and no sites have been identified.

In the cultural resources overview, American Indian land use patterns in the upland areas of the project site, where most construction will occur, was expected to have been limited to occasional travel between rivers, hunting, and plant collection (Attachment S-1). Based on this use, the most likely locations for detection of archeological deposits were estimated to include canyon bottoms and terraces in the lower portions of the walls of Willow Creek, Eightmile and Fourmile Canyons. Areas close to springs were considered to have the potential for location of archaeological resources, as were minor drainages and upland travel corridors. Based on expected land use patterns, AINW mapped areas within the project boundaries having a high-to-moderate potential for American Indian archeological resources.

There are three locations in which Euroamerican resources may be present or are known to occur. The project is crossed by a segment of the Oregon Trail and by the route of a telegraph line constructed in 1869. These routes, and the community of Cecil, were considered to be areas having the potential for location of archeological deposits.

In areas where turbine string, road and other project or construction-related corridors intersect these identified probability areas for prehistoric or historic-period sites, systematic ground surveys for surface evidence of archeological and historic resources are pending. The use of more intensive survey methods, such as subsurface testing, will be based upon the results of these ground surveys. Preliminary consultation with the affected tribes has occurred, and they will participate in the field surveys of the project property.

Potential Impacts and Resource Protection

Potential impacts to resources from construction, operation and decommissioning of the proposed facility include damage to or destruction of sites and artifacts, or displacement of artifacts from their current locations by ground disturbing activities; there is also the potential for preclusion of access to sites underneath facility components.

The Applicant proposes to prevent damage of identified resources during construction or decommissioning by avoiding any ground disturbing activity or component siting within 50 feet of known resources. The circumference of this buffer will be flagged for the duration of construction or decommissioning activities in the area, and the construction or decommissioning contractor instructed of their locations and the need for avoidance. Should potential resource sites be discovered in the course of construction or decommissioning, activity in the area will cease until the location is evaluated by AINW.

The Applicant proposes to build a low rustic fence around part of the identified area of visible Oregon Trail wagon ruts. Although the fence will help prevent inadvertent damage to the site, it is intended primarily to provide definition for display of an important cultural resource. An informational posting for the Trail is also proposed. The Oregon Historic Trails Advisory Council of the Parks and Recreation Department will be consulted on the location and design of both the fence and posting.

Monitoring

The Applicant proposes to monitor the condition of the Oregon Trail fence annually, and to repair it as needed.

EXHIBIT T

RECREATIONAL OPPORTUNITIES

Information about the impacts the proposed facility would have on important recreational opportunities in the analysis area, providing evidence to support a finding by the Council, as required by OAR 345-022-0100, including:

(A) A description of any important recreational opportunities in the analysis area considering the criteria in OAR 345-022-0100;

(B) An assessment 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;
(ii) Noise resulting from facility construction or operation;
(iii) Increased traffic resulting from facility construction or operation;
(iv) Water use during facility construction or operation;
(v) Wastewater resulting from facility construction or operation;
(vi) Visual impacts of facility structures, including cooling tower or other plumes, if any; and
(vii) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class 1 visual resources as described in OAR 340-204-0050;

(C) A description of any measures the applicant proposes to avoid, reduce or otherwise mitigate the significant adverse impacts identified in (B);

(D) A map of the analysis area showing the locations of important recreational opportunities identified in (A); and

(E) The applicant's proposed monitoring program, if any, for impacts to important recreational opportunities;

Important recreational opportunities in the analysis area

The site of the Shepherds Flat Wind Farm offers no public recreational opportunities. Similar properties might offer camping, hunting and off-road vehicle sport; however, the project is sited on privately-owned land that has been traditionally posted against trespass and hunting. Such posting is expected to continue.

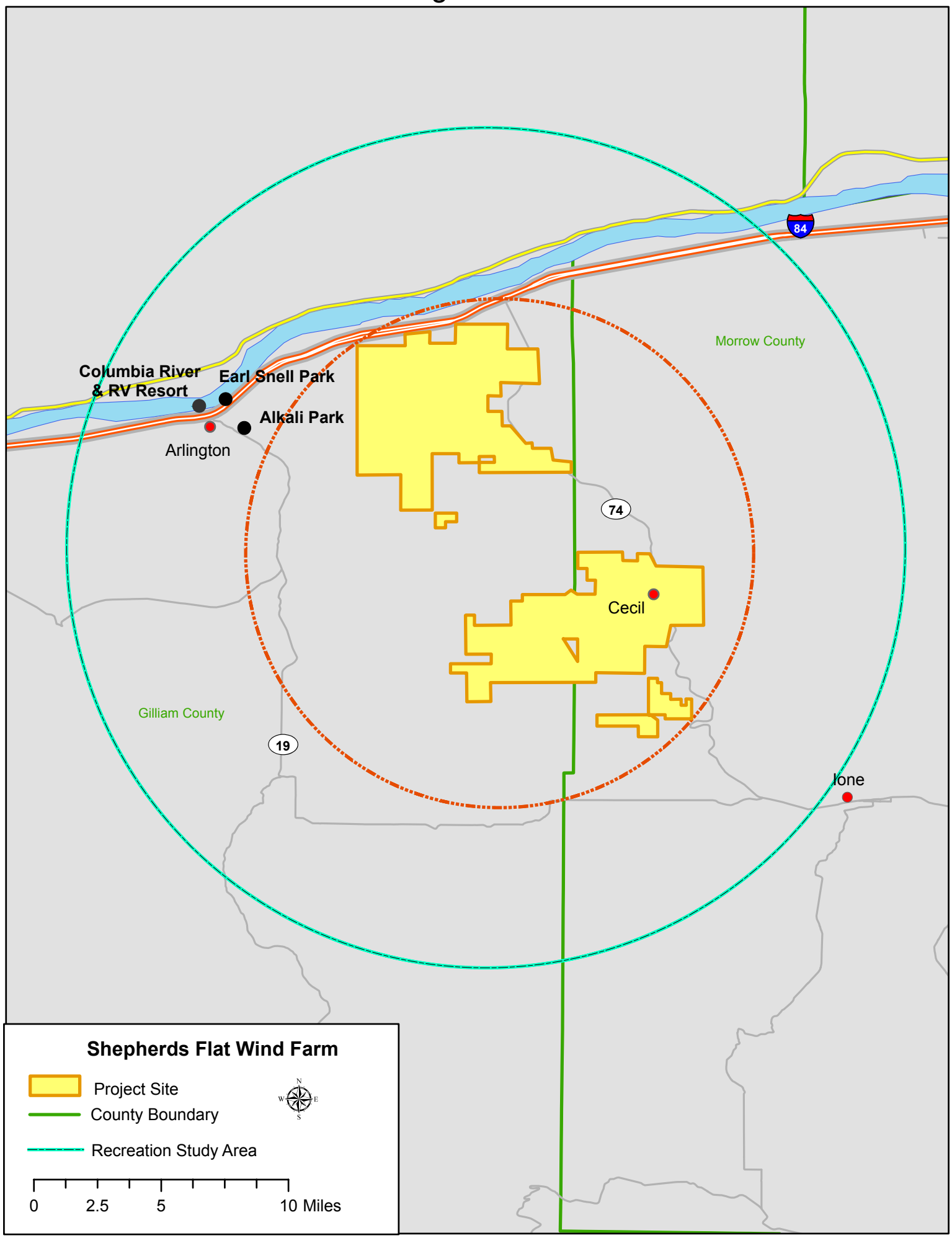
The analysis area for potential impacts on important recreational opportunities extends five miles beyond the facility site, and that area is shown in Figure T-1.

Within the analysis area we find three parks and a golf course in the Arlington area, and a public marina and day use area at the Port of Arlington. These facilities are well maintained and

demonstrably provide pleasure to residents and visitors alike. They do not, however, meet the criteria set forth in OAR 345-022-0100 as "important."

Therefore, no impact on important recreational facilities in that analysis area is anticipated, and no monitoring program is proposed.

Figure T-1


Columbia River
& RV Resort
Earl Snell Park
Alkali Park
Arlington
Morrow County
Gilliam County
Cecil
Ione
84
74
19
Shepherds Flat Wind Farm
Project Site
County Boundary
Recreation Study Area
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5
10 Miles

EXHIBIT U

IMPACTS ON PUBLIC SERVICES

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;

(A) The important assumptions the applicant used to evaluate potential impacts;

(B) Identification of the public and private providers in the analysis area that would likely be affected;

(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;

(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

(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 345-022-0110;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit U as follows:

> Include an analysis of estimated facility-related traffic during construction and operation and the potential impact on traffic safety. Discuss transportation of heavy equipment and shipments of facility components during construction.

Impacts on Public Services

Please see Figure U-1 for a map showing the Shepherds Flat Wind Farm (SFWF) in relation to the thirty mile radius analysis area.

The wind power facility itself requires few public services. Potential impacts to services will be caused, if at all, by increased population during construction and operations, and construction related traffic. Providers of services within the analysis area, and their potential for any impacts from the construction and operation of the Shepherds Flat Wind Farm, are shown in the following table:

Service Providers	Public Services								
	Sewers and sewage treatment	Water	Stormwater drainage	Solid waste management	Housing	Traffic Safety	Police and fire protection	Health care	Schools
Arlington	P	P	N	P	P	P	P	P	P
Boardman	N	N	N	N	P	N	N	P	P
Ione	P	N	N	N	P	N	P	P	P
Lexington	P	P	N	N	P	N	N	P	P
Irrigon	N	N	N	N	N	N	N	N	N
Heppner	N	N	N	N	N	N	N	N	N
Condon	N	N	N	N	N	N	N	N	N
Fossil	N	N	N	N	N	N	N	N	N
Rufus	N	N	N	N	N	N	N	N	N
Wasco	N	N	N	N	N	N	N	N	N
Moro	N	N	N	N	N	N	N	N	N

N=None
P=Potential for any impact

Significant potential adverse impacts have been judged relative to significant changes in population. During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families. The maximum direct employment during operations is expected to 25. Discussion of the impacts of these population increases on cities and town showing a potential for impacts follows.

Arlington and Boardman

Due to their size and proximity to the project area, the cities of Arlington and Boardman are likely to feel the greatest impact. During construction, it is expected that there will be a short-term affect on the availability and price of temporary housing (rentals, motels and RV parks). Arlington and Boardman contain sufficient temporary housing stocks for which basic public services are already provided. No adverse impact is predicted.

While permanent operating employment preference will be given to local applicants, it is likely that some experienced personnel will be recruited from outside the analysis area. Civic and business leaders in both cities have indicated that the addition of even the maximum number of recruited employees, some with families, will have a beneficial rather than adverse impact on the area. No adverse impact on public services is predicted.

Ione and Lexington

Applicant is in consultation with the Willow Creek Valley Economic Development Committee, and Ione and Lexington, assisting them in their efforts to attract as many project personnel as possible to these communities. No adverse impact on public services is predicted.

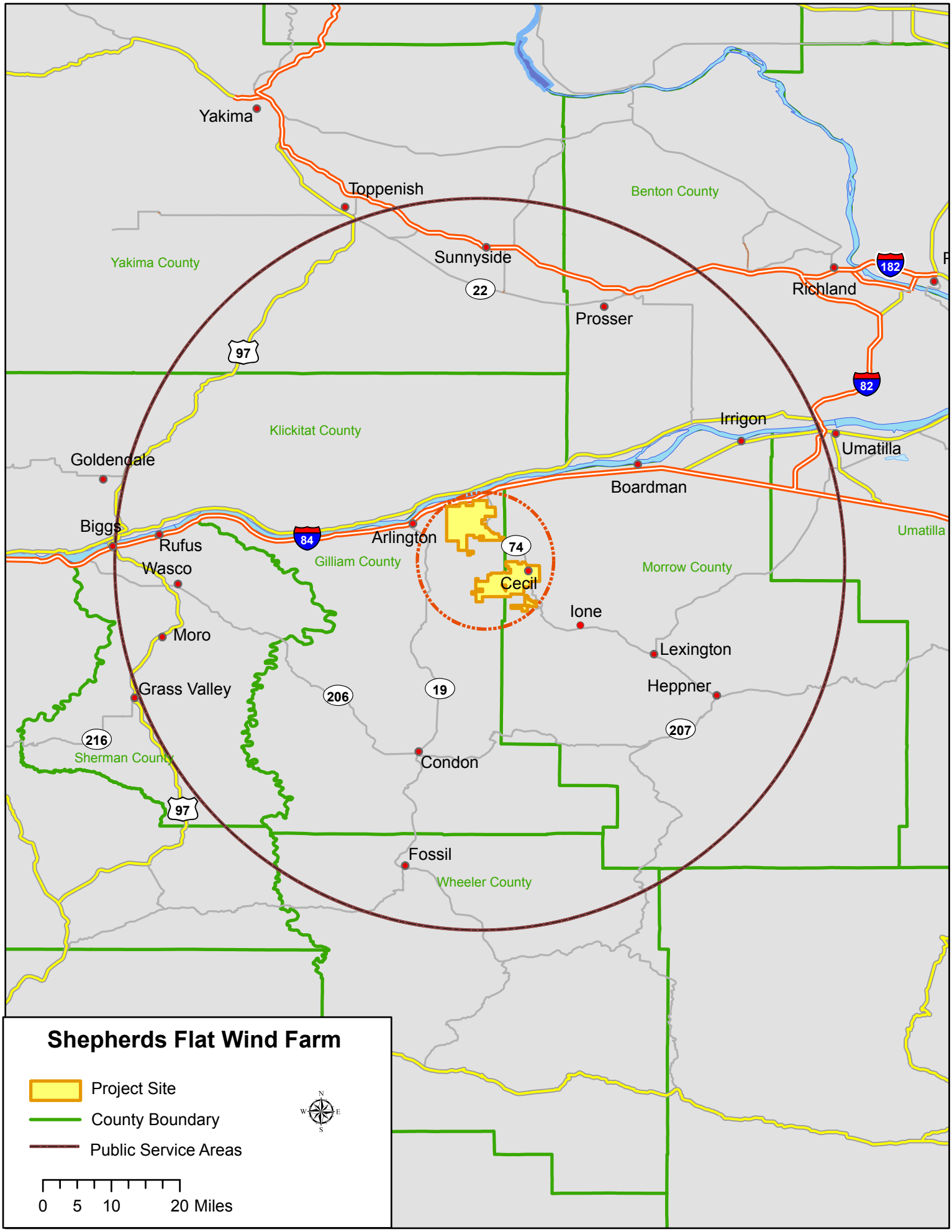
Traffic

Construction of project roads, facilities and collection and communication lines will occur at about the same time, using individual vehicles for multiple tasks. During the construction period, construction, delivery and personal vehicles will make approximately 25 to 50 round trips (50 to 100 one-way trips) daily. This estimate includes the round trips of flatbed trucks delivering the tower sections, nacelles and blades, as well as all dump trucks, concrete trucks, cranes, other construction vehicles, trade vehicles and personal vehicles.

Most heavy equipment will be delivered via Interstate 84, and most vehicles will exit I-84 at Arlington. Traffic in Arlington will be disrupted, particularly during the delivery of towers and rotors. City residents and the sheriff's department will be notified of these deliveries. Flaggers will be employed at all affected intersections.

During facility operation, two to four daily round trips to and from the project site are expected. Ordinary traffic will consist of personal vehicles and, typically, project pickup trucks. Occasionally, but infrequently, larger equipment such as flatbed trucks or a crane may be required. During storm conditions, personnel may use snow removal equipment on project site roads and may use specialized snow travel vehicles. These activities are not expected to adversely affect traffic in the area, nor present a safety hazard.

Figure U-1


Yakima
Toppenish
Benton County
Yakima County
Sunnyside
22
Richland
182
Prosser
97
82
Klickitat County
Irrigon
Umatilla
Goldendale
Boardman
Biggs
Rufus
84
Arlington
74
Umatilla
Wasco
Gilliam County
Morrow County
Cecil
Ione
Moro
Lexington
Grass Valley
206
19
Heppner
207
216
Sherman County
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Project Site
County Boundary
Public Service Areas
N
W
E
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0
5
10
20 Miles

EXHIBIT V

SOLID WASTE AND WASTEWATER

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:

(A) A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate;

(B) The applicants plans to minimize, recycle or reuse the solid waste and wastewater described in (A);

(C) A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility;

(D) Evidence that adverse impacts described in (C) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts; and

(E) The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit V as follows:

> Septic System
>
> If [Applicant] intends to discharge sanitary wastes to an on-site septic system during operation, the facility may need a WPCF permit depending on the design capacity of the system. [Applicant] must first verify that the site is suitable for an on-site septic system by applying to DEQ or its designated agency for a site evaluation of groundwater and soil conditions.
>
> The WPCF permit is a state permit. If the permit is needed, the Council would make the issuing decision in consultation with DEQ. The requirements for the WPCF permit are set forth in OAR Chapter 340, Division 71. Regulations pertaining to WPCF permits are in OAR Chapter 340, Division 45. [Applicant] must include in the site certificate application all information that would otherwise be required by DEQ in an application for the permit.

Solid waste and wastewater

The applicant does not intend to discharge sanitary wastes to an on-site septic system during operation.

Construction

The only wastewaters expected to be generated during construction come from the wash-down of concrete trucks. Wash-down will take place off-site at the concrete contractor's batch plant.

Solid wastes generated during construction will be limited to wood waste from foundation forms, wire and cable scraps, and equipment packaging. These materials will be sorted and recycled to the extent practical.

Facility Operation

No significant solid wastes or wastewaters will be generated during facility operation.

Facility retirement

The recycling of facility components, should the facility be retired, is discussed in Exhibit W.

EXHIBIT W

FACILITY RETIREMENT AND SITE RESTORATION

Information about facility retirement and site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1). The applicant shall include;

(A) The estimated useful life of the proposed facility;

(B) The actions that the applicant proposes for retirement of the facility and restoration of the site to a useful, non-hazardous condition;

(C) The estimated costs to retire the facility and restore the site to a useful, non-hazardous condition and a discussion of the methods and assumptions used to estimate retirement and restoration costs; and

(D) For facilities that might produce site contamination by hazardous materials, any proposed monitoring plan, such as periodic environmental site assessment and reporting, or an explanation why a monitoring plan is unnecessary.

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit W as follows:

> All paragraphs apply. The Department recommends estimating retirement costs based on determining the unit retirement costs for facility components.

Facility Retirement and Site Restoration

Applicant's estimate of the cost of facility decommissioning and site restoration is dependent, in part, on final site layout and choice of turbine. Upon the completion of the facility re-design process, this Exhibit W will be amended.

EXHIBIT X

NOISE

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 o Environmental Quality's noise control standards in OAR 340-35-0035. The applicant shall include;

(A) A baseline noise assessment for the proposed site and vicinity;

(B) Predicted noise levels resulting from construction and operation of the proposed facility;

(C) An assessment of the proposed facility's compliance with the applicable noise regulations in OAR 340-35-0035;

(D) Any measures the applicant proposes to reduce noise levels or noise impacts;

(E) The assumptions and methods used in the noise analysis; and

(F) The applicant's proposed monitoring program, if any, for noise generated by construction and operation of the facility;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit X as follows:

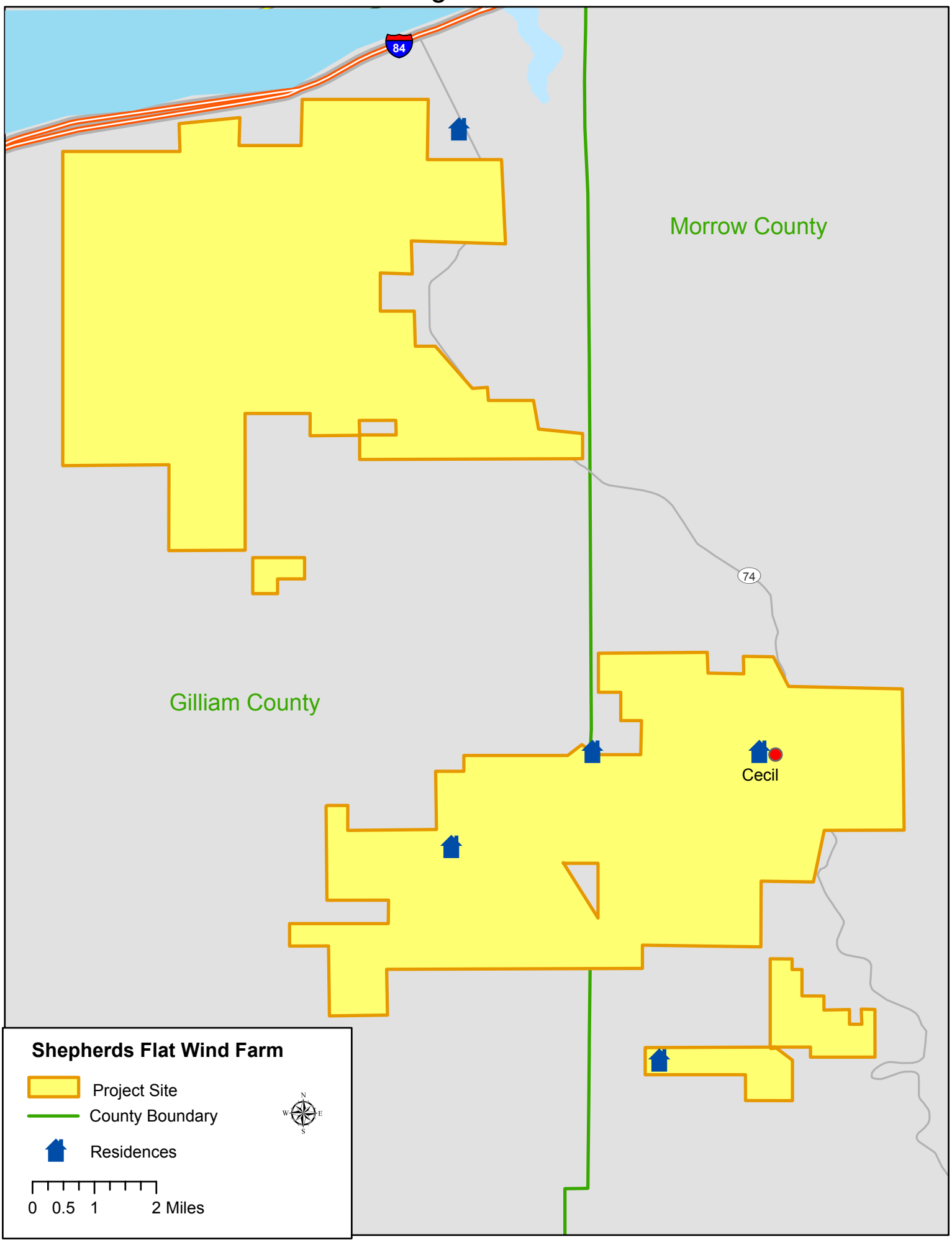
> All paragraphs apply. The analysis should include noise predictions based on a "worst case analysis" that assumes that turbines would be located within micrositing corridors in a position closest to the nearest noise sensitive receiver.
>
> [Applicant] should include a noise analysis in the application. The analysis must contain information to support a finding by the Council that the proposed facility would comply with the requirements of OAR 340-035-0035. The analysis must:
>
> - Identify the locations of all noise sensitive properties that might receive noise levels potentially exceeding applicable limits from SFWF turbines
> - Identify all turbine locations used in performing the analysis
> - Provide manufacturer's warranted sound power levels, including octave band data, for all turbine types that might be used at the SFWF (if specific turbine types are not known, [Applicant] must provide the maximum sound power level and octave band data that would not be exceeded by any turbine type used at the SFWF)
> - Identify all input parameters used in performing noise modeling

Turbine Noise

The project area, and the properties adjacent to the project area, contain few noise sensitive properties (Figure X-1), and all save one of these properties are owned by the project's landlords.

The Department has requested a noise analysis which is underway and will be completed before the issuance of a site certificate.

Figure X-1


84
Morrow County
74
Gilliam County
Cecil
Shepherds Flat Wind Farm
Project Site
County Boundary
Residences
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W
E
S
0
0.5
1
2 Miles

EXHIBIT Y

CARBON DIOXIDE EMISSIONS

If the facility is a base load gas plant, a non-base load power plant, or a nongenerating energy facility that emits carbon dioxide, a statement of the means by which the applicant elects to comply with the applicable carbon dioxide emissions standard under OAR 345-024-0560, OAR 345-024-0600, or OAR 345-024-0630 and information, showing detailed calculations, about the carbon dioxide emissions of the energy facility. The applicant may present the calculations in tabular form. The applicant shall include the following calculations:

(A) The total gross carbon dioxide emissions for 30 years, unless an applicant for a non-base load power plant or non generating energy facility proposes to limit operation to a shorter time;

(B) The gross carbon dioxide emissions rate expressed as:

(i) Pounds of carbon dioxide per kilowatt-hour of net electric power output for a base load gas plant, including operation with or without power augmentation, as appropriate, or for a non-base load power plant;

(ii) Pounds of carbon dioxide per horsepower hour for nongenerating facilities for which the output is ordinarily measured in horsepower; or

(iii) A rate comparable to pounds of carbon dioxide per kilowatt-hour of net electric power output for nongenerating facilities other than those measured in horsepower;

(C) The total excess carbon dioxide emission for 30 years, unless an applicant for a non-base load power plant or a nongenerating energy facility proposes to limit operation to a shorter time;

(D) The excess carbon dioxide emission rate, using the same measure as required for paragraph (B);

(E) The average annual site conditions, including temperature, barometric pressure and relative humidity, together with a citation of the source and location of the data collection devices;

(F) For a non-base load power plant (or when using power augmentation), the average temperature, barometric pressure and relative humidity at the site during the times of the year when the facility is intended to operate, together with a citation of the source and location of the data collection devices;

(G) The annual fuel input in British thermal units, higher heating value, to the facility for each type of fuel the facility will use, assuming:

(i) For a base load gas plant, a 100-percent capacity factor on a new and clean basis and the maximum number of hours annually that the applicant proposes to use alternative fuels;

(ii) For a non-base load power plant, the proposed annual hours of operation on a new and clean basis, the maximum number of hours annually that the applicant proposes to use alternative fuels and, if the calculation is based on an operational life of fewer than 30 years, the proposed operational life of the facility;

(iii) For a nongenerating energy facility, the reasonably likely operation of the facility bases on one year, 5-year, 15-year, and 30-year averages, unless an applicant proposes to limit operation to a shorter time;

(H) For each type of fuel a base load gas plant or a non-base load power plant will use, the estimated heat rate and capacity of the facility measured on a new and clean basis with no thermal energy to cogeneration, consistent with the data supplied in Exhibit B;

(I) For each type of fuel a nongenerating energy facility will use, the estimated efficiency and capacity of the facility with no thermal energy to cogeneration;

(J) If the facility provides thermal energy for cogeneration to lower its net carbon dioxide emissions rate, the applicant shall include:

(i) The estimated annual useful thermal energy available from the facility for non-electric process, annual useful thermal energy used by non-electric processes, and annual thermal energy rejected as heat waste;

(ii) For a base load gas plant or non-base load power plant, the estimated annual net electric power output and annual fuel input in British thermal units higher heating value for the facility for each type of fuel the facility will use and the basis of such estimates;

(iii) A description of the non-electric thermal processes, the names and addresses of the persons intending to use the non-electric thermal energy, and a description and an estimate of the fuel displaced by cogeneration including supporting assumptions;

(iv) A description of the products produced and thermal energy needed for protection of the primary products made by the persons intending to use the non-electric thermal energy produced by the proposed facility, supported by fuel use and steam production records or estimates, if the production facility is new;

(v) The efficiency of each boiler that the thermal energy will displace;

(vi) For each boiler, the annual fossil fuel displace in million Btu, higher heating value, by type of fuel that will be displace by the thermal energy;

(vii) The annual carbon dioxide offset by the cogeneration host, using a rate of 117 pounds of carbon dioxide per million Btu of natural gas fuel (higher heating value) and a rate of 161 pounds of carbon dioxide per million Btu of distillate fuel (higher heating value);

(viii) The cumulative carbon dioxide offset by the steam host through the thirtieth year of facility operation, or for a shorter period if an applicant for a nongenerating facility proposes a shorter operational period;

(ix) A copy of the contractual agreement between the applicant and the cogeneration host for the use of the thermal energy;

(x) A description of the guarantees of the offsets that the applicant shall provide for cogeneration projects, pursuant to OAR 345-024-0560(1) and OAR 345-024-0600(1);

(xi) A proposed monitoring and evaluation plan and an independent verification plan, pursuant to subparagraphs (K)(xix) and (K)(xx);

(xii) A copy of the instrument by which the certificate holder will transfer the offsets to the Council for it to hold in trust;

(K) If the applicant proposes to offset carbon dioxide emissions as described in OAR 345-024-0550(3), OAR 345-024-0560(2), OAR 345-024-0590(3), OAR 345-024-0600(2), OAR 345-024-0620(3) or OAR 345-024-0630(1), the applicant shall include:

(i) A description of each offset project;

(ii) A description of who will implement the offset project, including qualifications and experience;

(iii) Detailed estimates of the of carbon dioxide offset, measured in short tons, that the offset projects will achieve over the life of the project;

(iv) For each offset project, an explanation of how the applicant quantified its carbon dioxide estimates to a degree of certainty acceptable to the Council though a transparent and replicable calculation methodology;

(v) For each offset project, evidence that the offset project would not likely have been implemented if not for the applicant's activities or funding;

(vi) For each offset project, a description of a "Baseline" projection that does not include the proposed project and a "Project Case" projection that does. The historic Baseline shall use reliable emissions data or pre-project data available for the most recent three years unless the applicant can demonstrate that a different period more closely represents historical operations or unless it can demonstrate that another method provides a more reasonable estimate. The applicant shall show how the Baseline projection changes over time if changes from business-as-usual could be reasonably anticipated during the project life;

(vii) For each offset project, a description, in a transparent and realistic manner, of the assumptions and methodologies used to quantify the Baseline and the Project Case including a description of key parameters and data sources. This shall include a description of the formulae used to estimate carbon dioxide emissions or sequestration within the project boundary and a net change of carbon dioxide emissions or sequestration that occurs outside of the project boundary that is measurable and attributable to the project activity;

(viii) For projects that avoid conventional electricity generation, a description of a Baseline that calculates the carbon dioxide emissions per kilowatt hour in two steps: (1) for the first five years of operation, a description of the rate base on dispatch data or models or, absent that, a weighted average of all resources in a power pool except zero-fuel-cost or must-run facilities, and (2) a description of the rate for any subsequent years based on a group of similar facilities built within the prior five years or under construction in the electrical distribution region of the project or the three most recent plants built in the region, whichever rate is lower;

(ix)) For projects that avoid conventional electricity generation, a description of avoided transmission and distribution losses, using average grid area or national losses;

(x) A description of any guarantee for offsets from projects that the applicant proposes pursuant to OAR 345-024-0560(2), OAR 345-024-060(2) and OAR 345-024-630(1), if the applicant chooses to offer a guarantee;

(xi) A description of the offset project boundary. The boundary shall encompass all carbon dioxide emissions under the control of the project that are significant and reasonably attributable to the project activity. If the project is being conducted by one part of a corporation, the boundary shall include the emissions and reductions of the whole corporation entity and the carbon dioxide emissions resulting from processes and facilities that are related to the project, with identification of subsidiaries that are affected by the project;

(xii) A description of significant risks and risk mitigation strategies, including an estimate of the range of uncertainty around the expected carbon dioxide offsets;

(xiii) For biological sequestration projects, an assessment of the risk of climate change to natural systems that are sequestering the carbon dioxide, including, if appropriate, the risks from forest fires, pest and other unplanned releases of carbon from sequestration;

(xiv) A description of whether the offset project will permanently avoid or displace emissions of carbon dioxide. If a project only temporarily sequesters carbon, an indication of the duration of sequestration or storage;

(xv) A description of the amount of funding the applicant will provide for each offset project it proposes;

(xvi) If the applicant anticipates that a project will have funding sources in addition to itself, identification to the sources of those funds, the amount of other funding that is required to implement a project , the amount of funds other parties have committed, and the risks of other funds not being available;

(xvii) If the applicant proposes that a project will have funding sources in addition to itself, a description of how ownership of the offsets will be allocated among the several funding sources;

(xviii) A copy of the instrument by which the certificate holder will transfer all the offsets to the Council for it to hold in trust;

(xix) A description of a transparent and replicable methodology for the applicant's monitoring and evaluation plan and for an independent verification plan, including (1) procedures the applicant and the independent entity will employ, (2) how the applicant will assure funds for ongoing monitoring, evaluation and verification, (3) the time frame and frequency over which the applicant will conduct monitoring and evaluation and over which the independent entity will conduct verification, including the frequency of site visits, if applicable, (4) the reporting procedures and guidelines for the plans, and (5) whether the applicant has identified the independent entity that will perform the verification;

(xx) The monitoring and evaluation plan and the verification plan shall identify the data needs and data quality with regard to accuracy, comparability, completeness, and validity. It shall include methodologies to be use for data collection, monitoring, storage, reporting and management, including quality assurance and quality control provisions. It shall provide complete calculations uses to calculate and estimate carbon dioxide emissions from activity within the project boundary. It shall show any formulae and assumptions the applicant used to calculate offset project leakage;

(xxi) A description of reasonably likely, significant undesirable long-term environmental impacts from the implementation of an offset project; and

(L) If the applicant elects to comply with the applicable carbon dioxide emissions standard by using the monetary path under OAR 345-024-0560(3), OAR 345-024-0600(3) or OAR 345-024-0630(2), the applicant shall include:

(i) A statement of the applicant's election to use the monetary path;

(ii) The amount of carbon dioxide reduction, in tons, for which the applicant is taking credit by using the monetary path;

(iii) The qualified organization to whom the applicant will provide offset funds and funds for the cost of selecting and contracting for offsets. The applicant shall include evidence that the

organization meets the definition of a qualified organization under OAR 345-001-0010. The applicant may identify an organization that has applied for, but has not received, an exemption from federal income taxation, but the Council shall not find that the organization is a qualified organization unless the organization is exempt from federal taxation under section 501(c)(3) of the Internal Revenue Code as amended and in effect on December 31, 1996; and

(iv) A statement of whether the applicant intends to provide a bond or letter of credit to secure the funds it must provide to the qualified organization or whether it requests the option of providing either a bond or a letter of credit.

Does not apply.

EXHIBIT Z

COOLING TOWER

If the proposed facility has an evaporative cooling tower, information about the cooling tower plume, including:

(A) The predicted size and frequency of occurrence of a visible plume and an assessment of its visual impact;

(B) The predicted locations and frequency of occurrence of ice formation on surfaces and ground level fogging and an assessment of significant potential adverse impacts, including, but not limited to, traffic hazards on public roads;

(C) The predicted locations and rates of deposition of solids released from the cooling tower (cooling tower drift) and an assessment of significant potential adverse impacts to soils, vegetation and other land uses;

(D) Any measures the applicant proposes to reduce adverse impacts from the cooling tower plume or drift;

(E) The assumptions and methods used in the plume analysis; and

(F) The applicant's proposed monitoring program, if any, for cooling tower plume impacts;

Does not apply.

EXHIBIT AA

ELECTRIC TRANSMISSION LINE

If the proposed facility includes an electric transmission line:

(A) Information about the expected electric and magnetic fields, including:

(i) The distance in feet from the proposed center line of each proposed transmission line to the edge of the right-of-way;

(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;

(iii) The approximate distance in feet from the proposed center line to each structure identified in (A);

(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;

(v) Any measures the applicant proposes to reduce electric or magnetic field levels;

(vi) The assumptions and methods used in the electric and magnetic field analysis, including the current in amperes on each proposed transmission line; and

(vii) The applicant's proposed monitoring program, if any, for actual electric and magnetic field levels; and

(B) An evaluation of alternate methods and costs of reducing radio interference likely to be cause by the transmission line in the primary reception area near interstate, U.S. and state highways;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit AA as follows:

> All paragraphs apply to any transmission line, regardless of size, that is a related or supporting facility, including collector lines.

<u>Electric Transmission Lines</u>

Applicant is in the process of re-evaluating its project design, including facility layout and choice of turbine. A change in either will affect collector lines and the distribution system. This Exhibit AA will be amended upon re-design completion.

EXHIBIT BB

OTHER INFORMATION

Any other information that the Office requests in the project order;

In its Project Order dated October 16, 2006, the Department requested that Exhibit BB include:

> [I]nformation to support findings by the Council that the proposed facility complies with the Public Health and Safety Standards for Wind Energy Facilities (OAR 345-024-0010), the Siting Standards for Wind Energy Facilities (OAR 345-024-0015) and the Siting Standards for Transmission Lines (OAR 345-024-0090).

The Oregon Department of Energy received a comment letter raising a concern about the proximity of the project to the airspace of military training areas.

Compliance with Standards

Applicant's expertise and potential environmental impacts from the project are addressed in Exhibits D and P, respectively. The Applicant proposes to limit creation of artificial habitat for raptors or raptor prey by graveling of the area around turbine foundations, and modern turbines and towers are designed to minimize perching opportunities. Although there will be transformers installed at the base of each turbine, they provide little height advantage over natural perching locations, and are not expected to prove to be attractions to raptors. The area around transformer bases will also be graveled to reduce use by prey species.

The proposed facility is sited entirely on private property, much of which is posted against public access. The Applicant proposes to add additional postings, monitor for unauthorized access, and add locked gates on any project roadways that are regularly used for unauthorized trespass. Doors into turbine towers will be locked except when they are in use by project personnel, and there are no exterior ladders providing access to towers or turbine nacelles.

The Applicant proposes to install modern horizontal axis wind turbines and tubular towers that are commercially manufactured, and that meet the international standards for wind turbines. These include standards for safety of wind turbine generator systems (IEC 61400-1) and for turbine blade structural testing (IEC 61400-23) developed by Technical Committee-88 of the International Electrotechnical Commission. These standards specify requirements for wind turbine safety, including design, installation, maintenance, and operation, and address control and protection mechanisms, internal electrical and mechanical systems, turbine towers and electrical interconnection equipment. Facility transmission lines and electric fields and induced currents are discussed in Exhibit AA.

The Applicant proposes to place no advertising in the facility, although the logos of the transformer, turbine and tower manufacturers may appear on the equipment; signs are expected to be limited to facility and manufacturer identification, and those required by law or for health and safety reasons, such as emergency contact information, public access restrictions, and project

speed limits. The Applicant proposes to install only the external lighting required by the Federal Aviation Administration or Oregon Department of Transportation.

Military Aviation Airspace

Applicant has contacted the Department of the Navy, Naval Air Station Whidbey Island, with respect to the concerns it raised about the possibility that turbine placement might interfere with low altitude Military Training Routes.

Applicant and the Navy are cooperating in the exchange of mapping data, and will continue to cooperate throughout facility re-design.

EXHIBIT CC

STATE STATUTES, ADMINISTRATIVE RULES, AND LOCAL ORDINANCES

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.

Other statutes, rules and ordinances

Citation	Agency
Plant Conservation Biology Program ORS Chapter 564, OAR Chapter 603, Division 73.	Oregon Department of Agriculture

The Oregon Department of Agriculture ("ODA") provides technical review and recommendations regarding compliance with the Council's threatened and endangered species standard (OAR 345-022-0070) as it relates to plant species. OAR 603-073-0070 contains the state list of endangered and threatened plant species. OAR 603-073-0080 gives ODA the authority to designate candidate plants. State-listed threatened or endangered plant species that may be affected by the proposed facility are addressed in Exhibit Q.

Noise Control Regulations ORS 467.020, ORS 467.030, OAR Chapter 340, division 35.	Department of Environmental Quality

The proposed facility must comply with the noise control regulations applicable to wind energy facilities. The requirement is incorporated in the general standard of review, OAR 345-022-000. Please see Exhibit X.

Citation	Agency
Hazardous Materials	Department of Environmental Quality

ORS Chapters 465 and 466, OAR Chapter 340, divisions 100 through 122.

The proposed facility must comply with DEQ regulations concerning the use, clean up and disposal of hazardous materials. the requirement is incorporated in the general standard of review, OAR 345-022-000. Please see Exhibit G.

Wildlife Policy	Oregon Department of Fish and Wildlife

ORS Chapter 496, OAR Chapter 635, Division 415.

The OAR classifies habitat into six categories and establishes a mitigation goal for each category. Please see Exhibit P.

Threatened and Endangered Species Policy	Oregon Department of Fish and Wildlife

ORS Chapter 496, OAR Chapter 635, Division 100.

The OAR provides authority for adoption of the state sensitive species list and the Wildlife Diversity Plan and contains the state list of threatened and endangered wildlife species. Please see Exhibit Q.

Attachment A-1

AFFIDAVIT AS TO TRUTH AND ACCURACY

State of New York)
) ss:
County of New York)

I, Christopher McCallion, being first duly sworn, depose and say as follows:

1. I am the Executive Vice President and Chief Financial Officer of Caithness Shepherds Flat, LLC, a Delaware limited liability company and am authorized to act on behalf of Caithness Shepherds Flat, LLC.

2. Caithness Shepherds Flat, LLC is submitting this Application for Site Certificate for the Shepherds Flat Wind Facility. To the best of my knowledge and belief, the information contained in this Application is true and accurate.

CAITHNESS SHEPHERDS FLAT, LLC

By: _____
Christopher McCallion
Executive Vice President
and Chief Financial Officer

SUBSCRIBED AND SWORN to me this 26th day of January, 2007.

_____

GAIL M. CONBOY
Notary Public, State of New York
No. 4964579
Qualified in New York County
Commission Expires 4/2/10

CAITHNESS SHEPHERDS FLAT, LLC

WRITTEN CONSENT OF MANAGER

The undersigned, Caithness Energy, L.L.C., a Delaware limited liability company, being the manager (the "Manager") of Caithness Shepherds Flat, LLC, a Delaware limited liability company (the "Company"), does hereby adopt, by written consent, the following resolution:

RESOLVED, that the Company is hereby authorized to file an Application for a Site Certificate for the Shepherds Flat Wind Farm with the Oregon Energy Facility Siting Council;

RESOLVED FURTHER, that the Company's Business Manager, or any of its officers are hereby authorized to execute and deliver on behalf of the Company any instrument they may deem necessary or appropriate in furtherance of the foregoing resolution, as conclusively evidenced by their signature on such instrument, and that all actions heretofore taken on behalf of the Company in furtherance of said purpose be, and they hereby are, ratified and approved.

IN WITNESS WHEREOF, the undersigned Manager has adopted this consent resolution effective as of January 24, 2007.

Manager:

Caithness Energy, L.L.C.

By: _____
Christopher McCallion
Executive Vice President
and Chief Financial Officer

Secretary of State
Corporation Division
255 Capitol Street NE, Suite 151
Salem, OR 97310-1327

Phone:(503)986-2200
Fax:(503)378-4381
www.filinginoregon.com

Registry Number: 390384-92
Type: FOREIGN LIMITED LIABILITY COMPANY

Next Renewal Date: 10/20/2007

CAITHNESS SHEPHERDS FLAT, LLC
C/O CAITHNESS CORPORATION
565 FIFTH AVE 29TH FL
NEW YORK NY 10017

Acknowledgment Letter

The document you submitted was recorded as shown below. Please review and verify the information listed for accuracy.

If you have any questions regarding this acknowledgement, contact the Secretary of State, Corporation Division at (503)986-2200. Please refer to the registration number listed above. A copy of the filed documentation may be ordered for a fee of $5.00. Submit your request to the address listed above or call (503)986-2317 with your Visa or MasterCard number.

Document
APPLICATION FOR AUTHORITY

Filed On
10/20/2006

Jurisdiction
DELAWARE

Name
CAITHNESS SHEPHERDS FLAT, LLC

Principal Place of Business
C/O CAITHNESS CORPORATION
565 FIFTH AVE 29TH FL
NEW YORK NY 10017

Registered Agent
CORPORATION SERVICE COMPANY
285 LIBERTY ST NE
SALEM OR 97301

Mailing Address
C/O CAITHNESS CORPORATION
565 FIFTH AVE 29TH FL
NEW YORK NY 10017

JODFOR
ACK
10/20/2006

Phone: (503) 986-2200
Fax: (503) 378-4381

Application for Authority to Transact—Foreign Limited Liability Company

Secretary of State
Corporation Division
255 Capitol St. NE, Suite 151
Salem, OR 97310-1327
FilingInOregon.com

FILED
OCT 20 2006
OREGON
SECRETARY OF STATE

REGISTRY NUMBER: 390384-92
For office use only

In accordance with Oregon Revised Statute 192.410-192.490, the information on this application is public record. We must release this information to all parties upon request and it will be posted on our website. For office use only

Please Type or Print Legibly in **Black** Ink. Attach Additional Sheet if Necessary.

1) **NAME** CAITHNESS SHEPHERDS FLAT, LLC

NOTE: (Must contain the words "Limited Liability Company" or the abbreviations "LLC" or "L.L.C.") Must be identical to the name on the Certificate of Existence. See #3.

2) **STATE OR COUNTRY OF ORGANIZATION**
DELAWARE
Date of Organization: JUNE 29, 2006

3) **CERTIFICATE OF EXISTENCE**
☐ An original certificate of existence, current within 60 days of delivery to this Division, authenticated by the official having custody of the organization, is attached.

4) **DURATION** (Please check one.)
☐ Latest date upon which the Limited Liability Company is to dissolve is _____
☑ Duration shall be perpetual.

5) **THIS FOREIGN LIMITED LIABILITY COMPANY SATISFIES THE REQUIREMENTS OF ORS 63.714(3).**

6) **NAME OF OREGON REGISTERED AGENT**
Corporation Service Company

7) **ADDRESS OF OREGON REGISTERED AGENT** (Must be an Oregon Street Address, which is identical to the registered agent's business office.)
285 Liberty Street, NE
Salem, OR 97301

8) **ADDRESS OF PRINCIPAL OFFICE OF THE BUSINESS**
c/o Caithness Corporation
565 Fifth Avenue, 29th floor
New York, NY 10017

9) **ADDRESS WHERE THE DIVISION MAY MAIL NOTICES**
c/o Caithness Corporation
565 Fifth Avenue, 29th floor
New York, NY 10017

10) **IF THIS LIMITED LIABILITY COMPANY IS NOT MEMBER MANAGED, CHECK ONE BOX BELOW.**
☐ This limited liability company is managed by a single manager.
☐ This limited liability company is managed by multiple manager(s).

11) **EXECUTION** (At least one member or manager must sign.)

Signature	Printed Name	Title
Caithness Energy, L.L.C., its Member		
By:	Christopher McCallion	EVP and CFO

12) **CONTACT NAME** (To resolve questions with this filing.)
Gail Conboy

DAYTIME PHONE NUMBER (Include area code.)
212-921-9099

FEES

Required Processing Fee $50 Confirmation Copy (Optional) $5
Processing Fees are nonrefundable.
Please make check payable to "Corporation Division."
NOTE:
Fees may be paid with VISA or MasterCard. The card number and expiration date should be submitted on a separate sheet for your protection.

Delaware

The First State

FILED
OCT 20 2006
OREGON
SECRETARY OF STATE

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "CAITHNESS SHEPHERDS FLAT, LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE TWENTIETH DAY OF OCTOBER, A.D. 2006.

AND I DO HEREBY FURTHER CERTIFY THAT THE SAID "CAITHNESS SHEPHERDS FLAT, LLC" WAS FORMED ON THE TWENTY-NINTH DAY OF JUNE, A.D. 2006.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE NOT BEEN ASSESSED TO DATE.

SECRETARY'S OFFICE 1793 DELAWARE 1855

Harriet Smith Windsor

Harriet Smith Windsor, Secretary of State

4183429 8300

060963966

AUTHENTICATION: 5131445

DATE: 10-20-06

LIMITED LIABILITY COMPANY AGREEMENT OF CAITHNESS SHEPHERDS FLAT, LLC

LIMITED LIABILITY COMPANY AGREEMENT of CAITHNESS SHEPHERDS FLAT, LLC (the "***Company***") made as of June 29, 2006, by Caithness Energy, L.L.C., a Delaware limited liability company ("***Caithness***").

WHEREAS, Caithness authorized the execution of a certificate of formation of the Company and the filing thereof with the Secretary of State of Delaware for the purpose of forming the Company as a limited liability company pursuant to and in accordance with the Delaware Limited Liability Company Act, 6 *Del. C.* §§18-101, *et seq.*, as amended from time to time.

NOW, THEREFORE, in consideration of the agreements and obligations set forth herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Members (defined below) hereby agree as follows:

ARTICLE 1
DEFINED TERMS

Unless the context otherwise requires, the terms defined in this Article 1 shall, for the purposes of this Agreement, have the meanings herein specified.

Section 1.1 "***AAA***" has the meaning set forth in Section 16.1 hereof.

Section 1.2 "***Additional Members***" has the meaning set forth in Section 13.1 hereof.

Section 1.3 "***Additional Units***" has the meaning set forth in Section 13.1 hereof.

Section 1.4 "***Affiliate***" means with respect to a specified Person, any Person that directly or indirectly controls, is controlled by, or is under common control with, the specified Person. As used in this definition, the term "***control***" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a Person, whether through ownership of voting securities, by contract or otherwise.

Section 1.5 "***Agreement***" means this Limited Liability Company Agreement, as amended, modified, supplemented or restated from time to time.

Section 1.6 "***Capital Account***" means, with respect to any Unit Holder, the account maintained for such Unit Holder in accordance with the provisions of Section 4.4 hereof.

Section 1.7 "***Capital Contribution***" means, with respect to any Unit Holder, the aggregate amount of money and the initial Gross Asset Value of any property (other than money) contributed to the Company pursuant to Section 4.1 hereof with respect to the Units held by such Unit Holder. In the case of a Unit Holder that acquires an interest in the Company by virtue of an assignment in accordance with the terms of this Agreement, "***Capital Contribution***" has the meaning set forth in Section 4.4(a) hereof.

Section 1.8 "***Certificate***" means the certificate of formation and any and all amendments thereto and restatements thereof filed on behalf of the Company with the office of the Secretary of State of the State of Delaware pursuant to the Delaware Act.

Section 1.9 "***Code***" means the Internal Revenue Code of 1986, as amended from time to time, or any corresponding federal tax statute enacted after the date of this Agreement. A reference to a specific section (§) of the Code refers not only to such specific section but also to any corresponding provision of any federal tax statute enacted after the date of this Agreement, as such specific section or corresponding provision is in effect on the date of application of the provisions of this Agreement containing such reference.

Section 1.10 "***Company***" means Caithness Shepherds Flat, LLC, the limited liability company formed pursuant to the Delaware Act as ratified and governed by this Agreement.

Section 1.11 "***Covered Person***" means a Member, the Manager, any Affiliate of a Member or of the Manager, or any officer, director, shareholder, partner, member, employee, representative or agent of a Member or the Manager or their respective Affiliates, or of the Company or its Affiliates.

Section 1.12 "***Delaware Act***" means the Delaware Limited Liability Company Act, 6 *Del. C.* §§18-101, *et seq.*, as amended from time to time.

Section 1.13 "***Delaware Arbitration Act***" has the meaning set forth in Section 16.1 hereof.

Section 1.14 "***Depreciation***" means, for each Fiscal Year or other period, an amount equal to the depreciation, amortization or other cost recovery deduction allowable with respect to an asset for such Fiscal Year or other period; *provided, however*, that if the Gross Asset Value of an asset differs from its adjusted basis for federal income tax purposes at the beginning of such Fiscal Year or other period, Depreciation shall be an amount that bears the same ratio to such beginning Gross Asset Value as the federal income tax depreciation, amortization or other cost recovery deduction with respect to such asset for such Fiscal Year or other period bears to such beginning adjusted tax basis; and *provided further*, that if the federal income tax depreciation, amortization or other cost recovery deduction for such Fiscal Year or other period is zero, Depreciation shall be

determined with reference to such beginning Gross Asset Value using any reasonable method selected by the Manager.

Section 1.15 "***Fiscal Year***" means (a) the period commencing upon the formation of the Company and ending on December 31, 2006, (b) any subsequent twelve (12) month period commencing on January 1 and ending on December 31, or (c) any portion of the period described in clause (b) of this Section for which the Company is required to allocate Profits, Losses and other items of Company income, gain, loss or deduction pursuant to Article 8 hereof.

Section 1.16 "***Gross Asset Value***" means, with respect to any asset, such asset's adjusted basis for federal income tax purposes, except as follows:

(a) the initial Gross Asset Value of any asset contributed by a Member to the Company shall be the gross fair market value of such asset, as agreed to by the contributing Member and the Manager;

(b) the Gross Asset Values of all Company assets shall be adjusted to equal their respective gross fair market values, as determined by the Manager, as of the following times: (i) the acquisition of Additional Units in the Company by any existing Member or Additional Member in exchange for more than a *de minimis* Capital Contribution; (ii) the distribution by the Company to a Unit Holder of more than a *de minimis* amount of Company assets as consideration for an interest in the Company; and (c) the liquidation of the Company within the meaning of Treasury Regulation §1.704-1(b)(2)(ii)(g); *provided, however*, that adjustments pursuant to clause (i) and clause (ii) of this sentence shall be made only if the Manager reasonably determines that such adjustments are necessary or appropriate to reflect the relative economic interests of the Unit Holders in the Company; and

(c) the Gross Asset Value of any Company asset distributed to any Unit Holder shall be the gross fair market value of such asset on the date of distribution, as determined by the distributee Member and the Manager. If the Gross Asset Value of an asset has been determined or adjusted pursuant to subsection (a) or subsection (b) above, such Gross Asset Value shall thereafter be adjusted by the Depreciation taken into account with respect to such asset for purposes of computing Profits and Losses.

Section 1.17 "***Liquidating Trustee***" has the meaning set forth in Section 15.2 hereof.

Section 1.18 "***Majority Vote***" means the written approval of, or the affirmative vote by, Members holding a majority of the Units held by all of the Members.

Section 1.19 "***Manager***" means the Person designated by the Members in Section 6.1 hereof as the manager of the Company within the meaning of the Delaware Act and shall include a successor appointed pursuant to the provisions of this Agreement.

Section 1.20 "***Management Fee***" has the meaning set forth in Section 6.4 hereof.

Section 1.21 "***Member***" means any Person named as a member of the Company on Schedule A hereto and includes any Person admitted as an Additional Member pursuant to the provisions of this Agreement, and "***Members***" means two (2) or more of such Persons when acting in their capacities as members of the Company. For purposes of the Delaware Act, the Members shall constitute one (1) class or group of members.

Section 1.22 "***Net Cash Flow***" means, for each Fiscal Year or other period of the Company, the gross cash receipts of the Company from all sources, but excluding any amounts, such as gross receipts taxes, that are held by the Company as a collection agent or in trust for others or that are otherwise not unconditionally available to the Company, *less* all amounts paid by or for the account of the Company during the same Fiscal Year or other period (including, without limitation, payments of principal and interest on any Company indebtedness, payment of the Management Fee to the Manager pursuant to Section 6.4 hereof, expenses reimbursed to the Members under Section 5.2 hereof and expenses reimbursed to the Manager under Section 6.5 hereof), and *less* any amounts determined by the Manager to be necessary to provide a reasonable reserve for working capital needs or any other contingencies of the Company. Net Cash Flow shall be determined in accordance with the cash receipts and reimbursements method of accounting and otherwise in accordance with generally accepted accounting principles, consistently applied. Net Cash Flow shall not be reduced by depreciation, amortization, cost recovery deductions, depletion, similar allowances or other non-cash items, but shall be increased by any reduction of reserves previously established.

Section 1.23 "***Person***" includes any individual, corporation, association, partnership (general or limited), joint venture, trust, estate, limited liability company, or other legal entity or organization.

Section 1.24 "***Profits***" and "***Losses***" means, for each Fiscal Year, an amount equal to the Company's taxable income or loss for such Fiscal Year, determined in accordance with §703(a) of the Code (but including in taxable income or loss, for this purpose, all items of income, gain, loss or deduction required to be stated separately pursuant to §703(a)(1) of the Code), with the following adjustments:

(a) any income of the Company exempt from federal income tax and not otherwise taken into account in computing Profits or Losses pursuant to this definition shall be added to such taxable income or loss;

(b) any expenditures of the Company described in §705(a)(2)(B) of the Code (or treated as expenditures described in §705(a)(2)(B) of the Code pursuant to Treasury Regulation §1.704-1(b)(2)(iv)(i)) and not otherwise taken into account in computing Profits or Losses pursuant to this definition shall be subtracted from such taxable income or loss;

(c) in the event the Gross Asset Value of any Company asset is adjusted in accordance with subsection (b) or subsection (c) of the definition of "Gross Asset Value" above, the amount of such adjustment shall be taken into account as gain or loss from the disposition of such asset for purposes of computing Profits or Losses;

(d) gain or loss resulting from any disposition of any asset of the Company with respect to which gain or loss is recognized for federal income tax purposes shall be computed by reference to the Gross Asset Value of the asset disposed of, notwithstanding that the adjusted tax basis of such asset differs from its Gross Asset Value; and

(e) in lieu of the depreciation, amortization and other cost recovery deductions taken into account in computing such taxable income or loss, there shall be taken into account Depreciation for such Fiscal Year or other period, computed in accordance with the definition of "Depreciation" above.

Section 1.25 "***Tax Matters Member***" has the meaning set forth in Section 11.1 hereof.

Section 1.26 "***Treasury Regulations***" means the income tax regulations, including temporary regulations, promulgated under the Code, as such regulations may be amended from time to time (including corresponding provisions of succeeding regulations).

Section 1.27 "***Unit***" means an interest in the Company representing such fractional part of the interest of all Unit Holders pursuant to this Agreement as is equal to the quotient of one (1) divided by the total number of Units.

Section 1.28 "***Unit Holder***" means any Person who holds one (1) or more Units, regardless of whether such Person is a Member and regardless of whether such Units were initially acquired by such Person from the Company or by assignment from another Unit Holder.

ARTICLE 2
FORMATION AND TERM

Section 2.1 *Formation*.

(a) The Manager, being the sole Member, hereby acknowledges and ratifies that: (i) Aislinn Smith was authorized by the Manager to execute the Certificate and cause it to be filed, and is an authorized person within the meaning of the Delaware Act, (ii) on June 29, 2006, Aislinn Smith executed the Certificate and caused it to be filed on June 29, 2006 with the Delaware Secretary of State and upon such filing the powers of Gail Conboy ceased and the Manager thereupon became and is hereby designated as an authorized person within the meaning of the Delaware Act.

(b) The name and mailing address of each Unit Holder shall be listed on Schedule A attached hereto. The Manager shall update Schedule A from time to time as necessary to reflect accurately the information therein. Any amendment or revision to Schedule A made in accordance with this Agreement shall not be deemed an amendment to this Agreement. Any reference in this Agreement to Schedule A shall be deemed to be a reference to Schedule A as amended and in effect from time to time.

Section 2.2 Name. The name of the Company to be formed hereunder is Caithness Shepherds Flat, LLC. The business of the Company may be conducted upon compliance with all applicable laws under any other name designated by the Manager.

Section 2.3 Term. The Company shall remain in existence in perpetuity, unless dissolved in accordance with Section 15.1.

Section 2.4 Registered Agent and Office. The Company's registered agent and office in Delaware shall be Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, New Castle County, Delaware 19808. At any time, the Manager may designate another registered agent and/or registered office.

Section 2.5 Principal Place of Business. The principal place of business of the Company shall be c/o Caithness Corporation at 565 Fifth Avenue, New York, New York 10017. Upon ten (10) days' notice to the Members, the Manager may change the location of the Company's principal place of business.

Section 2.6 Qualification in Other Jurisdictions. The Manager shall cause the Company to be qualified, formed or registered under assumed or fictitious name statutes or similar laws in any jurisdiction in which the Company transacts business. The Manager, as an authorized person within the meaning of the Delaware Act, shall execute, deliver and file any certificates (and any amendments and/or restatements thereof) necessary for the Company to qualify to do business in a jurisdiction in which the Company may wish to conduct business.

ARTICLE 3
PURPOSE AND POWERS OF THE COMPANY

Section 3.1 Purpose. The Company is formed for the object and purpose of, and the nature of the business to be conducted and promoted by the Company is, engaging in any lawful act or activity for which limited liability companies may be formed under the Delaware Act and engaging in any and all activities necessary or incidental to the foregoing.

Section 3.2 *Powers of the Company*.

(a) The Company shall have the power and authority to take any and all actions necessary, appropriate, proper, advisable, incidental or convenient to or for the furtherance of the purpose set forth in Section 3.1, including, but not limited to, the power:

(i) to conduct its business, carry on its operations and have and exercise the powers granted to a limited liability company by the Delaware Act in any state, territory, district or possession of the United States, or in any foreign country that may be necessary, convenient or incidental to the accomplishment of the purpose of the Company;

(ii) to acquire by purchase, lease, contribution of property or otherwise, own, hold, operate, maintain, finance, improve, lease, sell, convey, mortgage, transfer, demolish or dispose of any real or personal property that may be necessary, convenient or incidental to the accomplishment of the purpose of the Company;

(iii) to enter into, perform and carry out contracts of any kind, including, without limitation, contracts with the Manager, any Member, any Affiliate thereof, or any agent of the Company necessary to, in connection with, convenient to, or incidental to the accomplishment of the purpose of the Company;

(iv) to purchase, take, receive, subscribe for or otherwise acquire, own, hold, vote, use, employ, sell, mortgage, lend, pledge, or otherwise dispose of, and otherwise use and deal in and with, shares or other interests in or obligations of domestic or foreign corporations, associations, general or limited partnerships, trusts, limited liability companies, or individuals or direct or indirect obligations of the United States or of any government, state, territory, governmental district or municipality or of any instrumentality of any of them;

(v) to lend money for its proper purpose, to invest and reinvest its funds, to take and hold real and personal property for the payment of funds so loaned or invested;

(vi) to sue and be sued, complain and defend, and participate in administrative or other proceedings, in its name;

(vii) to elect and designate one (1) or more managers of the Company in accordance with Section 6.1 hereof and to authorize any such Manager to appoint employees, officers and agents of the Company, and define their duties and fix their compensation;

(viii) to indemnify any Person in accordance with the Delaware Act;

(ix) to cease its activities and cancel its Certificate;

(x) to negotiate, enter into, renegotiate, extend, renew, terminate, modify, amend, waive, execute, acknowledge or take any other action with respect to any lease, contract or security agreement in respect of any assets of the Company;

(xi) to borrow money and issue evidences of indebtedness, and to secure the same by a mortgage, pledge or other line on the assets of the Company;

(xii) to pay, collect, compromise, litigate, arbitrate or otherwise adjust or settle any and all other claims or demands of or against the Company or to hold such proceeds against the payment of contingent liabilities; and

(xiii) to make, execute, acknowledge and file any and all documents or instruments necessary, convenient or incidental to the accomplishment of the purpose of the Company.

(b) The Members may, by a Majority Vote, authorize any Person (including, without limitation, the Manager) to enter into and perform any other obligation on behalf of the Company.

(c) The Company may merge with, or consolidate into, another Delaware limited liability company or other business entity (as defined in Section 18-209(a) of the Delaware Act) upon a Majority Vote.

ARTICLE 4
CAPITAL CONTRIBUTIONS, UNITS, CAPITAL ACCOUNTS AND ADVANCES

Section 4.1 *Capital Contributions*.

(a) Each Unit Holder has contributed or is deemed to have contributed to the capital of the Company certain assets.

(b) No Unit Holder shall be required to make any additional capital contribution to the Company. However, a Unit Holder may make additional capital contributions to the Company with the Manager's consent.

Section 4.2 *Units*. A Unit Holder's interest in the Company shall be represented by the "Unit" or "Units" held by such Unit Holder. Each Unit Holder's respective Units

shall be set forth on Schedule A attached hereto. Each Unit Holder hereby agrees that its interest in the Company and in its Units shall for all purposes be personal property. A Unit Holder shall have no interest in specific Company property.

Section 4.3 *Status of Capital Contributions*.

(a) Except as otherwise provided in this Agreement, the amount of a Unit Holder's Capital Contributions may be returned to it, in whole or in part, at any time, but only with the Manager's consent. Any such returns of Capital Contributions shall be made to all Unit Holders in proportion to the number of Units then held by each Unit Holder. Notwithstanding the foregoing, no return of a Unit Holder's Capital Contributions shall be made hereunder if such distribution would violate applicable state law. Under circumstances requiring a return of any Capital Contribution, no Unit Holder shall have the right to demand or receive property other than cash, except as may be specifically provided in this Agreement.

(b) No Unit Holder shall receive any interest, salary or drawing with respect to its Capital Contributions or its Capital Account or for services rendered on behalf of the Company or otherwise in its capacity as Unit Holder, except as otherwise specifically provided in this Agreement.

(c) Except as otherwise provided herein and by applicable state law, the Members shall be liable only to make their capital contributions pursuant to Section 4.1 hereof, and no Member shall be required to lend any funds to the Company or, after a Member's Capital Contributions have been fully paid pursuant to Section 4.1 hereof, to make any additional capital contributions to the Company. No Unit Holder shall have any personal liability for the repayment of any Capital Contribution of any other Member.

Section 4.4 *Capital Accounts*.

(a) An individual Capital Account shall be established and maintained for each Unit Holder. The initial amount of each Unit Holder's respective Capital Account shall be the aggregate capital account balances held by the Unit Holder in the interests contributed to the Company at the time of contribution. The original Capital Account established for any Unit Holder who acquires Units in the Company by virtue of an assignment in accordance with the terms of this Agreement shall be in the same amount as, and shall replace, the Capital Account of the assignor of such interest, and, for purposes of this Agreement, such Unit Holder shall be deemed to have made the Capital Contributions made by the assignor of such interest (or made by such assignor's predecessor in interest). To the extent such Unit Holder acquires less than all of the Units of the assignor, the original Capital Account of such Unit Holder and its Capital Contributions shall be in proportion to the Units it acquires, and the Capital Account of the assignor who retains Units in the Company, and the amount of its Capital Contributions, shall be reduced in proportion to the Units it retains.

(b) The Capital Account of each Unit Holder shall be maintained in accordance with the following provisions:

(i) to such Unit Holder's Capital Account there shall be credited such Unit Holder's Capital Contributions, such Unit Holder's distributive share of Profits and the amount of any Company liabilities that are assumed by such Unit Holder or that are secured by any Company assets distributed to such Unit Holder;

(ii) to such Unit Holder's Capital Account there shall be debited the amount of cash and the Gross Asset Value of any Company assets distributed to such Unit Holder pursuant to any provision of this Agreement, such Unit Holder's distributive share of Losses and the amount of any liabilities of such Unit Holder that are assumed by the Company or that are secured by any property contributed by such Unit Holder to the Company; and

(iii) in determining the amount of any liability for the purpose of clause (ii), there shall be taken into account §752(c) of the Code and any other applicable provisions of the Code and the Treasury Regulations.

Section 4.5 *Advances*. If any Unit Holder shall advance any funds to the Company in excess of its Capital Contributions, the amount of such advance shall neither increase its Capital Account nor entitle it to any increase in its share of the distributions of the Company. The amount of any such advance shall be a debt obligation of the Company to such Unit Holder and shall be repaid to it by the Company with interest at a rate equal to the lesser of (i) 10% and (ii) the maximum rate permitted by applicable law, and upon such other terms and conditions as shall be mutually determined by such Unit Holder and the Manager. Any such advance shall be payable and collectible only out of Company assets, and the other Unit Holders shall not be personally obligated to repay any part thereof. No Person who makes any nonrecourse loan to the Company shall have or acquire, as a result of making such loan, any direct or indirect interest in the profits, capital or property of the Company, other than as a creditor.

Section 4.6 *Certificates*. The Company may issue with the Manager's consent one or more certificates (each a "***Certificate***") in the name of such Member evidencing the number of Units issued to such Member. Upon the transfer of a Unit in accordance with the provisions of this Agreement, the Company shall issue replacement Certificates to the Unit Holder. The Manager shall maintain a register of all Units and Certificates held by Members and Unit Holders. All new and replacement Certificates shall contain a legend as follows:

The Units represented by this Certificate are subject to the terms of that certain Limited Liability Agreement of Caithness Shepherds Flat, LLC, dated as of June 29, 2006. Copies of such agreements are on file at the

Company's principal offices and, upon written request to the Manager of the Company, a copy thereof will be mailed or otherwise provided without charge within five (5) days of receipt of such request to appropriately interested persons.

Section 4.7 Lost, Stolen or Destroyed Certificates. The Company shall issue a new Certificate in place of any Certificate previously issued if the registered holder of the Certificate (i) makes proof by affidavit that a previously issued Certificate has been lost, stolen, defaced or destroyed, (ii) requests the issuance of a new Certificate before the Company has notice that the Units evidenced by such Certificate have been acquired by a purchaser for value in good faith and without notice of an adverse claim and (iii) if required by the Company, delivers to the Company against any claim that may be made on account of the alleged loss, destruction or theft of the Certificate. The Company shall be entitled to treat each registered holder of Units as a Member or Unit Holder of the Company and, accordingly, shall not be required to recognize any equitable or other claim or interest in or with respect to the Units on the part of any other Person, regardless of whether it has actual or other notice thereof.

ARTICLE 5
MEMBERS

Section 5.1 Powers of Members. The Members shall have the power to exercise any and all rights or powers granted to the Members pursuant to the express terms of this Agreement. The Members shall also have the power to authorize the Manager, by a Majority Vote, to possess and exercise any right or power not already vested in the Manager pursuant to Section 6.3 or any other provision of this Agreement. In addition to the foregoing, the Members shall have the power to exercise any and all other rights or powers of the Company and do all lawful acts and things as are not by the Delaware Act or this Agreement directed or required to be exercised or done by the Manager, *provided however*, that no Member shall have authority to bind the Company except to the extent and in the manner expressly provided in this Agreement.

Section 5.2 Reimbursements. The Company shall reimburse the Members for all ordinary and necessary out-of-pocket expenses incurred by the Members on behalf of the Company subject to the Manager's determination and prior written approval as to the type and amount of expenses that may be reimbursed to a Member, which determination and approval shall be made in its sole discretion and shall be binding and conclusive. Such reimbursement shall be treated as an expense of the Company that shall be deducted in computing the Net Cash Flow and shall not be deemed to constitute a distributive share of Profits or a distribution or return of capital to any Member.

Section 5.3 Partition. Each Member waives, until termination of the Company, any and all rights that it may have to maintain an action for partition of the Company's property.

Section 5.4 *Resignations; Retirements*. A Member may not resign from the Company without the written consent of the Manager. The Company may recover damages for breach of this Section 5.4 if any Member violates this Section 5.4 and may offset the Company's damages against any amount owed to a resigning Member for distributions.

ARTICLE 6
MANAGER AND OFFICERS

Section 6.1 *Designation of Manager*. The management of the Company's business shall be vested, to the extent provided in Section 6.3 hereof, in a Manager designated by a Majority Vote. The Manager may be but need not be a Member. Caithness shall be the initial Manager, and Caithness hereby accepts and agrees to be bound by the terms and conditions of this Agreement. In the event that Caithness ceases to be the Manager of the Company as provided in this Agreement, subject to the admission of an Additional Member in accordance with Section 13.1 hereof, a successor Manager shall be elected by a Majority Vote. Such successor Manager shall execute an instrument approved by a Majority Vote accepting and agreeing to the terms and conditions of this Agreement. The Manager may assign the duties and powers of this Agreement to a qualified affiliate of Caithness with the Company's consent, provided that such consent shall not be unreasonably withheld.

Section 6.2 *Manager as Agent*. The Manager, to the extent of its powers set forth in Section 6.3 hereof, is an agent of the Company for the purpose of the Company's business, and the actions of the Manager taken in accordance with such powers shall bind the Company.

Section 6.3 *Powers of the Manager*.

(a) Except for situations in which the approval by a Majority Vote is required by nonwaivable provisions of applicable law, and subject to the provisions of Section 6.3(b), the powers of the Company shall be exercised only by or under the authority of, and the business and affairs of the Company shall be managed solely under the direction of, the Manager, and the Manager shall make all decisions and take all actions for the Company not otherwise provided for in this Agreement, including, without limitation, the following:

(i) entering into, making, and performing contracts, agreements, and other undertakings binding the Company that may be necessary, appropriate, or advisable in furtherance of the purposes of the Company and making all decisions and waivers thereunder;

(ii) opening and maintaining bank and investment accounts and arrangements, drawing checks and other orders for the payment of money, and designating individuals with authority to sign or give instructions with respect to those accounts and arrangements;

(iii) maintaining in good order and insuring the assets of the Company;

(iv) collecting sums due the Company;

(v) to the extent that funds of the Company are available therefor, paying debts and obligations of the Company;

(vi) acquiring, utilizing for Company purposes, disposing of, pledging, granting a security interest in, or otherwise encumbering any asset of the Company;

(vii) borrowing money or otherwise committing the credit of the Company for Company activities and voluntary prepayments or extensions of debt, or guaranteeing any indebtedness;

(viii) selecting, removing, and changing the authority and responsibility of lawyers, accountants, and other advisers and consultants;

(ix) obtaining insurance for the Company;

(x) determining allocations of income, gain, loss, deduction and credit to each Member's Capital Account, and the amount, timing and making of distributions of Company cash and other property, in each case as provided in this Agreement;

(xi) forming other limited or general partnerships, joint ventures, limited liability companies, corporations or other relationships that the Manager deems appropriate and contributing to such other entities or ventures such assets of the Company as are necessary in connection therewith;

(xii) controlling other matters affecting the rights and obligations of the Company, including settlement of any litigation, incurring of legal expenses, and settling claims and suits;

(xiii) prior to distribution to the Members in accordance with Article 9, investing and reinvesting Company funds in a manner to be determined by the Manager in the exercise of its reasonable judgment;

(xiv) otherwise exercising management powers over the business and affairs of the Company; and

(xv) possessing and exercising any additional right or power granted to the Manager pursuant to the express terms of this Agreement or vested in the Manager by the Members pursuant to a Majority Vote.

(b) Notwithstanding the provisions of Section 6.3(a), the Company may not do any of the following without the approval of the Members by a Majority Vote:

(i) sell, lease, exchange or otherwise dispose of (other than by way of a pledge, mortgage, deed of trust or trust indenture) all or substantially all of the Company's property and assets (with or without good will), other than in the usual and regular course of the Company's business;

(ii) be a party to a merger or an acquisition; and

(iii) amend or restate this Agreement.

(c) In the event that the Manager is unsure of the application of any provision of this Agreement or any other agreement relating to the transactions contemplated hereby, the Manager may request and rely upon instructions of the Members (which instructions shall be adopted by the Members by a Majority Vote); *provided, however*, that if the Manager shall not have received instructions from the Members pursuant to its request within twenty (20) days after the date of such request, until instructed otherwise, the Manager may, but shall be under no duty to, take or refrain from taking such action as it shall deem advisable in the best interests of the Company and the Members.

Section 6.4 Fees.

(a) The Company shall pay annually to the Manager, as compensation for its services in the management and administration of the Company, a fee (the "***Management Fee***"), to be determined by majority vote until such time as the Manager ceases to be a manager of the Company or the Company is dissolved.

(b) The Management Fee shall be payable by the Company within thirty (30) days after demand therefor by the Manager, which demand shall be submitted by the Manager to all Members annually no later than sixty (60) days following December 1 of each year during the term of the Company.

Section 6.5 Reimbursement. In addition to the fees payable to the Manager pursuant to Section 6.4 hereof, the Company shall reimburse the Manager for all ordinary and necessary out-of-pocket expenses incurred by the Manager on behalf of the Company. Such reimbursement shall be treated as an expense of the Company that shall be deducted in computing the Net Cash Flow and shall not be deemed to constitute a distributive share of Profits or a distribution or return of capital to the Manager.

Section 6.6 *Removal of Manager*.

(a) The Manager may be removed with or without cause by a Majority Vote.

(b) Any removal of the Manager shall become effective on such date as may be specified by the Members voting in favor thereof. Should a Manager that is removed also be a Member, such Member shall continue to participate in the Company as a Member and shall share in the Profits, Losses and Net Cash Flow in the same ratios, as provided in Articles 8 and 9 hereof, as were applicable to such Member before its removal as Manager.

Section 6.7 *Resignation of Manager*. A Manager may resign from its position as a Manager at any time upon not less than twenty (20) days' prior written notice to all of the Members.

Section 6.8 *Officers*.

(a) The Manager may, from time to time, designate one or more Persons to be officers of the Company and shall initially designate James D. Bishop, Sr. as Chairman and Chief Executive Officer, James D. Bishop, Jr. as Vice Chairman, Leslie J. Gelber as President and Chief Operating Officer, Christopher McCallion as Executive Vice President and Chief Financial Officer, Kenneth Hoffman as Senior Vice President, Ross Ain as Senior Vice President, Barbara Bishop-Gollan as Senior Vice President, James R. Pagano as Senior Vice President - Development, David Casale as Vice President and Controller, John McNamara as Vice President - Finance, Timothy Prenger, Vice President - Engineering, Joseph Greco as Vice President – Western Region, and Gail Conboy as Assistant Secretary. No officer need be a resident of the State of Delaware, a Member or a Manager. Any officers so designated shall have such authority and perform such duties as the Manager may, from time to time, delegate to them, subject to the limitations of Section 6.3(b) of this Agreement. The Manager may assign titles to particular officers. Unless the Manager decides otherwise, if the title is one commonly used for officers of a business corporation formed under the General Corporation Law of the State of Delaware, the assignment of such title shall constitute the delegation to such officer of the authority and duties that are normally associated with that office, subject to (i) any specific delegation of authority and duties made to such officer by the Manager, or (ii) the limitations set forth in Section 6.3 hereof. Each officer shall hold office until his successor shall be duly designated and shall qualify or until his death or until he shall resign or shall have been removed in the manner hereinafter provided. Any number of offices may be held by the same Person. The salaries or other compensation, if any, of the officers and agents of the Company shall be fixed from time to time by the Manager.

(b) Any officer may resign as such at any time. Such resignation shall be made in writing and shall take effect at the time specified therein, or if no time be specified, at the time of its receipt by the Manager. The acceptance of a resignation shall not be necessary to make it effective, unless expressly so provided in the resignation. Any officer may be removed as such, either with or without cause, by the Manager. Designation of an officer shall not create any contract rights for an officer. Any vacancy occurring in any office of the Company (other than Manager) may be filled by the Manager.

ARTICLE 7
AMENDMENTS AND MEETINGS

Section 7.1 *Amendments*. Any amendment to this Agreement shall be adopted and be effective as an amendment hereto if it receives the affirmative vote of all of the Members, provided that such amendment be in writing and executed by all of the Members.

Section 7.2 *Meetings of the Members*.

(a) Meetings of the Members may be called by the Manager and shall be called by the Manager by a Majority Vote. The call shall state the location of the meeting and the nature of the business to be transacted. Notice of any such meeting shall be given to all Members not less than seven (7) days nor more than thirty (30) days prior to the date of such meeting. Members may vote in person or by proxy at such meeting. Whenever a vote, consent or approval of Members is permitted or required under the Agreement, such vote, consent or approval may be given at a meeting of Members or may be given in accordance with the procedure prescribed in Subsection (e) of this Section 7.2. Except as otherwise expressly provided in this Agreement, a Majority Vote of the Members shall be required to constitute the act of the Members.

(b) For the purpose of determining the Members entitled to vote on, or to vote at, any meeting of the Members or any adjournment thereof, the Manager or the Member requesting such meeting may fix, in advance, a date as the record date for any such determination. Such date shall not be more than thirty (30) days and not less than ten (10) days before any such meeting.

(c) Each Member may authorize any Person to act for it by proxy on all matters in which a Member is entitled to participate, including, without limitation, waiving notice of any meeting, or voting or participating at a meeting or providing written consent under subsection (e) hereof. Every proxy must be signed by the Member or its attorney-in-fact. No proxy shall be valid after the expiration of eleven (11) months from the date thereof unless otherwise provided in the proxy. Every proxy shall be revocable at the pleasure of the Member executing it.

(d) Each meeting of Members shall be conducted by the Manager or Member requesting such meeting or by such other Person that the Manager or Member requesting such meeting may designate.

(e) Except as otherwise expressly provided in this Agreement, the Company may take any action contemplated under this Agreement as approved by a Majority Vote.

ARTICLE 8
ALLOCATIONS

Section 8.1 *Profits and Losses*.

(a) Subject to the allocation rules of Section 8.2 hereof, Profits for any Fiscal Year shall be allocated among the Unit Holders in proportion to the number of Units held by each Unit Holder as set forth on Schedule A attached hereto.

(b) Subject to the allocation rules of Section 8.2 hereof, Losses for any Fiscal Year shall be allocated among the Unit Holders in proportion to the number of Units held by each Unit Holder as set forth on Schedule A attached hereto.

Section 8.2 *Allocation Rules*.

(a) In the event Members are admitted to the Company pursuant to this Agreement on different dates, the Profits (or Losses) allocated to the Unit Holders for each Fiscal Year during which Members are so admitted shall be allocated among the Unit Holders in proportion to the number of Units each holds from time to time during such Fiscal Year in accordance with §706 of the Code, using any convention permitted by law and selected by the Manager.

(b) For purposes of determining the Profits, Losses or any other items allocable to any period, Profits, Losses and any such other items shall be determined on a daily, monthly or other basis, as determined by the Manager using any method that is permissible under §706 of the Code and the Treasury Regulations thereunder.

(c) Except as otherwise provided in this Agreement, all items of Company income, gain, loss, deduction and any other allocations not otherwise provided for shall be divided among the Unit Holders in the same proportions as they share Profits and Losses for the Fiscal Year in question.

(d) The Members are aware of the income tax consequences of the allocations made by this Article 8 and hereby agree to be bound by the provisions of this Article 8 in reporting their shares of Company income and loss for income tax purposes.

Section 8.3 *Tax Allocations: Section 704(c) of the Code.*

(a) In accordance with §704(c) of the Code and the Treasury Regulations thereunder, income, gain, loss and deduction with respect to any property contributed to the capital of the Company shall, solely for income tax purposes, be allocated among the Unit Holders so as to take account of any variation between the adjusted basis of such property to the Company for federal income tax purposes and its initial Gross Asset Value (computed in accordance with Section 1.16 hereof).

(b) In the event the Gross Asset Value of any Company asset is adjusted pursuant to subsection (b) of the definition of "Gross Asset Value" contained in Section 1.16 hereof, subsequent allocations of income, gain, loss and deduction with respect to such asset shall take account of any variation between the adjusted basis of such asset for federal income tax purposes and its Gross Asset Value in the same manner as under §704(c) of the Code and the Treasury Regulations thereunder.

(c) Any elections or other decisions relating to allocations under this Section 8.3, including the selection of any allocation method permitted under proposed Treasury Regulation §1.704-1(c), shall be made by the Manager in any manner that reasonably reflects the purpose and intention of this Agreement. Allocations pursuant to this Section 8.3 are solely for purposes of federal, state and local taxes and shall not affect, or in any way be taken into account in computing, any Unit Holder's Capital Account or share of Profits, Losses, other items or distributions pursuant to any provision of this Agreement.

ARTICLE 9
DISTRIBUTIONS

Section 9.1 *Net Cash Flow*. Except as otherwise provided in Article 15 hereof, any distribution of the Net Cash Flow during any Fiscal Year shall be made to the Unit Holders in proportion to the number of Units held by each Unit Holder as set forth on Schedule A attached hereto.

Section 9.2 *Distribution Rules.*

(a) All distributions pursuant to Section 9.1 hereof shall be at such times and in such amounts as shall be determined by the Manager.

(b) All amounts withheld pursuant to the Code or any provision of any state or local tax law with respect to any payment, distribution or allocation to the Company or the Unit Holders shall be treated as amounts distributed to the Unit Holders pursuant to this Article 9 for all purposes of this Agreement. The Manager in its sole discretion, may but shall not be obligated to, withhold from distributions, or with respect to allocations, to Unit Holders and to pay over to any federal, state or local government any amounts required to be so withheld pursuant to the Code or any provision of any other federal, state or local law, and shall allocate such amounts to such Unit Holders with respect to which such amounts were withheld.

Section 9.3 *Limitation on Distribution*. Notwithstanding any provision to the contrary contained in this Agreement, the Company shall not make a distribution to any Unit Holder on account of its interest in the Company if such distribution would violate Section 18-607 of the Delaware Act or other applicable law.

ARTICLE 10
BOOKS AND RECORDS

Section 10.1 *Books, Records and Financial Statements*.

(a) At all times during the continuance of the Company, the Company shall maintain, at its principal place of business, separate books of account for the Company that shall show a true and accurate record of all costs and expenses incurred, all charges made, all credits made and received and all income derived in connection with the operation of the Company business in accordance with generally accepted accounting principles consistently applied, and, to the extent inconsistent therewith, in accordance with this Agreement. Such books of account, together with a certified copy of this Agreement and of the Certificate, shall at all times be maintained at the principal place of business of the Company and shall be open to inspection and examination at reasonable times by each Member and its duly authorized representative for any purpose reasonably related to such Member's interest in the Company. The books of account and the records of the Company shall be examined by and reported upon as of the end of each Fiscal Year by a firm of independent certified public accounts selected by the Manager. Any Member shall have the right to have a private audit of the Company books and records conducted at reasonable times and after reasonable advance notice to the Company for any purpose reasonably related to such Member's interest in the Company, but any such private audit shall be at the expense of the Member desiring it, and it shall not be paid for out of Company funds.

(b) The Manager shall prepare and maintain, or cause to be prepared and maintained, the books of account of the Company and the following documents shall be transmitted by the Manager to each Member at the times hereinafter set forth:

(i) Within one hundred fifty (150) days after the close of each Fiscal Year, the following financial statements:

(1) balance sheet of the Company as of the beginning and close of such Fiscal Year;

(2) statement of Company Profits and Losses for such Fiscal Year; and

(3) statement of such Member's Capital Account as of the close of such Fiscal Year, and changes therein during such Fiscal Year.

(ii) Within one hundred fifty (150) days after the close of each Fiscal Year, a statement indicating such Member's share of each item of Company income, gain, loss, deduction or credit for such Fiscal Year for income tax purposes.

(c) All information contained in any statement or other document distributed to any Member pursuant to subsection 10.1(b) shall be deemed accurate, binding and conclusive with respect to such Member unless written objection is made thereto by such Member to the Company within twenty (20) business days after the receipt of such statement or other document by such Member.

Section 10.2 *Accounting Method.* For both financial and tax reporting purposes and for purposes of determining Profits and Losses, the books and records of the Company shall be kept on the accrual method of accounting applied in a consistent manner and shall reflect all Company transactions and be appropriate and adequate for the Company's business.

ARTICLE 11
TAX MATTERS

Section 11.1 *Tax Matters Member.*

(a) Caithness is hereby designated as the initial "Tax Matters Member" of the Company for purposes of §6231(a)(7) of the Code and shall have the power to manage and control, on behalf of the Company, any administrative proceeding at the Company level with the Internal Revenue Service relating to the determination of any item of Company income, gain, loss, deduction or credit for federal income tax purposes.

(b) The Tax Matters Member shall, within ten (10) days of the receipt of any notice from the Internal Revenue Service in any administrative proceeding at the Company level relating to the determination of any Company item of income, gain, loss, deduction or credit, mail a copy of such notice to each Unit Holder.

(c) The Members, by a Majority Vote, may at any time hereafter designate a new Tax Matters Member; *provided, however*, that only a Member may be designated as the Tax Matters Member of the Company.

Section 11.2 *Right to Make Section 754 Election*. The Manager may, in its sole discretion, make or revoke, on behalf of the Company, an election in accordance with §754 of the Code, so as to adjust the basis of Company property in the case of a distribution of property within the meaning of §734 of the Code, and in the case of a transfer of a Company interest within the meaning of §743 of the Code. Each of the Unit Holders shall, upon request of the Manager, supply the information necessary to give effect to such an election.

ARTICLE 12
LIABILITY, EXCULPATION AND INDEMNIFICATION

Section 12.1 *Liability*.

(a) Except as otherwise provided by the Delaware Act, the debts, obligations and liabilities of the Company, whether arising in contract, tort or otherwise, shall be solely the debts, obligations and liabilities of the Company, and no Covered Person shall be obligated personally for any such debt, obligation or liability of the Company solely by reason of being a Covered Person.

(b) Except as otherwise expressly required by law, a Member, in its capacity as such, shall have no liability in excess of (a) the amount of its Capital Contributions, (b) its share of any assets and undistributed profits of the Company, (c) its obligation to make other payments expressly provided for in this Agreement, and (d) the amount of any distributions wrongfully distributed to it.

Section 12.2 *Exculpation*.

(a) No Covered Person shall be liable to the Company or any other Covered Person for any loss, damage or claim incurred by reason of any act or omission performed or omitted by such Covered Person in good faith on behalf of the Company and in a manner reasonably believed to be within the scope of authority conferred on such Covered Person by this Agreement, except that a Covered Person shall be liable for any such loss, damage or claim incurred by reason of such Covered Person's gross negligence, bad faith or willful misconduct.

(b) A Covered Person shall be fully protected in relying in good faith upon the records of the Company and upon such information, opinions, reports or statements presented to the Company by any Person as to matters the Covered Person reasonably believes are within such other Person's professional or expert competence and who has been selected with reasonable care by or on behalf of the Company, including information, opinions, reports or statements as to the value and amount of the assets, liabilities, Profits, Losses or Net Cash Flow or any other facts pertinent to the existence and amount of assets from which distributions or Members might properly be paid.

Section 12.3 *Fiduciary Duty*.

(a) To the extent that, at law or in equity, a Covered Person has duties (including fiduciary duties) and liabilities relating thereto to the Company or to any other Covered Person, a Covered Person acting under this Agreement shall not be liable to the Company or to any other Covered Person for its good faith reliance on the provisions of this Agreement. The provisions of this Agreement, to the extent that they restrict the duties and liabilities of a Covered Person otherwise existing at law or in equity, are agreed by the parties hereto to replace such other duties and liabilities of such Covered Person.

(b) Unless otherwise expressly provided herein, whenever a conflict of interest exists or arises between Covered Persons or whenever this Agreement or any other agreement contemplated herein or therein provides that a Covered Person shall act in a manner that is, or provides terms that are, fair and reasonable to the Company or any Member, the Covered Person shall resolve such conflict of interest, taking such action or providing such terms, considering in each case the relative interest of each party (including its own interest) to such conflict, agreement, transaction or situation and the benefits and burdens relating to such interests, any customary or accepted industry practices, and any applicable generally accepted accounting practices or principles. In the absence of bad faith by the Covered Person, the resolution, action or term so made, taken or provided by the Covered Person shall not constitute a breach of this Agreement or any other agreement contemplated herein or of any duty or obligation of the Covered Person at law or in equity or otherwise.

(c) Whenever in this Agreement a Covered Person is permitted or required to make a decision (i) in its "discretion" or under a grant of similar authority or latitude, the Covered Person shall be entitled to consider only such interests and factors as it desires, including its own interests, and shall have no duty or obligation to give any consideration to any interest of or factors affecting the Company or any other Person, or (ii) in its "good faith" or under another express standard, the Covered Person shall act under such express standard and shall not be subject to any other or different standard imposed by this Agreement or other applicable law.

Section 12.4 *Indemnification*. To the fullest extent permitted by applicable law, a Covered Person shall be entitled to indemnification from the Company for any loss, damage or claim incurred by such Covered Person by reason of any act or omission

performed or omitted by such Covered Person in good faith on behalf of the Company and in a manner reasonably believed to be within the scope of authority conferred on such Covered Person by this Agreement, except that no Covered Person shall be entitled to be indemnified in respect of any loss, damage or claim incurred by such Covered Person by reason of gross negligence or willful misconduct with respect to such acts or omissions; *provided, however*, that any indemnity under this Section 12.4 shall be provided out of and to the extent of Company assets only, and no Covered Person shall have any personal liability on account thereof.

Section 12.5 *Expenses*. To the fullest extent permitted by applicable law, expenses (including legal fees) incurred by a Covered Person in defending any claim, demand, action, suit or proceeding shall, from time to time, be advanced by the Company prior to the final disposition of such claim, demand, action, suit or proceeding upon receipt by the Company of an undertaking by or on behalf of the Covered Person to repay such amount if it shall be determined that the Covered Person is not entitled to be indemnified as authorized in Section 12.4 hereof.

Section 12.6 *Outside Businesses*. Any Member, Manager or Affiliate thereof may engage in or possess an interest in other business ventures of any nature or description, independently or with others, similar or dissimilar to the business of the Company, and the Company, the Members and the Manager shall have no rights by virtue of this Agreement in and to such independent ventures or the income or profits derived therefrom, and the pursuit of any such venture, even if competitive with the business of the Company, shall not be deemed wrongful or improper. No Member, Manager or Affiliate thereof shall be obligated to present any particular investment opportunity to the Company even if such opportunity is of a character that, if presented to the Company, could be taken by the Company, and any Member, Manager or Affiliate thereof shall have the right to take for its own account (individually or as a partner or fiduciary) or to recommend to others any such particular investment opportunity.

ARTICLE 13
ADDITIONAL MEMBERS AND UNITS

Section 13.1 *Additional Units*. With the Manager's consent, the Company may raise additional capital by offering and selling, or causing to be offered and sold, additional limited liability company interests in the Company ("***Additional Units***") to any Person in such amounts and on such terms as the Members may determine. Each Person who subscribes for any of the Additional Units shall be admitted as an additional member of the Company (each, an "***Additional Member***" and collectively, the "***Additional Members***") at the time such Person (i) executes this Agreement or a counterpart of this Agreement and (ii) is named as a Member on Schedule A hereto. The legal fees and expenses associated with such admission shall be borne by the Company.

Section 13.2 *Allocations*. Additional Units shall not be entitled to any retroactive allocation of the Company's income, gains, losses, deductions, credits or other items; provided that, subject to the restrictions of §706(d) of the Code, Additional Units shall be entitled to their respective share of the Company's income, gains, losses, deductions, credits and other items arising under contracts entered into before the effective date of the issuance of any Additional Units to the extent that such income, gains, losses, deductions, credits and other items arise after such effective date. To the extent consistent with §706(d) of the Code and Treasury Regulations promulgated thereunder, the Company's books may be closed at the time Additional Units are issued (as though the Company's tax year had ended) or the Company may credit to the Additional Units *pro rata* allocations of the Company's income, gains, losses, deductions, credits and items for that portion of the Company's Fiscal Year after the effective date of the issuance of the Additional Units.

ARTICLE 14
ASSIGNABILITY

(a) *Assignability of Units; Restrictions on Transfers*. Except pursuant to the written consent of the Manager, no Member directly or indirectly shall sell, assign, transfer, pledge, hypothecate, mortgage, encumber, exchange, give or otherwise dispose of (collectively, a "***Transfer***") any of its Units or any economic, voting or other interest (collectively, an "***interest***") in the Company. Notwithstanding anything to the contrary in Section 18-702(a) of the Delaware Act, so long as the Manager is the assignor and the sole Member, an assignee of an interest in the Company may participate in the management of the business and affairs of the Company pursuant to the written approval of the Manager.

Section 14.2 *Indemnification*. In the case of a Transfer or attempted Transfer of any Unit or any interest therein in violation of this Agreement, the Parties engaging or attempting to engage in such assignment shall be liable to indemnify and hold harmless the Company and the other Members from all costs, liabilities and damages that any of such indemnified Persons may incur (including, without limitation, incremental tax liability and lawyers' fees and expenses) as a result of such assignment or attempted assignment and efforts to enforce the indemnity granted hereby.

ARTICLE 15
DISSOLUTION, LIQUIDATION AND TERMINATION

Section 15.1 *Dissolution*. (a) The Company shall not be dissolved by the admission of Additional Members in accordance with the terms of this Agreement.

(b) The Company shall be dissolved and its affairs shall be wound up pursuant to Section 18-801 of the Delaware Act.

Section 15.2 *Notice of Dissolution*. Upon the dissolution of the Company, the Person or Persons approved by a Majority Vote to carry out the winding up of the Company (the "***Liquidating Trustee***") shall promptly notify the Members of such dissolution.

Section 15.3 *Liquidation*. Upon dissolution of the Company, the Liquidating Trustee shall immediately commence to wind up the Company's affairs; *provided, however*, that a reasonable time shall be allowed for the orderly liquidation of the assets of the Company and the satisfaction of liabilities to creditors so as to enable the Members to minimize the normal losses attendant upon a liquidation. The Unit Holders shall continue to share Profits and Losses during liquidation in the same proportions, as specified in Article 8 hereof, as before liquidation. Each Member shall be furnished with a statement prepared by the Company's certified public accountants that shall set forth the assets and liabilities of the Company as of the date of dissolution. The proceeds of liquidation shall be distributed, as realized, in the following order and priority:

(a) to creditors of the Company, including Unit Holders who are creditors, to the extent otherwise permitted by law, in satisfaction of the liabilities of the Company (whether by payment or the making of reasonable provision for payment thereof), other than liabilities for distributions to Unit Holders; and

(b) to distribute to the Unit Holders the remaining proceeds of liquidation in accordance with their Capital Account balances, after giving effect to all contributions, distributions and allocations for all periods.

Section 15.4 *Termination*. The Company shall terminate when all of the assets of the Company, after payment of or due provision for all debts, liabilities and obligations of the Company, shall have been distributed to the Unit Holders in the manner provided for in this Article 15, and the Certificate shall have been canceled in the manner required by the Delaware Act.

Section 15.5 *Claims of the Members*. The Members shall look solely to the Company's assets for the return of their Capital Contributions, and if the assets of the Company remaining after payment of or due provision for all debts, liabilities and obligations of the Company are insufficient to return such Capital Contributions, the Members shall have no recourse against the Company or any other Covered Person.

ARTICLE 16
ARBITRATION

Section 16.1 *Dispute Resolution*. To the fullest extent permitted by the Delaware Act and other applicable law, any controversy or claim arising out of or relating to this Agreement, or any breach thereof, shall be settled by arbitration in accordance and to the extent permitted by the Uniform Arbitration Act (*10 Del. C. §5701, et seq.*) (the "***Delaware Arbitration Act***") and, to the extent not inconsistent therewith, the

Commercial Arbitration Rules of the American Arbitration Association ("***AAA***"), as amended and in effect on the date that demand for arbitration is filed with the AAA. Each party to the arbitration shall select one (1) arbitrator. The arbitrators' ruling shall be binding and conclusive upon the parties hereto to the fullest extent permitted by law. Any arbitration shall occur in Wilmington, Delaware, and judgment upon the award rendered may be entered in any court having jurisdiction thereof. The arbitrators shall be governed by and shall apply the substantive law of the State of Delaware in making their award. The expenses of the arbitration shall be borne equally by the parties to the arbitration, provided that each party shall pay for and bear the cost of its own experts, evidence and legal counsel.

ARTICLE 17
MISCELLANEOUS

Section 17.1 *Notices*. All such notices provided for in this Agreement shall be in writing, duly signed by the party giving such notice, and shall be delivered, telecopied or mailed by registered or certified mail, as follows:

(a) if to the Company, in care of the Manager at the Company's mailing address set forth on Schedule A attached hereto;

(b) if to the Manager, at its mailing address set forth on Schedule A attached hereto; or

(c) if to any Member, at the address set forth opposite its name on Schedule A attached hereto, or at such other address as such Member may hereafter designate by written notice to the Company.

(d) Notices shall be effective as follows: if delivered by courier or by hand, on the date of delivery or, if such date is not a business day, on the business day immediately following; if mailed, on the third (3rd) day following the date of mailing or, if such day is not a business day, on the business day immediately following; if sent by telecopier, on the date of sending or, if such date is not a business day, on the business day immediately following, *provided* that with respect to notices sent by telecopier, the burden of proof of receipt shall be on the sender.

Section 17.2 *Failure to Pursue Remedies*. The failure of any party to seek redress for violation of, or to insist upon the strict performance of, any provision of this Agreement shall not prevent a subsequent act, which would have originally constituted a violation, from having the effect of an original violation.

Section 17.3 *Cumulative Remedies*. The rights and remedies provided by this Agreement are cumulative and the use of any one right or remedy by any party shall not preclude or waive its right to use any or all other remedies. Such rights and remedies are given in addition to any other rights the parties may have by law, statute, ordinance or otherwise.

Section 17.4 *Binding Effect*. This Agreement shall be binding upon and inure to the benefit of all of the parties and, to the extent permitted by this Agreement, their successors, legal representatives and assigns.

Section 17.5 *Interpretation*. Throughout this Agreement, nouns, pronouns, and verbs shall be construed as masculine, feminine, neuter, singular or plural, wherever shall be applicable. All references herein to "Articles," "Sections" and paragraphs shall refer to corresponding provisions of this Agreement. The heading and subheadings in this Agreement are included for convenience and identification only and are in no way intended to describe, interpret, define or limit the scope, extent or intent of this Agreement or any provision hereof.

Section 17.6 *Severability*. The invalidity or unenforceability of any particular provision of this Agreement shall not affect the other provisions hereof, and this Agreement shall be construed in all respects as if such invalid or unenforceable provision were omitted.

Section 17.7 *Counterparts*. This Agreement may be executed in any number of counterparts with the same effect as if all parties hereto had signed the same document. All counterparts shall be construed together and shall constitute one instrument.

Section 17.8 *Integration*. This Agreement constitutes the entire agreement among the parties hereto pertaining to the subject matter hereof and supersedes all prior agreements and understandings pertaining thereto.

Section 17.9 *Governing Law*. This Agreement and the rights of the parties hereunder shall be interpreted in accordance with the laws of the State of Delaware, and all rights and remedies shall be governed by such laws without regard to principles of conflict of laws.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above stated.

MEMBER:

CAITHNESS ENERGY, L.L.C.

By: _____

Christopher McCallion
Executive Vice President
& Chief Financial Officer

SCHEDULE A

Name of Member: Caithness Energy, L.L.C.

Address of Member: 565 Fifth Avenue 29th floor, New York, New York 10017

Number of Units Held by Member: 100

Name of Manager: Caithness Energy, L.L.C.

Address of Manager: 565 Fifth Avenue 29th floor, New York, New York 10017

Oregon
Theodore R. Kulongoski, Governor

Department of Geology & Mineral Industries
Administrative Office
800 NE Oregon Street #28, Suite 965
Portland, OR 97232
~~503-731-4100~~
~~FAX 503-731-4066~~
PHONE 971-673-1555
FAX 971-673-1562

RECEIVED
JUL 27 2006
DEPARTMENT OF ENERGY

July 24, 2006

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

Re: Proposed Shepard's Flat Wind Farm Project, Gilliam and Morrow Counties, Oregon, Notice of Intent (NOI) Review by DOGAMI

We received a copy of the Notice of Intent (NOI) on July 5, 2006 dated June 2006 to apply for a Site Certificate for the proposed Shepard's Flat Wind Farm Project, Gilliam and Morrow Counties, Oregon submitted by Lifeline Development Group LLC. The Department of Geology and Mineral Industries (DOGAMI) issues no permits and should be considered a "commenting agency." Our interest in the application is primarily focused on public safety and health considerations related to geologic hazards. Applicable Oregon Administrative Rules include OAR 345-021-0010, OAR 345-022-0020, and OAR 345-022-0022 (see attached).

The Shepard's Flat Wind Farm Project NOI was reviewed and found to currently lack adequate geologic hazards and geotechnical information and/or the acknowledgment of future studies to be performed prior to permitting. Specifically, the applicant should provide the acknowledgment of future studies of the project area including a detailed geologic hazards assessment (including seismic hazards) and a site-specific geotechnical evaluation. These assessments should include, but not be limited to seismic, slope stability, and erosion hazards at the proposed facility. The geotechnical and seismic evaluations should also include subsurface explorations and provide adequate supporting evidence to determine if the facility can be safely built and operated. Also, in Exhibit C, the NOI states that the site is in seismic zone 2B. Oregon no longer uses the seismic zone designations, because of the adoption of the International Building Code 2003. The applicant should use the IBC 2003 instead of the seismic zones in the UBC 1997.

The Oregon Board of Geologist Examiners developed and adopted a document titled *Guidelines for Engineering Geologic Reports and Site-Specific Seismic Hazard Reports* and we encourage the geotechnical consultant to use this document as a guideline for preparing their report (see attached).

Based on the potential of these hazards, we suggest that the "analysis area" should extend well beyond the site boundaries so that any potential geologic hazards affecting the site are included in the study.

Please call Yumei Wang or myself should you have questions regarding this matter. Our number is 503-673-1555.

Sincerely,
Bill Burns, MS, CEG
Engineering Geologist

Bill Burns
GB

CC Yumei Wang, Vicki McConnell, Don Lewis

GENERAL SCOPE OF DOGAMI REVIEW

We have scoped our efforts as follows:

- The Department of Geology and Mineral Industries (DOGAMI) is a "commenting agency" and requires no permits.

- Our area of responsibility in this review includes geologic and seismic hazards as described in OAR 345-21-0010 h and OAR 345-22-020 (both attached). These relate to vulnerability to geologic hazards and to standards respectively. An additional regulation is ORS 445.447. The focus of ORS 445.447 is on the safety of occupants during hazard events.

- The charge to this agency is to address these concerns is in accordance with the general terms and budget of Interagency Agreement No. 101039 first executed in 1993. Included tasks are Notice of Intent Reviews and Completeness Review. Other tasks are possible upon specific request from the council.

- Within this overall context we also note that any site-specific studies by DOGAMI to assist EFSC in the specific discharge of its duties are allowable only after council determination of specific need and statement of specific direction.

OAR 345-021-0010

Site Characterization

(h) **Exhibit H**. Information from reasonably available sources regarding the geological and soil stability of the site and vicinity, providing evidence to support findings by the Council as required by OAR 345-022-0020, including:

(A) A description of the geological features and topography of the site and vicinity;

(B) A description of site specific geological and geotechnical work performed or planned to be performed before construction. The applicant shall include:

(i) A proposed schedule for geotechnical work;

(ii) A description of the nature and extent of the work with a discussion of the methods used to assess the expected ground response, including amplification, at the site;

(iii) A list of the professional literature relied on in characterizing the site; and

(iv) The names of the personnel responsible for the work and a description of their relevant experience;

(C) For all transmission lines, a description of locations along the proposed route where the applicant proposes to perform site specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, dead ends, corners, and portions of the proposed route where geologic reconnaissance and other site specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction;

(D) For all pipelines that would carry explosive, flammable or hazardous materials, a description of locations along the proposed route where the applicant proposes to perform site specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings and portions of the proposed alignment where geologic reconnaissance and other site specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction;

(E) A map showing the location of existing and significant potential geological and soil stability hazards and problems, if any, on the site and in its vicinity that could adversely affect, or be aggravated by, the construction and operation of the proposed facility;

(F) An assessment of seismic hazards. For the purposes of this assessment, the maximum probable earthquake (MPE) is the maximum earthquake that could occur under the known tectonic framework and that has not more than a 10 percent chance of being exceeded in a 50 year period. If seismic sources are not mapped sufficiently to identify the ground motions above, the applicant shall provide a probabilistic seismic hazard analysis to identify the peak ground accelerations expected at the site for a 500 year recurrence interval and a 5000 year recurrence interval. In the assessment, the applicant shall include:

(i) Identification of the Oregon Building Code Seismic Zone designation for the site;

(ii) Identification and characterization of all earthquake sources capable of generating median peak ground accelerations greater than 0.05g on rock at the site. For each earthquake source, the applicant shall assess the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE) and the MPE;

(iii) A description of any recorded earthquakes within 50 miles of the site and of recorded earthquakes greater than 50 miles from the site that caused ground shaking at the site more intense than the Modified Mercalli III intensity. The applicant shall include the date

of occurrence and a description of the earthquake that includes its magnitude and highest intensity and its epicenter location or region of highest intensity;
(iv) Assessment of the median ground response spectrum from the MCE and the MPE and identification of the spectral accelerations greater than the design spectrum provided in the Oregon Building Code. The applicant shall include a description of the probable behavior of the subsurface materials and amplification by subsurface materials and any topographic or subsurface conditions that could result in expected ground motions greater than those characteristic of the Oregon Building Code Seismic Zone identified above; and
(v) An assessment of seismic hazards expected to result from reasonably probable seismic events. As used in this rule "seismic hazard" includes ground shaking, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement, and subsidence;
(G) An assessment of soil-related hazards such as landslides, flooding and erosion which could, in the absence of a seismic event, adversely affect or be aggravated by the construction or operation of the facility;
(H) An explanation of how the applicant will design, engineer and construct the facility to avoid dangers to human safety from the seismic hazards identified in paragraph (F). The applicant shall include proposed design and engineering features, applicable construction codes, and any monitoring for seismic hazards; and
(I) An explanation of how the applicant will design, engineer and construct the facility to adequately avoid dangers to human safety presented by the hazards identified in paragraph (G);
(i) **Exhibit I.** Information from reasonably available sources regarding soil conditions and uses of the site and vicinity, providing evidence to support findings by the Council as required by OAR 345-022-0022, including:
(A) Identification and description of the major soil types at the site and its vicinity;
(B) Identification and description of any land uses on the proposed site and in its vicinity, such as growing crops, that require or depend on productive soils;
(C) Identification and assessment of significant potential adverse impact to soils from construction, operation and retirement of the facility, including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills;
(D) A description of any measures the applicant proposes to avoid or mitigate adverse impact to soils; and
(E) The applicant's proposed monitoring program, if any, for impact to soils;

OAR 345-022-0020

Structural Standard

To issue a site certificate, the Council must find that:

(1) The applicant, through appropriate site-specific study, has adequately characterized the site as to seismic zone and expected ground motion and ground failure, taking into account amplification, during the maximum credible and maximum probable seismic events; and

(2) The applicant can design, engineer, and construct the facility to avoid dangers to human safety presented by seismic hazards affecting the site that are expected to result from all maximum probable seismic events. As used in this rule "seismic hazard" includes ground shaking, landslide, liquefaction, lateral spreading, tsunami inundation, fault displacement, and subsidence;

(3) The applicant, through appropriate site-specific study, has adequately characterized the potential geological and soils hazards of the site and its vicinity that could, in the absence of a seismic event, adversely affect, or be aggravated by, the construction and operation of the proposed facility; and

(4) The applicant can design, engineer and construct the facility to avoid dangers to human safety presented by the hazards identified in section (3).

Stat. Auth.: ORS 469.470 & ORS 469.501

Stats. Implemented: ORS 469.501

Hist.: EFSC 1-1980, f. & ef. 2-28-80; EFSC 1-1981, f. & ef. 1-19-81; EFSC 2-1981, f. & ef. 1-19-81; EFSC 4-1982, f. & ef. 5-3-82; EFSC 4-1986, f. & ef. 9-5-86; EFSC 7-1986, f. & ef. 9-18-86; EFSC 1-1993, f. & cert. ef. 1-15-93; Renumbered from 345-79-060, 345-100-040, 345-111-035; 345-115-040 & 345-125-070; EFSC 5-1993(Temp), f. & cert. ef. 8-16-93; EFCS 1-1994, f. & cert. ef. 1-28-94; EFSC 2-1994, f. & cert. ef. 5-6-94; EFSC 5-1994, f. & cert. ef. 11-30-94; EFSC 3-1995, f. & cert. ef. 11-16-95; EFSC 2-1999, f. & cert. ef. 4-14-99

OAR 345-022-0022

Soil Protection

To issue a site certificate, the Council must find that the design, construction and operation of the facility, taking into account mitigation, is not likely to result in a significant adverse impact to soils including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills.

Stat. Auth.: ORS 469.470 & ORS 469.501

Stats. Implemented: ORS 469.501

Hist.: EFSC 5-1994, f. & cert. ef. 11-30-94; EFSC 2-1999, f. & cert. ef. 4-14-99

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

50 years 1954-2004

April 19, 2004

Patrick & Henderson, Inc.
1965 Airport Drive
Bakersfield, California 93308

Attn: Mr. Allan Henderson, P.E.

RE: REPORT OF PRELIMINARY GEOTECHNICAL ENGINEERING STUDY; SHEPHERDS RIDGE WIND PROJECT, MORROW COUNTY, OREGON

Shannon & Wilson, Inc. is pleased to present our preliminary geotechnical engineering study for the proposed Shepherds Ridge Wind Project in Morrow County, Oregon. The study was conducted in accordance with our proposal dated January 20, 2004.

This report provides six test boring logs, laboratory test results, and recommended soil and rock strength values for use in your tower foundation design. We recommend additional studies for the entire project.

We appreciate the opportunity to work with you on this project. Should you have comments or questions regarding this report, or if we can be of additional service to you on another phase of this work, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Burrie, P.E.
Branch Manager

DJB:LJR/djb

04-19-2004/22-1-02081-001Gtr.Preliminary Study Report/cvm

22-1-02081-001

303 WELLSIAN WAY · P.O. BOX 967
RICHLAND, WASHINGTON 99352
509·946·6309 FAX 509·946·6580
TDD: 1-800-833-6388
www.shannonwilson.com

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APPENDIX B EXPLORATORY BORING LOGS

APPENDIX C LABORATORY TEST RESULTS

APPENDIX D IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

PRELIMINARY GEOTECHNICAL ENGINEERING STUDY
SHEPHERDS RIDGE WIND PROJECT
MORROW COUNTY, OREGON

1.0 INTRODUCTION

This data report presents the results of our preliminary geotechnical engineering study conducted at the proposed Shepherds Ridge Wind Project in Morrow County, Oregon. The project is located southeast of Arlington, Oregon, just east of the Morrow County- Gilliam County line (Figure 1). Our preliminary field observations and laboratory testing results, a brief description of the subsurface conditions, and preliminary soil and rock strength properties for use in your foundation design are included in this report.

2.0 SITE AND PROJECT DESCRIPTION

The Shepherds Ridge Wind Project is located on a series of northwest-southeast trending ridges in western Morrow County, Oregon. The turbine locations are summarized in the following table and shown in Figure 2.

Development Corridor	Tower Numbers	Location		
		Section (s)	Township	Range
Line A	A1-A12	31; 6	2N; 1N	23E
Line B	B1-B13	5,6,7 & 8	1N	23E
Line C	C1-C12	31; 5 & 6	2N; 1N	23E
Line D	D1-D12	19,20,29 & 30	2N	23E
Line E	E1-E12	28,29,32 & 34	2N	23E

3.0 FIELD EXPLORATIONS

The preliminary field exploration program included exploratory borings at six selected tower sites. Exploratory borings were drilled using hollow-stem auger equipment to refusal in the basalt bedrock or 35 feet below the surface elevation. Disturbed and relatively undisturbed samples were obtained as the drilling progressed. The approximate exploratory boring locations are shown on Figure 2.

Exploratory borings and test holes locations were identified based on Global Positioning Satellite (GPS) coordinates provided by Patrick & Henderson, Inc. A Shannon & Wilson, Inc. engineer

staked the boring locations using a hand-held GPS unit, which is generally accurate within 3 to 5 meters. A list of boring coordinates is located in Appendix A.

Environmental West Exploration, Inc. provided the exploratory drilling under subcontract with Shannon & Wilson, Inc. Our engineer observed the drilling and prepared a log of each boring. Boring logs are presented in Appendix B.

The borings were advanced using a Foremost-Mobile B-80, truck-mounted drill rig equipped with hollow-stem auger tools. Disturbed samples were obtained at 5-foot intervals in conjunction with the Standard Penetration Test (ASTM D 1586). The Standard Penetration Test (SPT) consists of driving a 2-inch outside diameter split-spoon sampler a distance of 18 inches into the soil beneath the bottom of the casing with a 140 pound hammer free-falling a distance of 30 inches. The number of blows required to advance the split-spoon through each 6-inch increment is recorded. The SPT resistance, or N-value, is defined as the number of blows required to drive the sample from 6 to 18 inches below the casing. The SPT N-value is reported as the number of blows per 1 foot of penetration. When 50 blows were required for 6 inches or less of penetration, the test was stopped, and the number of blows and the corresponding penetration were recorded. The SPT N-value provides an indication of the relative density or consistency of the soil and is plotted on the boring logs located in Appendix B.

The SPT N-values provide a means for evaluating the relative density or compactness of cohesionless (granular) soils and the relative consistency or stiffness of cohesive (fine-grained) soils. The terminology used to describe the relative density or compactness of the soils is listed in the following table.

SOIL DENSITY AND CONSISTENCY TERMINOLOGY			
Cohesionless (granular) Soils		**Cohesive (clayey) Soils**	
Relative Density	**Penetration Resistance (blows per foot)**	**Relative Consistency**	**Penetration Resistance (blows per foot)**
Very Loose	Under 4	Very Soft	Under 2
Loose	4 – 10	Soft	2 – 4
Medium Dense	10 – 30	Medium Stiff	4 – 8
Dense	30 – 50	Stiff	8 – 15
Very Dense	Over 50	Very Stiff	15 – 30
		Hard	Over 30

The split spoon sampler used during the penetration testing recovers a disturbed sample of soil, which is useful for identification and classification purposes. The samples were field classified and recorded on the logs by our field representative. The samples were sealed in plastic bags and returned to our office for laboratory testing. Thin wall samplers (Shelby tubes) were used to obtain

relatively undisturbed samples of the fine-grained soils. Shelby tubes were capped and sealed in the field to protect the samples from disturbance during shipping. Laboratory testing was conducted in our Seattle, Washington laboratory.

We estimate the strata boundaries in the field based on the drilling progress and from samples obtained in conjunction with the SPT and Shelby tubes. The subsurface conditions are known only at the boring locations on the date explored and should be considered approximate. Actual subsurface conditions between borings may vary.

4.0 SUBSURFACE PROFILE

The following table summarizes the subsurface profile encountered at each boring.

Boring No.	**E10**	**E3**	**D11**	**D8**	**A10**	**B7**
Soil Description	**Depth, feet**					
Loose Tan Silt (loess)	0-23				0-6	
Med. Dense to Dense Silt (loess)		0-24	0-25	0-6		0-6.5
Caliche (cemented silt w/ rock fragments)	23-27	27-27	25-27	6-8	6-10.5	6.5-18.75
Weathered Basalt	27-35	27-33	27-36.5	8-15	10.5-15	
Basalt				15	15	

Groundwater was not observed in the explorations.

5.0 LABORATORY TESTING

We submitted representative soil samples to our laboratory for index and engineering properties testing. The test results are summarized in the following table. Graphic representations of the test results are presented in Appendix C.

Boring No.	**Depth, ft.**	**Description**	**In situ Moisture, %**	**% Passing No. 200 Sieve**	**Shear Angle, θ**
A-10	10.5	Silty Sand w/ Gravel	18.1	10.7	
D-11	13.7	Silt with Sand	5.0	95.7	32
E-10	12.5	Fine sandy Silt	7.9	94.5	
E-3	5.6	Fine sandy Silt	6.0	82.4	32

6.0 RECOMMENDED DESIGN PARAMETERS

Based on the field explorations, laboratory testing, and our experience on similar projects in the area, we recommend using the following design parameters.

Rock Materials			
Unconfined Compressive Strength, psi		Shear Angle, θ	Average Unit Weight, pcf
4000		45	150
Caliche Materials			
Unconfined Compressive Strength, psi		Shear Angle, θ	Average Unit Weight, pcf
2000		38	110
Soil Materials			
Allowable Bearing Pressure, psf	Shear Angle	Passive Earth Pressure, psf/ft	Average In Situ Unit Weight, pcf
1500	32	270	83

6.1 UBC Seismic Design Criteria

Based on the site geology and the soil conditions encountered, we recommend the following Uniform Building Code (UBC) seismic design criteria.

Seismic Zone	2B
Zone Factor (Z)	0.20
Soil Profile (Table 16-J)	S_B (Rock)
Seismic Coefficient Ca (Table 16-Q)	0.20
Seismic Coefficient Cv (Table 16-R)	0.20
Near-Source Factor Na	1.0
Near-Source Factor Nv	1.0

7. 0 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based upon site conditions, as they presently exist. We further assume that the site explorations are representative of the subsurface conditions throughout the site; i.e., site conditions are not significantly different from those disclosed by the field exploration and observations.

If subsurface conditions different from those encountered in the field exploration are observed or appear to be present beneath the excavations during construction, we should be advised at once so that we can review these conditions and reconsider our recommendations, where necessary.

If there is a substantial lapse of time between the submission of this report and the start of construction at the site, if conditions have changed because of natural forces or construction at the site, or if the design or loading configurations change, we recommend that we review this report to determine the applicability of the conclusions and recommendations concerning the time lapse or changed conditions contained in this report.

This report was prepared for the use of Patrick & Henderson, Inc. and the Shepherds Ridge Wind Project design team, for the design and construction of the wind turbine foundations in Morrow County, Oregon. This report was made for a specific set of proposed structures and locations on the site. Variations from the structure types or locations discussed in this report should be analyzed by Shannon & Wilson to assess the potential geotechnical impacts of those variations on the foundation recommendations included in this report.

As an integral part of this report, we have prepared the attached "Important Information About Your Geotechnical Engineering Report," (Appendix D) to help you more clearly understand its use and limitations.

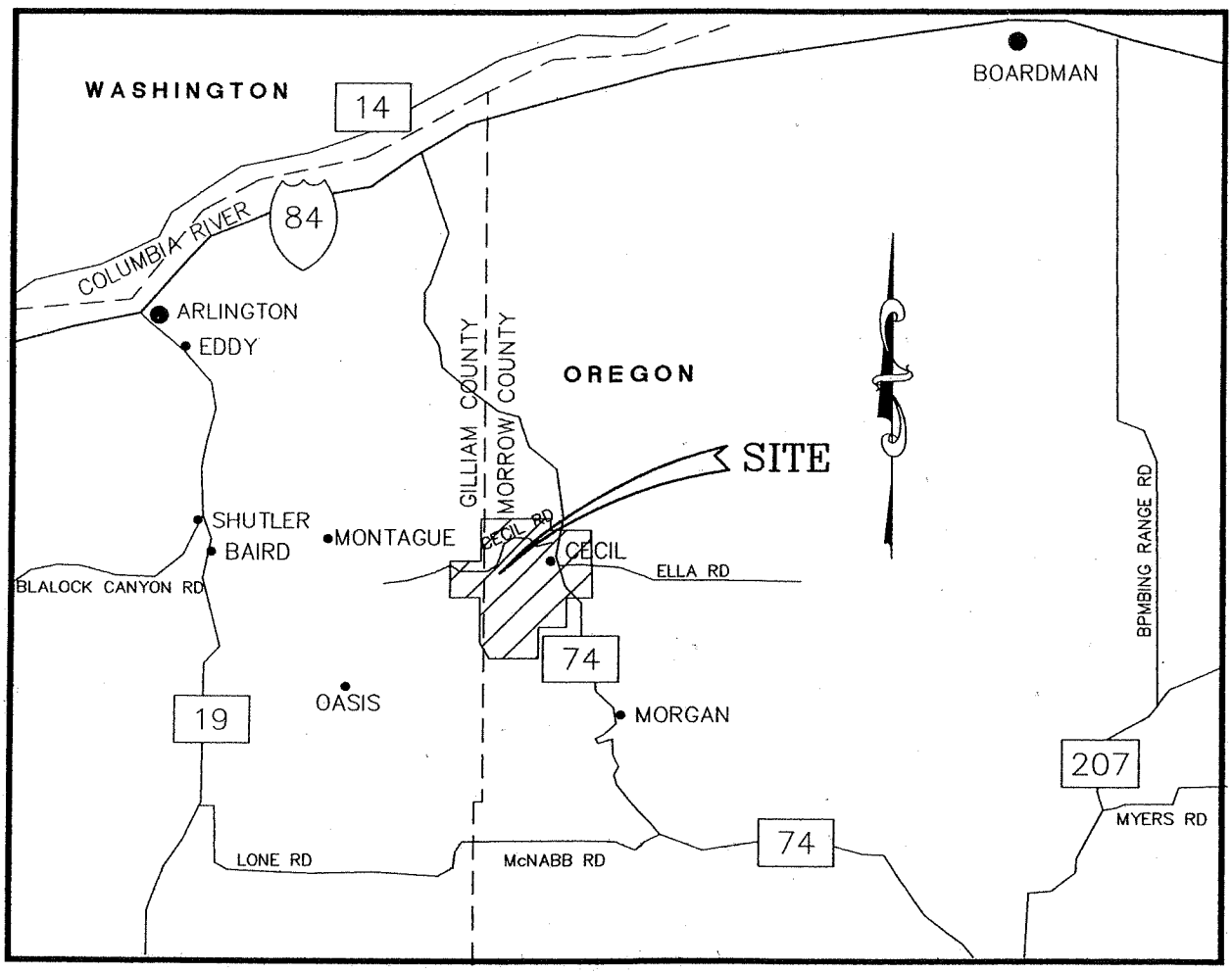
SHANNON & WILSON, INC.

REGISTERED PROFESSIONAL ENGINEER 14,357 OREGON MAY 30, 1989 DEE J. BURRIE

4/19/04

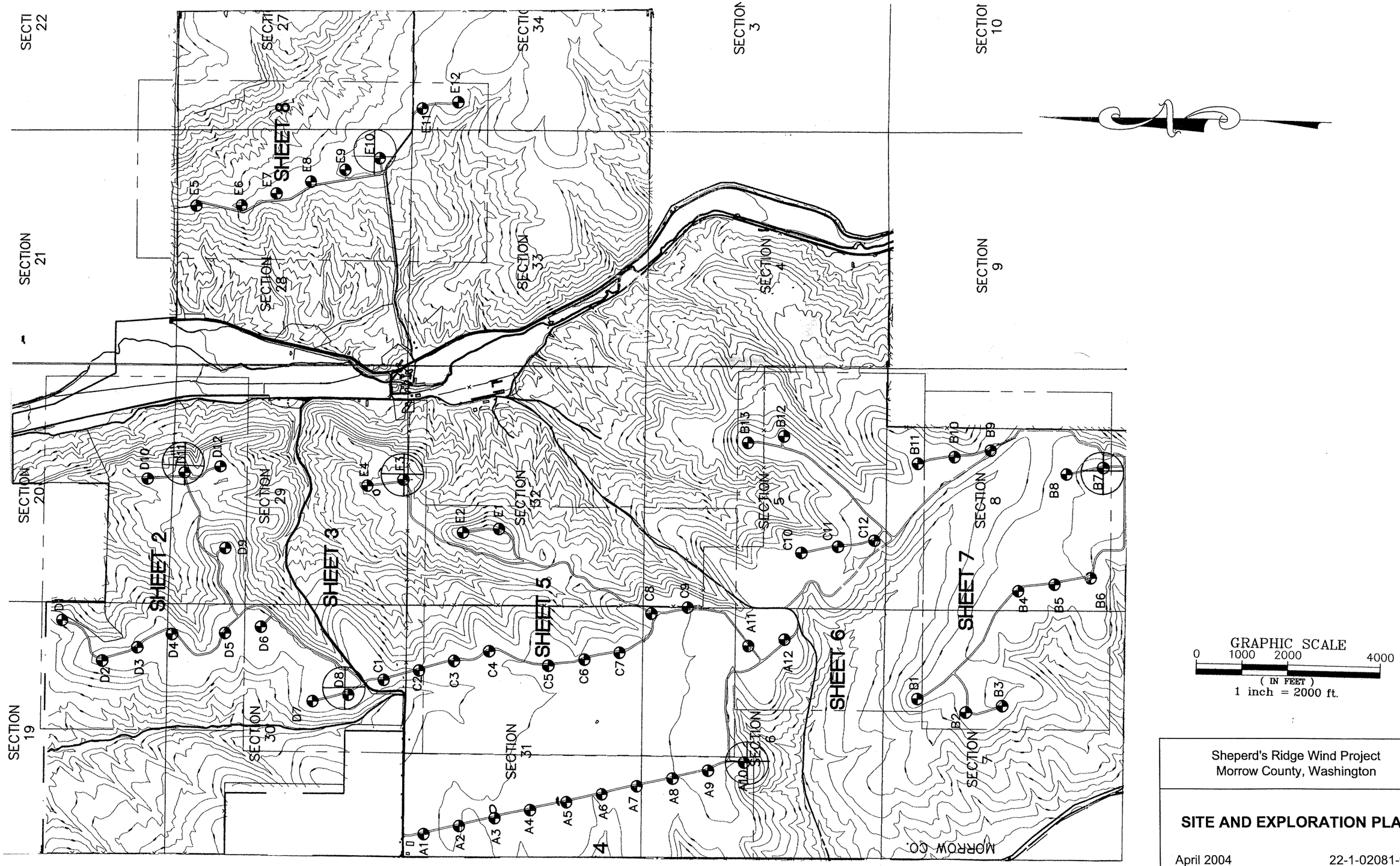
Dee J. Burrie, P.E.
Vice President

DJB:LJR/djb



VICINITY MAP
NOT TO SCALE

Sheperd's Ridge Wind Project **Morrow County, Oregon**	
VICINITY MAP	
April 2004	22-1-02081-001
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. 1**



Base map provided by Patrick & Henderson, Inc.

Sheperd's Ridge Wind Project
Morrow County, Washington

SITE AND EXPLORATION PLAN

April 2004 | 22-1-02081-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 2

APPENDIX A

BORING COORDINATES FOR SIX BORING LOCATIONS

BORING LOCATION COORDINATES
UTM 27

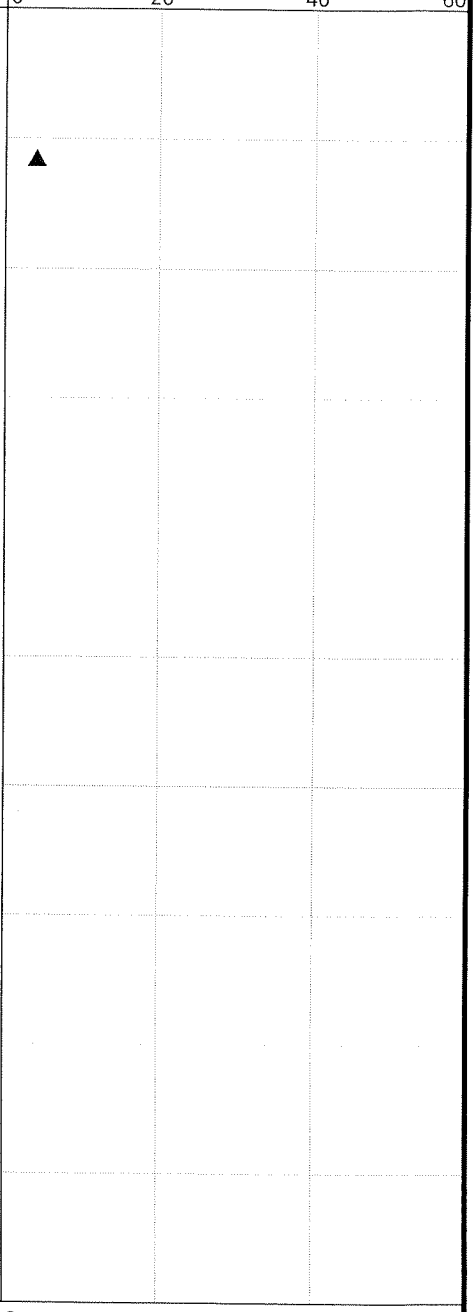
Turbine #	*Northing*	*Easting*	*Estimated Ground Elevation*
A10	5053566.44253	734826.28285	326
B7	5051254.55344	736880.95264	344
D8	5056247.15175	735162.72876	315
D11	5057419.85991	736598.04578	270
E3	5055942.61145	736610.60762	275
E10	5056192.73574	738768.04613	275

APPENDIX B

EXPLORATORY BORING LOGS

SOIL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.
Loose, tan SILT (ML); damp to dry.				Not Encountered	5
White/tan, trace to slightly fine gravelly SILT (ML); dry	6.0		S-1		10
Very dense, light brown, gravelly silt to silty GRAVEL (GM); gravel is subrounded basalt.	10.5		S-2, S-3		15
Bottom of Boring Completed 02/20/2004	15.0		S-4		20, 25, 30, 35, 40, 45

Standard Penetration Resistance (140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered
Split Spoon
1" Plastic Sheath

● % Water Content
Plastic Limit |—●—| Liquid Limit
Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING A-10

April 2004 | 22-1-02081-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B-1

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.	Standard Penetration Resistance (140 lb. weight, 30-inch drop) ▲ Blows per foot (0 – 20 – 40 – 60)
Medium dense, tane SILT (ML), damp to dry, (Loess).						
			S-1		5	▲
Very dense, white/brown to brown, slightly silty to silty GRAVEL (GM); gravel is subrounded basalt.	6.5			Not Encountered		
			S-2		10	
			S-3		15	
Bottom of Boring Completed 02/20/2004	18.8				20	
					25	
					30	
					35	
					40	
					45	

LEGEND

* Sample Not Recovered

Split Spoon

0 – 20 – 40 – 60

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING B-7

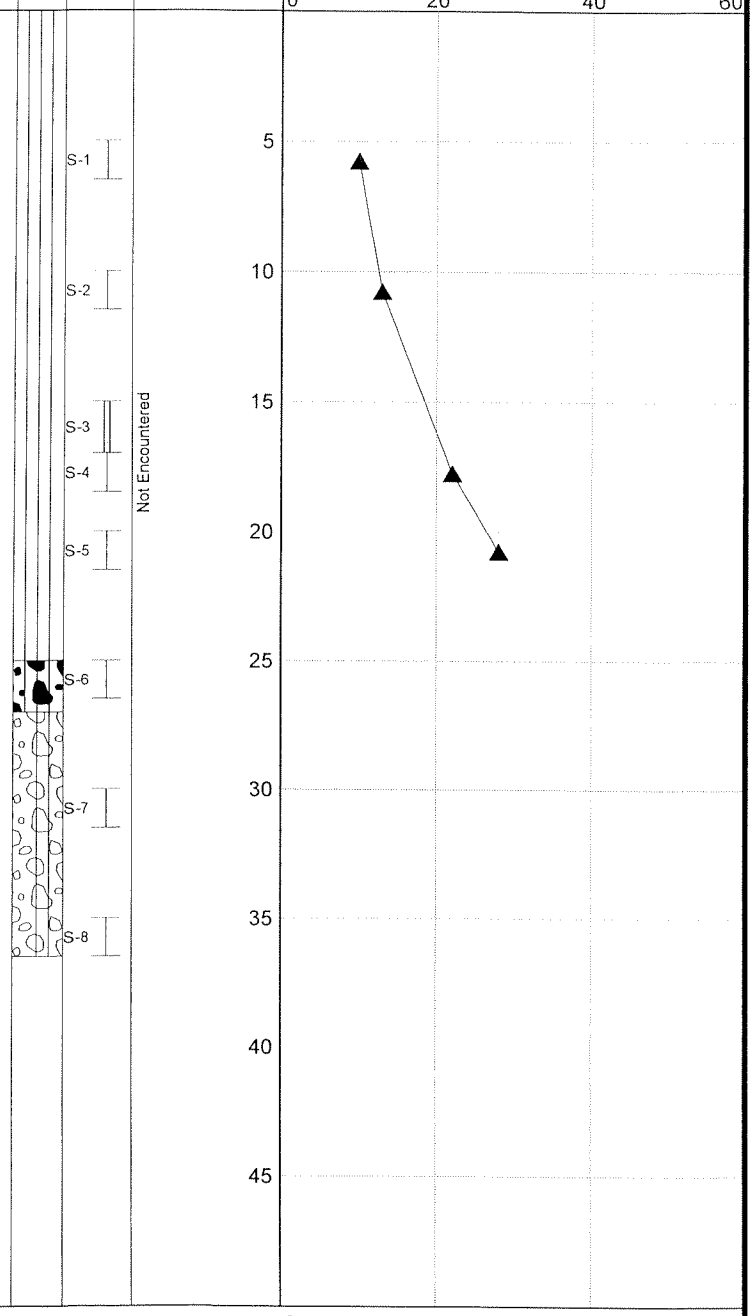
April 2004 | 22-1-02081-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B-2

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.
Medium dense to dense, tan SILT (ML); dry (Loess).	
Very dense, white and tan, silty GRAVEL (GM).	25.0
Very dense, brown, slightly sitly GRAVEL (GP-GM); gravel is basalt.	27.0
Bottom of Boring Completed 02/19/2004	36.5



LEGEND

- * Sample Not Recovered
- Split Spoon
- 1" Plastic Sheath

0 20 40 60

● % Water Content

Plastic Limit |—●—| Liquid Limit
Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING D-11

April 2004 22-1-02081-001

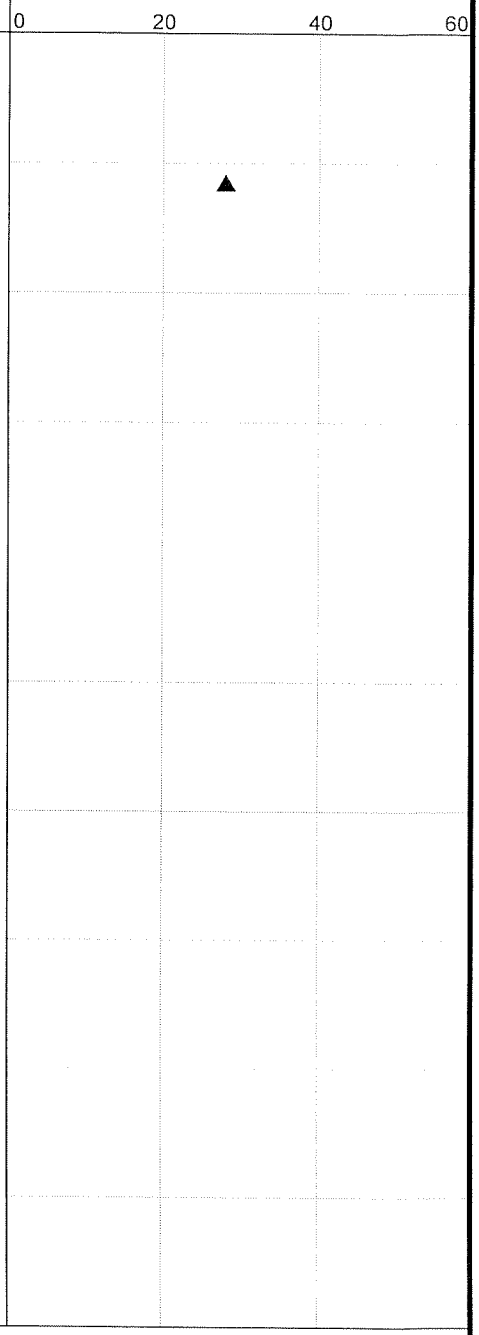
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B-3

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.
Medium dense, tan SILT (ML); damp (Loess).					
	6.0		S-1	Not Encountered	5
Medium dense, white gravelly SILT (ML), dry.					
	8.0				
Very dense, dark brown, silty GRAVEL (GM); gravel is basalt.					10
			S-2		
	11.5				
Very dense, brown, slightly silty GRAVEL (GP-GM); gravel is basalt.					
	15.0		S-3		15
Bottom of Boring Completed 02/20/2004					20
					25
					30
					35
					40
					45

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered

Split Spoon

● % Water Content

Plastic Limit ├──●──┤ Liquid Limit
Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING D-8

April 2004 22-1-02081-001

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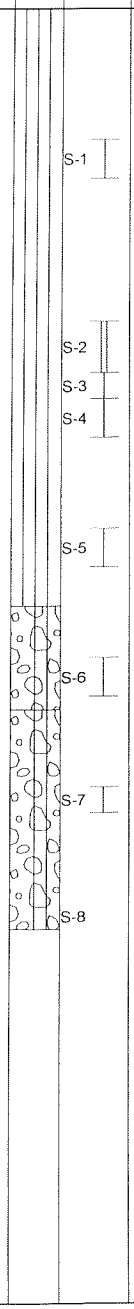
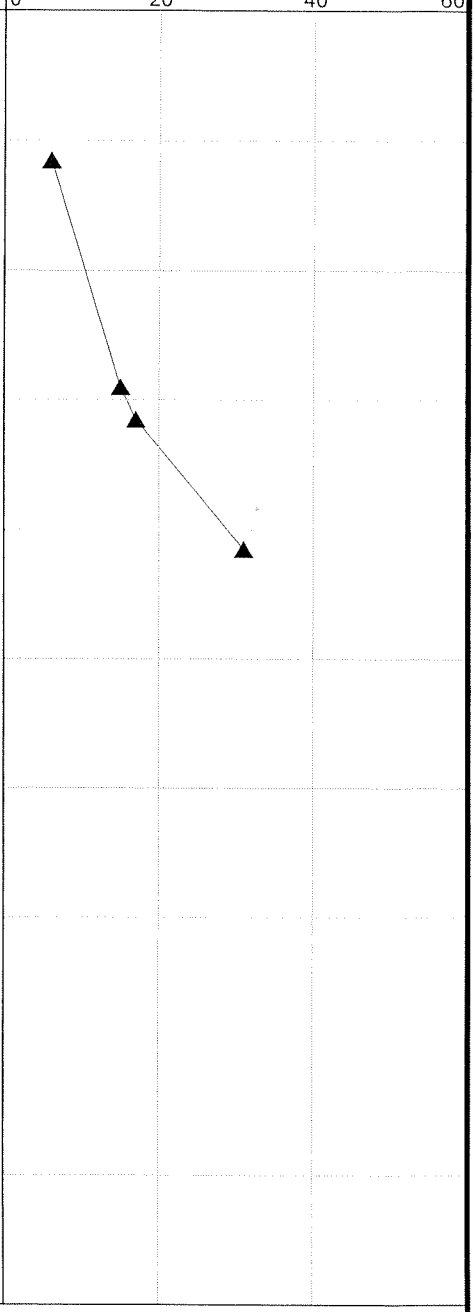
FIG. B-4

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.
Loose to dense, tan SILT (ML); dry (Loess).	
Very dense, grayish-white, slightly silty GRAVEL (GP-GM); gravel is subrounded basalt with white coatings.	23.0
Very dense, slightly silty GRAVEL (GP-GM); gravel is subangular basalt.	27.0
Bottom of Boring Completed 02/19/2004	35.5





LEGEND

- * Sample Not Recovered
- Split Spoon
- 1" Plastic Sheath

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
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LOG OF BORING E-10

April 2004 | 22-1-02081-001

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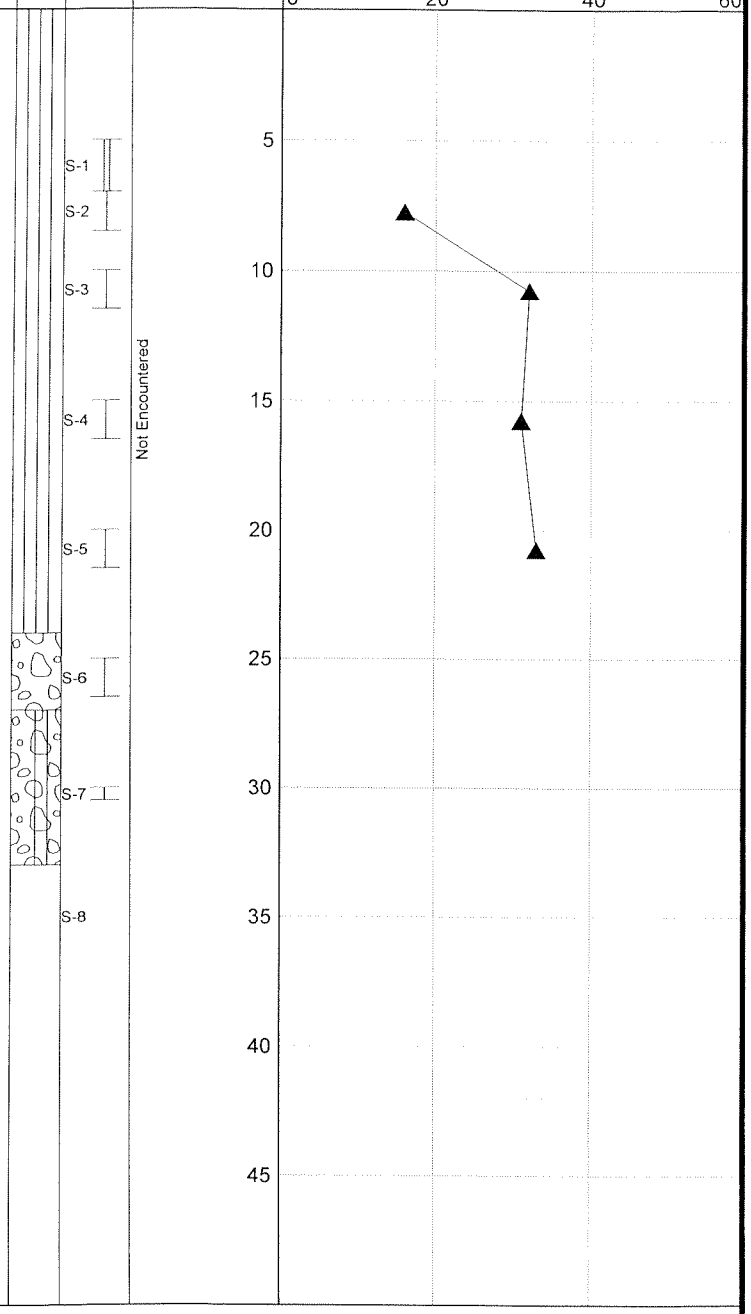
FIG. B-5

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.
Medium dense to dense, tan SILT (ML); dry; moist about 3 feet, (Loess).	
Very dense, tan and white, GRAVEL (GP); dry.	24.0
Very dense, white/black, lightly silty GRAVEL (GP-GM); gravel is subangular.	27.0
Bottom of Boring Completed 02/19/2004	33.0



LEGEND

* Sample Not Recovered

1" Plastic Sheath

Split Spoon

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

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Morrow County, Oregon

LOG OF BORING E-3

April 2004 | 22-1-02081-001

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FIG. B-6

MASTER_LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

UNIFIED SOIL CLASSIFICATION SYSTEM
(From ASTM D 2488-93 & 2487-93)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL ②	TYPICAL DESCRIPTION
Coarse-Grained Soils *(more than 50% retained on No. 200 sieve)* *[use Dual Symbols for 5 - 12% Fines (i.e. GP-GM)]* ①	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Clean Gravels ① *(less than 5% fines)*	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		Gravels with ① Fines *(more than 12% fines)*	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Clean sands ① *(less than 5% fines)*	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly Graded Sand, Gravelly Sands, Little or No Fines
		Sands with ① Fines *(more than 12% fines)*	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Silt Mixtures
Fine-Grained Soils *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML	Inorganic Silts of Low to Medium Plasticity, Rock Flour, or Clayey Silts With Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
		Organic	OL	Organic Silts and Organic Silty Clays of Low Plasticity
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	CH	Inorganic Clays of Medium to High Plasticity, Sandy Fat Clay, Gravelly Fat Clay
			MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sands or Silty Soils, Elastic Silt
		Organic	OH	Organic Clays of Medium to High Plasticity, Organic Silts
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	Peat, Humus, Swamp Soils with High Organic Content (See D 4427-92)

NOTES

1. Dual Symbols (symbols separated by a hyphen, i.e., SP-SM, slightly silty fine SAND) are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

2. Borderline symbols (symbols separated by a slash, i.e., CL/ML, silty CLAY/clayey SILT; GW/SW, sandy GRAVEL/gravelly SAND) indicate that the soil may fall into one of two possible basic groups.

Sheperd's Ridge Wind Project
Morrow County, Oregon

SOIL CLASSIFICATION AND LOG KEY

April 2004 22-1-02081-001

SHANNON & WILSON, INC.
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FIG. B-7
Sheet 2 of 2

Shannon & Wilson, Inc. (S&W), uses a soil classification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following page. Soil descriptions are based on visual-manual procedures (ASTM D 2488-93) unless otherwise noted.

S&W CLASSIFICATION OF SOIL CONSTITUENTS

- MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (SAND).
- Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (slightly silty SAND).
- Trace constituents compose 0 to 5 percent of the soil (slightly silty SAND, trace of gravel).

MOISTURE CONTENT DEFINITIONS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

ABBREVIATIONS

ATD	At Time of Drilling
Elev.	Elevation
ft	feet
HSA	Hollow Stem Auger
ID	Inside Diameter
in	inches
lbs	pounds
Mon.	Monument cover
N	Blows for last two 6-inch increments
NA	Not Applicable or Not Available
OD	Outside Diameter
OVA	Organic Vapor Analyzer
PID	Photoionization Detector
ppm	parts per million
PVC	Polyvinyl Chloride
SS	Split Spoon sampler
SPT	Standard Penetration Test
USC	Unified Soil Classification
WLI	Water Level Indicator

GRAIN SIZE DEFINITIONS

DESCRIPTION	SIEVE SIZE
FINES	< #200 (0.8 mm)
SAND*	
▪ Fine	#200 - #40 (0.4 mm)
▪ Medium	#40 - #10 (2 mm)
▪ Coarse	#10 - #4 (5 mm)
GRAVEL*	
▪ Fine	#4 - $\frac{3}{4}$ inch
▪ Coarse	$\frac{3}{4}$ - 3 inches
COBBLES	3 - 12 inches
BOULDERS	> 12 inches

* Unless otherwise noted, sand and gravel, when present, range from fine to coarse in grain size.

RELATIVE DENSITY / CONSISTENCY

COARSE-GRAINED SOILS		FINE-GRAINED/COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
0 - 4	Very loose	<2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
Over 50	Very dense	15 - 30	Very stiff
		Over 30	Hard

WELL AND OTHER SYMBOLS

Cement/Concrete	Asphalt or PVC Cap
Bentonite Grout	Cobbles
Bentonite Seal	Fill
Slough	Ash
Silica Sand	Bedrock
2" I.D. PVC Screen (0.020-inch Slot)	Gravel

Sheperd's Ridge Wind Project
Morrow County, Oregon

SOIL CLASSIFICATION AND LOG KEY

April 2004 22-1-02081-001

SHANNON & WILSON, INC.
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FIG. B-7
Sheet 1 of 2

APPENDIX C

LABORATORY TEST RESULTS

DIRECT SHEAR TEST NO. 1
SUMMARY OF TEST DATA

Boring D-11
Sample S-3
Depth, ft. 13

Tested By / Date JFL 3-2-04
Calc. By / Date JFL 3-3-04
Check By / Date _____

CLASSIFICATION:
Brown SILT, trace of fine sand and clay; ML

SAMPLE DATA:
Spec. Grav. (est.) : 2.70
Specimen : COMPACTED

SPECIMEN DATA:

	Before Test
Height, inches :	1.240
Diameter, inches :	4.510
Wet Density, pcf :	85.7
Dry Density, pcf :	81.4
Initial Water Content, % :	5.3
Final Water Content, % :	5.2
Hanger + Lever Tare, kg :	36.60
Load on Hanger, kg :	.00
Load on Lever, kg :	6.40
Normal Stress, tsf :	1.00
Shear Defl. Const., in/div :	.0004
Shear Load Const., kg/div :	.328
Normal Defl. Const., in/div :	.001

Elapsed Time min	Shear Defl. Read. div	Normal Defl. Read. div	Shear Load Read. div	Shear Displ. inches	Normal Displ. inches	Shear Strain %	Shear Stress tsf
1.0	.0	.0	.0	.000	.0000	.0	.00
2.0	1.0	.1	29.0	.000	.0001	.0	.09
3.0	3.0	.1	54.0	.001	.0001	.0	.18
4.0	8.0	.2	73.0	.003	.0001	.1	.24
5.0	12.0	.3	79.5	.005	.0002	.1	.26
6.0	23.0	.6	92.0	.009	.0003	.2	.30
7.0	40.0	1.1	105.0	.016	.0006	.4	.34
8.0	60.0	2.0	120.5	.024	.0010	.5	.39
9.0	95.0	3.1	137.5	.038	.0016	.8	.45
10.0	115.0	3.8	144.5	.046	.0019	1.0	.47
11.0	130.0	4.1	141.0	.052	.0021	1.2	.46
12.0	140.0	4.3	138.5	.056	.0022	1.2	.45
13.0	150.0	4.4	136.0	.060	.0022	1.3	.44
14.0	160.0	4.5	139.0	.064	.0023	1.4	.45
15.0	170.0	4.5	136.5	.068	.0023	1.5	.44
16.0	185.0	4.6	136.0	.074	.0023	1.6	.44
17.0	200.0	4.6	138.5	.080	.0023	1.8	.45
18.0	215.0	4.7	140.0	.086	.0024	1.9	.46
19.0	230.0	4.7	140.0	.092	.0024	2.0	.46
20.0	260.0	4.8	144.0	.104	.0024	2.3	.47
21.0	285.0	5.1	156.0	.114	.0026	2.5	.51
22.0	350.0	6.6	173.0	.140	.0033	3.1	.56
23.0	430.0	8.1	188.0	.172	.0041	3.8	.61
24.0	550.0	9.1	204.5	.220	.0046	4.9	.67
25.0	640.0	9.5	214.0	.256	.0048	5.7	.70
26.0	775.0	9.7	223.0	.310	.0049	6.9	.73
27.0	870.0	9.7	226.0	.348	.0049	7.7	.74
28.0	980.0	9.5	226.5	.392	.0048	8.7	.74
29.0	1200.0	9.1	226.5	.480	.0046	10.6	.74
30.0	1250.0	9.0	226.5	.500	.0045	11.1	.74

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Cecil, Oregon

DIRECT SHEAR TEST
BORING D-11, S-3

March 2004 22-1-02081-001

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FIG. 1

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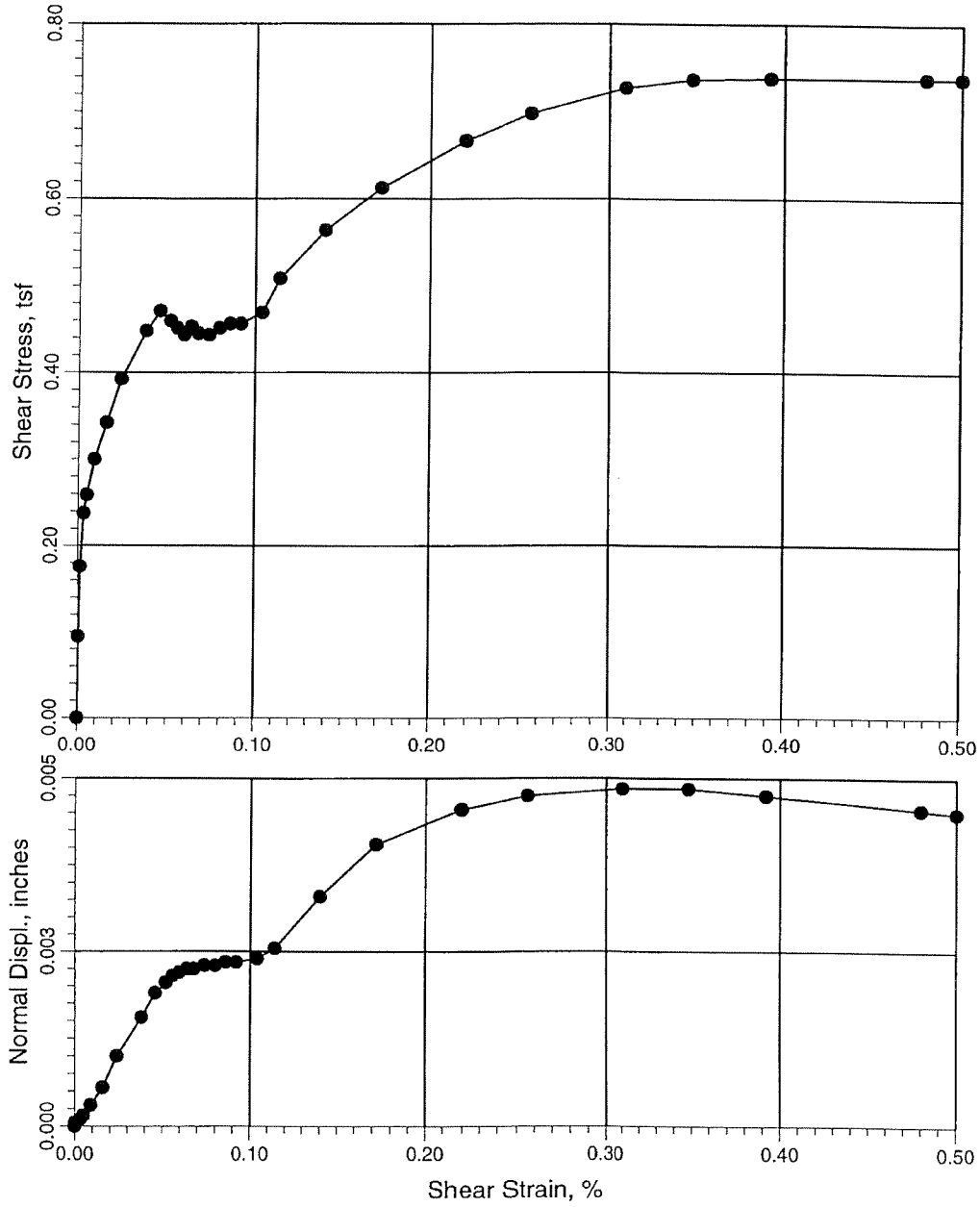
DIRECT SHEAR TEST NO. 1
STRESS AND NORMAL DISPLACEMENT VS STRAIN

Boring	D-11	Tested By / Date	JFL 3-2-04
Sample	S-3	Calc. By / Date	JFL 3-3-04
Depth, ft.	13	Check By / Date	



Normal Stress, tsf = 1.00

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Cecil, Oregon

DIRECT SHEAR TEST
BORING D-11, S-3

March 2004 22-1-02081-001

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FIG. 2

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DIRECT SHEAR TEST NO. 2
SUMMARY OF TEST DATA

Boring	E-3	Tested By / Date	JFL 3-3-04
Sample	S-1	Calc. By / Date	JFL 3-4-04
Depth, ft.	5	Check By / Date	

CLASSIFICATION:
Brown, fine sandy SILT; ML

SAMPLE DATA:
Spec. Grav. (est.) : 2.70
Specimen : COMPACTED

SPECIMEN DATA:

	Before Test
Height, inches :	1.240
Diameter, inches :	4.510
Wet Density, pcf :	85.7
Dry Density, pcf :	81.1
Initial Water Content, % :	5.6
Final Water Content, % :	5.6
Hanger + Lever Tare, kg :	36.60
Load on Hanger, kg :	.00
Load on Lever, kg :	16.40
Normal Stress, tsf :	1.99
Shear Defl. Const., in/div :	.0004
Shear Load Const., kg/div :	.328
Normal Defl. Const., in/div :	.001

Elapsed Time min	Shear Defl. Read. div	Normal Defl. Read. div	Shear Load Read. div	Shear Displ. inches	Normal Displ. inches	Shear Strain %	Shear Stress tsf
1.0	.0	.0	.0	.000	.0000	.0	.00
2.0	1.0	.1	51.0	.000	.0001	.0	.17
3.0	4.0	.5	76.0	.002	.0003	.0	.25
4.0	9.0	1.3	94.0	.004	.0007	.1	.31
5.0	19.0	2.7	115.0	.008	.0014	.2	.37
6.0	30.0	4.0	129.5	.012	.0020	.3	.42
7.0	50.0	6.2	148.5	.020	.0031	.4	.48
8.0	70.0	8.1	168.0	.028	.0041	.6	.55
9.0	110.0	11.5	194.5	.044	.0058	1.0	.63
10.0	135.0	13.4	212.0	.054	.0067	1.2	.69
11.0	165.0	15.5	232.0	.066	.0078	1.5	.76
12.0	200.0	17.6	251.5	.080	.0088	1.8	.82
13.0	240.0	19.9	267.5	.096	.0100	2.1	.87
14.0	260.0	20.6	272.0	.104	.0103	2.3	.89
15.0	280.0	21.2	275.0	.112	.0106	2.5	.90
16.0	290.0	21.4	270.0	.116	.0107	2.6	.88
17.0	310.0	21.6	267.0	.124	.0108	2.7	.87
18.0	345.0	22.0	267.0	.138	.0110	3.1	.87
19.0	360.0	22.1	263.0	.144	.0111	3.2	.86
20.0	390.0	22.4	288.0	.156	.0112	3.5	.94
21.0	450.0	24.8	314.5	.180	.0124	4.0	1.03
22.0	490.0	26.3	328.0	.196	.0132	4.3	1.07
23.0	550.0	28.1	343.5	.220	.0141	4.9	1.12
24.0	630.0	30.5	362.0	.252	.0153	5.6	1.18
25.0	710.0	32.5	376.5	.284	.0163	6.3	1.23
26.0	810.0	34.5	391.0	.324	.0173	7.2	1.27
27.0	900.0	35.6	400.0	.360	.0178	8.0	1.30
28.0	1000.0	36.7	407.0	.400	.0184	8.9	1.33
29.0	1100.0	37.6	414.5	.440	.0188	9.8	1.35
30.0	1235.0	38.7	422.0	.494	.0194	11.0	1.38

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DIRECT SHEAR TEST
BORING E-3, S-1

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FIG. 3

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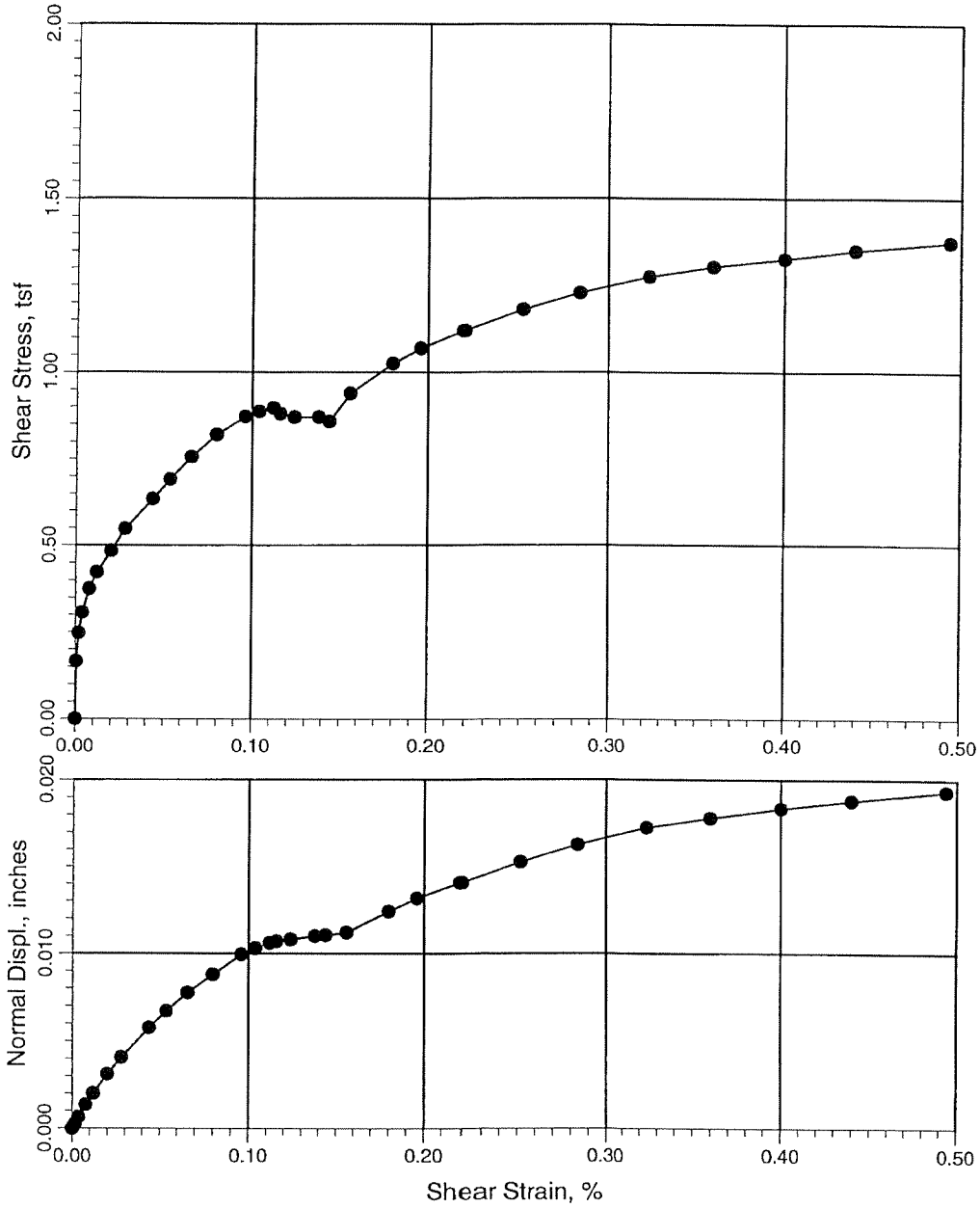
DIRECT SHEAR TEST NO. 2
STRESS AND NORMAL DISPLACEMENT VS STRAIN

Boring	E-3	Tested	By / Date JFL	3-3-04
Sample	S-1	Calc.	By / Date JFL	3-4-04
Depth, ft.	5	Check	By / Date	



Normal Stress, tsf = 1.99

Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORING E-3, S-1

March 2004 22-1-02081-001

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FIG. 4

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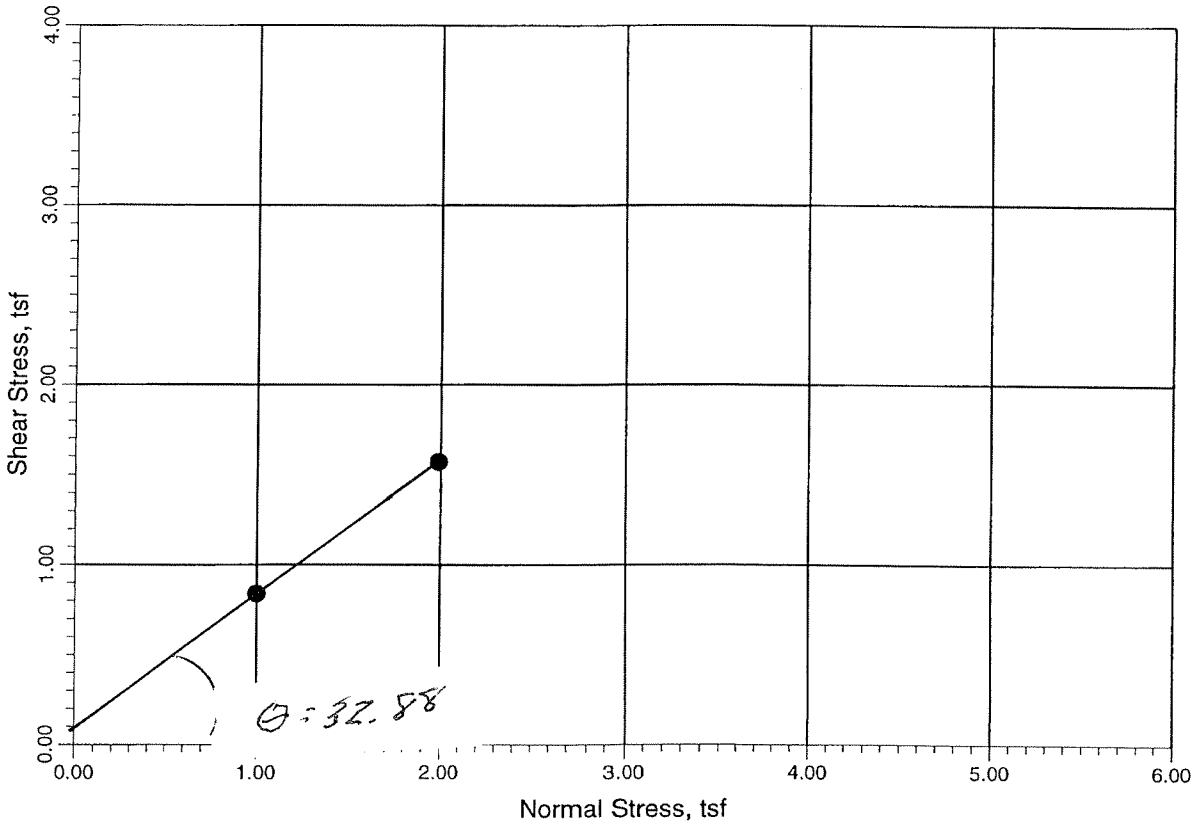
DIRECT SHEAR TEST, PEAK STRESS
MOHR DIAGRAM

Test ID:	1	2
Boring:	D-11	E-3
Sample:	S-3	S-1
Depth, ft:	13	5
Normal Stress, tsf:	1.00	1.99
Peak Stress, tsf:	.84	1.57

Failure Criteria: Peak Stress



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Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORINGS D-11, S-13 AND E-3, S-3

March 2004 | 22-1-02081-001

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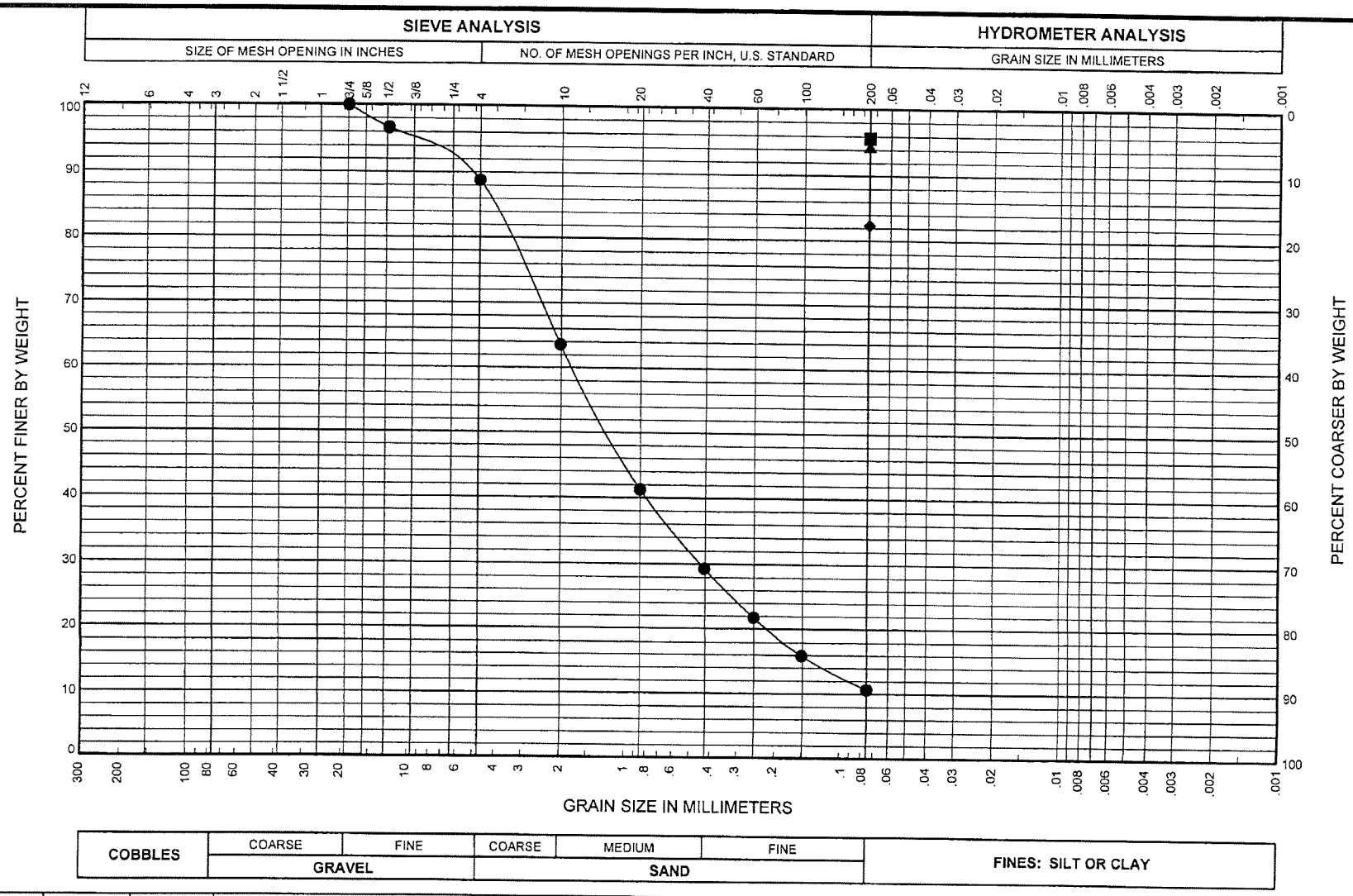
FIG. 5



BORING AND SAMPLE NO.	DEPTH (feet)	U.S.C.S. SYMBOL	SAMPLE DESCRIPTION	FINES %	NAT. W.C. %	LL %	PL %	PI %
● A-10, S-2	10.5	SW-SM	Brown, slightly silty SAND with slightly gravel size weathered rock	10.7	18.1			
■ D-11, S-3	13.7	ML	Brown SILT, trace of fine sand and clay	95.7	5.0			
▲ E-10, S-2	12.5	ML	Brown, slightly fine sandy SILT, trace of clay	94.5	7.9			
◆ E-3, S-1	5.6	ML	Brown, fine sandy SILT	82.4	6.0			

Shepherds Ridge Wind Energy Project
Cecil, Oregon

GRAIN SIZE DISTRIBUTION

March 2004 22-1-02081-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG.

FIG.

GSAMAIN1 22-02081.GPJ SHAN WIL.GDT 3/5/04

APPENDIX D

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your

report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the

ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

Wildlife Assessment for the Shepherds Flat Wind Farm

Prepared for:
LifeLine Renewable Energy, Inc.

Prepared by:
Rick Welch, Environmental Scientist
Lana Schleder, Environmental Scientist
Energy Northwest Environmental Services

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Overview

This report summarizes approximately two years of environmental monitoring data collected at the proposed Shepherds Flat Wind Farm, and includes results from surveys of avian use, raptor nesting, breeding birds, Washington ground squirrels and burrowing owls. The subject property includes approximately 32,100 acres located in north-central Oregon between the city of Arlington and Willow Creek (LifeLine 2006). The project is comprised of two distinct areas: the northern property (NP), a shrub-steppe habitat influenced by nearly 100 years of sheep grazing activity (Link *et al.*, 2003); and the southern property (SP), characterized by dry-land wheat farming practices.

No endangered avian species were encountered and only one observation of a threatened species occurred during the course of the study. There were no indications of Washington ground squirrels and only a few observations of burrowing owls were recorded in the project area. For species with special status listings, only Swainson's hawks, ferruginous hawks, and long-billed curlews were found in significant numbers and/or at locations that warranted some concern. Raptor nesting surveys identified only ten active nests within close proximity of proposed turbine locations. Richness of avian species and mean use estimates were low, similar to those found at other wind energy conversion facilities in the region. Overall, raptor use was similar to that observed at the Buffalo Ridge Minnesota and Foote Creek Rim Wyoming facilities, where raptor mortality has been low.

Adverse avian impacts from construction or operation of the Shepherds Flat Wind Farm are expected to be low, as is generally the case for modern wind energy conversion facilities. Concerns regarding potential construction impacts on breeding birds in the NP study area, including two special status species, can be lessened considerably by avoiding construction during the breeding season.

Methods

Avian Surveys

Northwest Wildlife Consultants (NWC) was responsible for the initial program design and locations of plots 1 – 25, and performed the fall 2002 and initial winter 2002 (early November) surveys. Energy Northwest Environmental Services conducted all subsequent surveys from winter 2002 (late December) through fall 2004, assigned locations for plots 26 – 46, and was responsible for all data interpretation. The methods implemented by NWC were used throughout the study period for consistency purposes.

Fixed-point circular plots, each with a viewing area approximately 800 m in radius, were used to assess avian use within the project area (Figure 1). Observations were performed during daylight hours, with each plot surveyed for 20 minutes. The number of observations, mean use estimates (number of birds/20 minute survey) and frequency of occurrence estimates (how often a species was observed during a 20 minute survey, expressed as % of surveys) within 800 m were calculated by species and season. Observations outside of the 800 meter viewing area were used to compile the total species list for the project area and for discussions related to notable events and species with special status rankings.

Observations were initiated in September 2002 at twenty-five survey plots, numbered 1 through 25. Several reconfigurations of the project, including the acquisition of adjacent properties (particularly in the SP area), resulted in the establishment of several sets of additional plots, three in December 2002 (plots 26 – 28), three in March 2003 (38 – 40), and six in August of 2004 (41 – 46). With the exception of plots 41 through 46, which were surveyed for one season (fall 2004), the monitoring period for each set of survey plots was approximately one year in duration. Thus, the majority of the project area was surveyed between September 2002 and August 2003 (Table 1).

Initially, areas of the current Shepherds Flat project were considered as separate wind projects. One project, Shepherds Ridge Wind Farm, was permitted at the county level. Shepherds Ridge included several survey plots located in the SP area. A wildlife assessment of the Shepherds Ridge project was completed in November 2003 (Welch 2003). The information from that study has been incorporated into this report.

To facilitate comparison of seasonal use estimates from this study with results from other wind projects, seasons are defined as follows:

Fall	August 16 – October 31
Winter	November 1 – March 15
Spring	March 16 – May 15
Summer	May 16 – August 15

In fall 2002, weekly surveys commenced September 6 and continued through October 28. Information obtained from observations at plots 1 – 25 was used for assessing this period. A total of 216 surveys were performed during 9 visits.

Winter surveys were performed weekly for the first two weeks in November 2002, and then every other week beginning December 22, 2002 and ending March 5, 2003. Property boundary adjustments in late-November resulted in the elimination of one plot (8), the relocation and re-labeling of two plots (6 and 7, changed to 6A and 7A), and the establishment of three additional plots (26, 27, and 28). Data from plots 1 – 28 were used to assess the winter period. A total of 204 surveys were performed during site visits varying from two at plots 6 – 8, six at plots 6A, 7A, and 26 – 28, and eight at all remaining plots.

Spring surveys were performed on a weekly basis, beginning March 19 and ending May 15, 2003. The acquisition of new property resulted in the establishment of three additional plots (38 – 40) prior to initiation of the spring study period. Data from plots 1 – 28 and 38 – 40 were used to assess the spring period. A total of 232 surveys were performed during eight visits.

In summer 2003, surveys were performed every other week from May 22 through August 13. Data from plots 1 – 28 and 38 – 40 were used to assess the summer period. A total of 203 surveys were performed during seven visits.

Observations at plots 26 – 28 and 38 – 40 continued until mid-March 2004. A total of 60 surveys were performed during ten visits in fall 2003, and 58 surveys during ten visits in winter 2003-2004.

In fall 2004, surveys were performed on a weekly basis from August 19 through October 28. Data from plots 41 – 46 were used to assess this period. A total of 66 surveys were performed during eleven site visits.

Data from the point-count surveys collected over the two-year monitoring period were combined into seasonal data, and interpreted from an entire project perspective as well as from an individual study area (NP and SP) perspective. Information obtained from observations at plot 5 was not included in the analysis of point-count data because the site is not representative of the habitat type associated with turbine strings (valley bottom riparian vs. ridge top dry-land wheat) and its viewing area did not encompass any of the proposed turbine locations. Survey data from plot 5 were used to assess the total number of species observed within the general project area.

For data analysis, species were organized into six major groups, including: passerines, raptors (including vultures and owls), waterbirds, waterfowl, upland game birds, and doves.

Other assessments

Foot and vehicle raptor nest surveys of the Shepherds Flat study area were performed on April 16 and 17 and May 28 and 29, 2003. The project site and a buffer zone of approximately two miles were included in the survey. Habitat and/or structures suitable for nesting, including cliff areas, trees, and power poles, were examined. Areas assessed in 2003 were re-visited during the late-winter and spring periods in 2004 while performing point-count surveys.

Foot surveys were performed near proposed turbine string locations within areas of suitable habitat, including hillsides and field edges, for evidence of activity associated with burrowing owls and Washington ground squirrels. These surveys were performed in conjunction with avian plot surveys. The period of focused observation was from March through mid-June in 2003 and March through mid-May in 2004. Field notes of observations both on and off survey plots were recorded while assessing the project area from December 2002 through October 2004. These notes included avian and mammalian observations.

A breeding bird survey was performed by William and Nancy LaFramboise in 2003. They surveyed Eight-mile Canyon, beginning at its confluence with Willow Creek and running south/south-west for approximately six miles, ending near the intersection with Four-mile Canyon Road. The purpose of the survey was to provide additional information on the avian community, specifically breeding passerines, in the vicinity of the project. Most of the habitats associated with the canyon are not representative of the areas designated for turbine placement. This is particularly true in the SP area, where turbine placement is primarily in wheat fields. The canyon is represented by riparian areas, substantial stands of sage brush, cliff areas, and scattered pockets of juniper trees. Twenty stations, positioned at 0.3-mile intervals, were each monitored for 10 minutes using point-count techniques. Two surveys were performed, one in May and one in June.

Results

General Avian Observations

For the entire study period, 80 species of birds were documented in the Shepherds Flat study area while performing avian surveys and other wildlife related monitoring activities (Table 2). Eighteen of the 80 species were not observed during point-count surveys, but were recorded while performing breeding bird surveys, raptor nesting surveys, burrowing owl/ground squirrel surveys, in-transit observations, and observations associated with plot 5. No species listed as endangered at the federal or state level were observed in the project area. One species listed as threatened at both the federal and state level, the bald eagle, was recorded from one point-count survey performed in the NP study area. Several species with special status listings were observed within the project area, and include: long-billed curlew (federal species of concern, state sensitive), ferruginous hawk (federal species of concern, state sensitive), Swainson's hawk (state sensitive), western burrowing owl (federal species of concern, state sensitive), loggerhead shrike (state sensitive), sage sparrow (state sensitive), sandhill crane (state sensitive), Lewis' woodpecker (state sensitive), grasshopper sparrow (state sensitive), willow flycatcher (state sensitive), and bank swallow (state sensitive). All of the special status species, with the exception of the grasshopper sparrow, were observed during point-count surveys.

Point-count Surveys

A total of 9,415 individual bird sightings were recorded from 1039 20-minute point-count surveys conducted from September 6, 2002 through October 28, 2004. Sixty-two species were documented across the entire Shepherds Flat project area. Fall had the greatest number of species observed (41), followed by spring (40), summer (32), and winter (30). The NP study area produced 54 species out of 4984 individual observations from 652 surveys. The SP study area produced 43 species out of 4431 observations from 387

surveys. The NP study area had the greatest number of species for a specific season, with 32 species documented in both fall and spring (Table 3).

The mean number of bird species observed per survey (species richness) was highest in the spring (2.59 species/survey) followed by fall (1.74), summer (1.73), and winter (1.53). The highest and lowest species richness/study area occurred in the NP study area in spring (2.69 species/survey) and winter (1.36 species/survey), respectively.

For the entire Shepherds Flat project, avian use was highest in the winter (15.03 birds/survey) followed by fall (9.53), spring (5.66), and summer (4.45). The highest and lowest use occurred in the SP area in winter (25.53 birds/survey) and summer (3.51 birds/survey), respectively.

Passerines had the highest use of all bird groups during all seasons for the entire project, and also had the highest use in the NP and SP study areas (Table 4). Passerine use was highest in the winter and lowest in summer for both the overall project and the SP study area. For the NP study area, passerine use was highest in the fall and lowest in the summer. Overall raptor use was highest in the fall and lowest in the winter, as was the case for the SP study area. The NP study area had the highest raptor use estimates in the summer and lowest in the winter. Raptor use was higher in the SP area than in the NP area during all seasons. Waterbird use was highest in the winter and lowest in the summer, both overall and for the NP study area. Waterbird use in the SP study area was highest in the spring and lowest in the fall and winter. The NP area had higher waterbird use than the SP area for all seasons, with considerably higher use estimates in the fall, winter, and summer. Waterfowl use was highest in the winter across the entire project and lowest in the summer. The NP and SP study areas produced the highest waterfowl use in the winter. The lowest waterfowl use for the NP and SP areas occurred in the summer and fall, respectively. Waterfowl use was considerably higher in the SP study area than the NP study area. Upland game-bird use was highest in the winter and lowest in the summer, both overall and for the SP area. The NP area had highest use for this group in the fall. Doves were most numerous in the fall and least numerous in the winter across the entire project as well as for the NP and SP study areas. Dove use was higher in the SP study area than in the NP study area.

Fall: For the entire project, passerines were the most abundant avian group (7.97 birds/survey), followed by waterbirds (0.73), and raptors (0.55). Passerines made up 83.6% of the avian use, followed by waterbirds at 7.7% and raptors at 5.8%. Passerines were observed during 83.6% of the surveys, followed by raptors at 29.5% and waterbirds, upland game birds, and doves at 2.6% (Table 4). Horned lark (4.14 birds/survey), unidentified passerine (0.99), American pipit (0.61), western meadowlark (0.51), and Eurasian starling (0.28) were the five small bird species with the highest fall use (Table 5). Killdeer (0.72), common raven (0.64), Swainson's hawk (0.18), Canada goose (0.15), and black-billed magpie (0.10) were the five large bird species with the highest fall use. Horned lark made up 43.4% of the total avian use, and were observed during 65.8% of the surveys. For raptors, Swainson's hawk made up 1.8% of the total avian use, and were observed during 5.3% of the surveys. Killdeer comprised 7.6% of the avian use, and were observed during 2.0% of the surveys. For the NP and SP study areas, the same pattern was generally observed with passerines producing the highest use, percent composition, and frequency of occurrence. Horned lark (3.23), unidentified passerine (1.19), and American pipit (1.15) had the highest use for small bird species in the NP area (Table 6). The observations for American pipit in the NP area accounted for 100% of the use estimates for this species across the entire Shepherds Flat project area. For large bird species, the NP area was similar to the overall project in that killdeer and common raven had the highest avian use. Common raven and Swainson's hawk had the highest use for large bird species in the SP area (Table 7). Swainson's hawk made up 46.1% of the use estimates for raptors in the SP area and 98.3% of the total observations of this species for the entire project. Four of the top five use estimates for large birds in the SP area were raptors.

Winter: Passerines (8.71 birds/survey), waterfowl (3.95), and waterbird (1.92) were the three most abundant avian groups for the NP and SP study areas combined. Passerines made up 58.0% of the avian use, with waterfowl and waterbird at 26.3% and 12.8%, respectively. Passerines were observed in 79.0% of the surveys, with raptors at 24.8% and waterfowl at 7.6%. Horned lark (6.39), unidentified passerine

(0.55), house finch (0.43), western meadowlark (0.19), and American goldfinch (0.16) were the five small bird species with the highest winter use. Canada goose (3.91), killdeer (1.92), common raven (0.64), rough-legged hawk (0.08), and black-billed magpie (0.08) were the five large bird species with the highest use for this period. Horned lark made up 42.5% of the total winter use and were observed during 59.9% of the surveys. Canada goose and killdeer made up 26.0% and 12.8% of the use and were observed during 6.5% and 1.1% of the surveys, respectively. Small bird use in the NP area was dominated by horned lark (2.64), followed by house finch (0.64) and unidentified passerine (0.44). Large bird use was represented by killdeer (2.96) and Canada goose (1.07). Killdeer in the NP area accounted for 31.7% of the total avian use for this area and 100% of the observations for this species across the entire Shepherds Flat project area. Golden eagle (0.06), red-tailed hawk (0.04), and northern harrier (0.04) were the three raptor species with the highest use in the NP area. In the SP study area, horned lark (13.32) comprised 86.5% of the passerine use and 52.2% of the total avian use for this area. Canada goose (9.16) made up 98.9% of the waterfowl use and 35.9% of the total use for this area, as well as comprising 82.2% of the observations for this species across the entire Shepherds Flat project. Canada goose observations were characterized by a few flocks containing large numbers of individuals, which is reflected in the low frequency of occurrence (7.6%). Raptor use was dominated by rough-legged hawk (0.21), which is 39.6% of the total use for this avian group in the SP area.

Spring: For the entire Shepherds Flat project, passerines (3.88 birds/survey), waterbird (1.20), and raptor (0.44) were the three avian groups with the highest use. Passerines made up 68.4% of the total avian use and were observed in 94.8% of the surveys. Waterbirds and raptors comprised 21.2% and 7.8% of the use estimates and were observed during 42.7% and 33.6% of the surveys, respectively. Horned lark (2.10), western meadowlark (0.87), cliff swallow (0.09), Brewer's blackbird (0.07), and red-winged blackbird (0.07) were the five small bird species with the highest use. Long-billed curlew (0.77), common raven (0.36), unidentified gull (0.22), sandhill crane (0.13), and northern harrier (0.10) were the five large bird species with the highest spring use. Horned lark and western meadowlark made up 37.1% and 15.4% of the use estimates and were observed during 73.7% and 52.2% of the surveys, respectively. For large birds, long-billed curlew comprised 64.2% of the use estimates for waterbird and 13.6% of the total avian use. Long-billed curlews were observed during 40.5% of the surveys. Unidentified gull and sandhill crane ranked in the top five for use in the large bird category but were only observed during 2.2% and 0.9% of the surveys, respectively. For raptors, northern harrier (0.10) and Swainson's hawk (0.10) had the highest use estimates, each comprising 22.7% of the total use for this group and were observed during 9.5% and 7.3% of the surveys, respectively. For the NP and SP study areas, horned larks and western meadowlarks dominated the use estimates for small birds. Large bird use in the NP area was dominated by long-billed curlew (1.06), which made up 84.8% of the total use for waterbirds in this area. Observations of long-billed curlew in the NP area accounted for 95.0 % of the total observations for this species across the entire Shepherds Flat project. For the SP area, unidentified gull (0.60) and sandhill crane (0.36) had the highest use for large birds, together accounting for 88.9% of the use estimates for waterbirds. Additionally, unidentified gull and sandhill crane observations in the SP area comprised 82.7% and 83.9% of the total observations for these species across the entire Shepherds Flat project area. Swainson's hawk (0.19) and rough-legged hawk (0.15) were the two raptor species with the highest use in the SP area. California quail (0.19) accounted for 100% of the use estimates for upland game-bird in the SP area as well as the entire project area.

Summer: Passerines (3.43 birds/survey), raptors (0.49), and waterbirds (0.48) were the three bird groups with the highest use for the entire Shepherds Flat project. Passerines made up 77.0% of the total avian use, with raptors and waterbirds comprising 11.0% and 10.7%, respectively. Passerines, raptors, and waterbirds were observed during 79.8%, 32.0%, and 14.8% of the surveys, respectively. Horned lark (2.16), western meadowlark (0.38), bank swallow (0.13), western kingbird (0.08), and red-winged blackbird (0.06) were the five small bird species with the highest use. Long-billed curlew (0.37), common raven (0.35), red-tailed hawk (0.13), Swainson's hawk (0.10), and ring-billed gull (0.09) were the five large bird species with the highest summer use. Horned larks made up 63.0% of the use for passerines and 48.5% of the total avian use. Long-billed curlews comprised 77.1% of the waterbird use and were observed during 11.8% of the surveys. Combined, red-tailed hawks and Swainson's hawks made up 46.9% of the use estimates for raptors and were observed during 9.9% and 6.4% of the surveys,

respectively. Horned larks were the most abundant species in both the NP and SP study areas. For small bird use, horned larks were followed by western meadowlarks (0.49) and bank swallows (0.14) in the NP area, and by red-winged blackbirds (0.18) and western meadowlarks (0.13) in the SP area. Long-billed curlew (0.47) and common raven (0.41) had the highest use for large bird species in the NP area. Observations of long-billed curlew in the NP area accounted for 88.0% of the total observations for this species across the entire Shepherds Flat project. Red-tailed hawk (0.22) and Swainson's hawk (0.22) were the two raptor species with the highest use in the SP area. Together, these two species made up 62.0% of the total use for this avian group in the SP area.

Other Surveys

Suitable nesting habitat is scarce in the project area, and is limited primarily to scattered clusters of juniper trees in the Eight-mile Canyon/Horn Butte area, small isolated cliff faces in Eight-mile Canyon and adjacent to the Columbia River, wood and metal power pole structures, and a few large trees associated with human dwellings. Nesting activity was low in the project area, with only ten active and five inactive nest sites identified. For active nest sites, seven were identified in the NP area and three in the SP area. In the NP area, there were three active red-tailed hawk nests, two of which were within 0.5 miles of the nearest proposed turbine string (one NW of the project boundary near plot 16, one within the project boundary near plot 25). The other red-tailed hawk nest was located in the Willow Creek valley, approximately one mile from the nearest proposed turbine. One ferruginous hawk nest was identified near plot 23 in the Horn Butte area, approximately 0.75 miles from the nearest proposed turbine. Two great-horned owl nests were identified, one located in the Horn Butte area and the other in the bottom of Eightmile Canyon. Both nests are approximately 0.5 miles from the nearest proposed turbine locations. One golden eagle nest was identified in a metal power pole structure near Willow Creek and Rhea Road. This nest is approximately 0.75 miles from the nearest proposed turbine string. Other nests in the NP area include two common raven nests in power pole structures near plots 14 and 25, and a few black-billed magpie nests constructed in juniper trees in the Horn Butte area. The three active nests in the SP area were occupied by red-tailed hawks. Two of the nests were located in the Willow Creek valley, with the nearest nest approximately 0.3 miles east of the nearest proposed turbine string. The other nest was located in Fourmile Canyon and was approximately 0.5 miles west of the nearest proposed turbine string. One common raven nest was identified approximately 5.5 miles south of the project along Fourmile Canyon Road.

No indications of Washington ground squirrels were found in the area of the proposed facility during the spring periods of focused observation, nor were any indications found during the balance of the study. Surveys of habitat suitable for burrowing owls showed no evidence of activity associated with this species during the breeding season. There were, however, three observations of burrowing owls recorded in the project area, two in mid-August 2003 and one in early September 2003.

One observation of a white-tailed jackrabbit (a state sensitive species) was recorded near plot 23 in August 2003 while performing avian point-count surveys. Black-tailed jackrabbits were observed on multiple occasions throughout the study area. Other mammalian observations included antelope, mule deer, coyote, yellow-bellied marmot, and badger. Antelope were observed primarily in the NP study area, with the majority of the sightings on Hurlburt Flat. Many coyote observations were recorded throughout the project area, with several sightings associated with sheep grazing activity. Mule deer were also observed throughout the project area, primarily in the Horn Butte and Eightmile Canyon areas. Yellow-bellied marmots were associated with rock outcroppings on Hurlburt Flat and near plot 28. One badger observation was recorded near plot 7A. Evidence of agricultural pests, such as pocket gophers, was also encountered.

Discussion

General Observations and Comparisons to other sites

For the entire Shepherds Flat project, overall avian use was higher in the SP area (agricultural landscape) than the NP area (native landscape). This is directly attributable to high winter use estimates recorded in the SP area. Excluding winter, seasonal use estimates in the NP and SP study areas were very similar to one another, and were actually slightly higher in the NP area. The higher winter use estimates are due primarily to the large flocks of horned larks and Canada geese recorded in the SP area during this period. The use of grain fields by large flocks of waterfowl, particularly Canada geese, is a common occurrence in the region during the winter. The general pattern of seasonal use estimates recorded at Shepherds Flat, with winter having the highest use and summer the lowest, has been observed at other wind projects in the region (e.g. Nine Canyon and Zintel Canyon, WEST 2002 and Erickson *et al.* 2001).

Passerine use was dominated by horned larks during all seasons and in both study areas. Western meadowlarks generally followed, only occasionally surpassed on a seasonal and study area basis by a few other species, including the American pipit, house finch, American goldfinch, Brewer's blackbird, and red-winged blackbird. With the exception of horned larks and western meadowlarks, the other species were typically observed on only a few occasions and in relatively large flocks. The same general trend in passerine use has been observed at other wind projects in the region, including Nine Canyon and Zintel Canyon.

Waterfowl use of the project was basically confined to the winter period and was almost exclusively limited to observations of Canada geese. Waterfowl use recorded during the other seasons was very low. With the exception of long-billed curlews, waterbird use in the area was characterized by a few observations of relatively large flocks of killdeer, sandhill crane, and various gull species. The majority of the observations of killdeer and sandhill crane were likely associated with fall and spring migration.

Mean raptor use estimates for Shepherds Flat Wind Farm were compared to raptor use estimates from several wind projects in and outside of the Pacific Northwest (Erickson *et al.* 2002). Overall raptor use at Shepherds Flat was similar to Buffalo Ridge Reference Area and Foote Creek Rim UV for fall and summer periods, Nine Canyon for winter, and Klondike and Foote Creek Rim UV for spring (Table 8). Raptor use in the NP area was compared to use estimates from projects located within predominately native landscapes. Overall, use was most similar to the Foote Creek Rim Morton's Pass Reference and Simpson's Ridge areas. The SP area was compared to use estimates from projects located within agricultural landscapes and appears to be most similar to the Buffalo Ridge projects. Regionally, fall, spring, and summer use was higher in the SP area than at Condon, Klondike, and Nine Canyon. Winter use in the SP area was higher than Condon and Nine Canyon, but very similar to Klondike, Zintel Canyon, and Stateline/Vansycle.

Raptors were observed more often in the SP area than in the NP area, with differences associated with individual species. Swainson's hawks, rough-legged hawks, and to a lesser extent red-tailed hawks, preferred the agricultural landscapes associated with the SP study area. Golden eagles, ferruginous hawks, and northern harriers were more often observed at plots located in the native landscapes of the NP study area. Behavior patterns and prey preferences specific to individual species probably help explain these results. American kestrels were distributed fairly evenly throughout the project area.

Plots of flight paths of raptors indicate a fairly uniform distribution in the NP area whereas the SP study area had the majority of observations associated with the edges or rims of the ridges. The topography in the project area creates more ridge soaring opportunities in the SP area than in the NP area, where it is generally limited to the west/southwest facing slopes in the Eight-mile canyon and Horn Butte areas. Greater than three-quarters of the raptor observations in the SP area were associated with the ridge edge or rim and the majority of these had flight paths that were parallel to the ridge edge, and thus parallel to the proposed turbine strings. Approximately 75% of the raptor observations in the SP area and 50% in the

NP area have flight paths considered to have a low probability of intersecting proposed turbine strings. Concerns regarding the proposed placement of one turbine near plot 7A, brought to light in the Shepherds Ridge report (Welch 2003), were addressed by a follow-up study performed in 2004 (Welch 2004). The results of the follow-up study indicated that the proposed location of the turbine would not have an adverse impact on raptors.

Special Status Species

Bald eagles are known to winter along the Columbia River and were observed on a few occasions en-route from the Tri-cities to the project site, primarily between Boardman and Arlington. Only one observation of this species was recorded within the project area from point-count surveys (including 262 surveys performed during the winter period), in-transit observations, and other wildlife assessments. Ferruginous hawks were primarily observed near Horn Butte in the NP study area. Juniper trees in this area provide some nesting opportunities for this species, and one documented nest site is located near plot 23. Although there are no turbines proposed in the immediate area of plot 23, access to turbines proposed near plot 40 to the southwest and plots 22 and 24 to the north may pass through this area. Swainson's hawks were observed more often during the fall period and primarily in the SP study area. This species is known to form large migrating flocks and a few observations in the project area confirm this finding. Approximately 25 Swainson's hawks were observed during one survey at plot 43 in August of 2004, working behind a tractor tilling a wheat field. Although no nest sites were recorded for this species, the number of observations in spring and summer suggests that this species does nest in the vicinity of the project. Burrowing owls were observed on only three occasions in the project area, and only one of the observations was associated with a survey plot. None of the observations occurred during the breeding season as all were recorded during late August and early September. These possibly represented migrants passing through the area.

The majority of the observations of long-billed curlews occurred at plots located in the NP study area and, more specifically, at plots located on Hurlburt Flats. This area appears to provide adequate breeding opportunities for this species, as behaviors typical of nesting adults were recorded throughout the spring and early summer periods. There were only two observations of sandhill cranes recorded in the project area – both were in the spring and probably represent passing migrants. One flock contained 26 individuals and was recorded in the SP area.

Loggerhead shrikes were observed on twelve occasions during point-count surveys. Several observations were also recorded while traveling between survey plots. All observations were associated with landscapes containing some degree of sage brush habitat. One loggerhead shrike family (adults and several juveniles) was observed in Eight-mile Canyon while conducting raptor nesting surveys. One observation of a sage sparrow was recorded at plot 19 in June of 2003, and one observation of a grasshopper sparrow was recorded while in-transit near plot 21 in July of the same year. Both of these areas are located immediately adjacent to Eight-mile Canyon, which contains habitat suitable for these two species. Two Lewis' woodpeckers were observed while performing a survey at plot 39 in May of 2003. One other observation was recorded in the Horn Butte area while performing raptor nesting surveys. The observations may represent the migration of this species through the project area. One willow flycatcher observation was recorded in the Horn Butte area while performing raptor nesting surveys. Suitable habitat for this species is scarce in the project area, and occurs only in isolated pockets in Eight-mile Canyon and along Willow Creek. The majority of bank swallow observations were recorded while performing surveys at plot 5 in late spring and summer periods. Plot 5 represents habitat more suitable to this species as it is located in the bottom of the valley next to Willow Creek. A few observations were also recorded during the summer period at survey plots located primarily in the Hurlburt Flat area.

The one observation of a white-tailed jackrabbit recorded near plot 23 represents the only sighting for this species in the project area for the entire study period. Suitable habitat for this species is found primarily in the Horn Butte and Eight-mile Canyon area. Impact from the project on this species is expected to be minimal as there are only a few turbines proposed to be located in areas identified as being somewhat

suitable for this species, represented by turbines proposed near plot 22 and west of plot 23. Impacts would be primarily associated with minor disturbances caused by increased traffic from construction vehicles gaining access to these sites.

Other special status species that were not observed during the course of the study but have the potential to occur in or near the project area include: peregrine falcon (state endangered), American white pelican (state sensitive), greater sage grouse (federal species of concern, state sensitive) Washington ground squirrel (federal candidate, state endangered), and northern sagebrush lizard (federal species of concern, state sensitive).

Conclusions

Results of avian use studies indicate relatively low use and diversity in the Shepherds Flat Wind Farm project area. Only 62 species were identified during a two-year study, and mean number of species observed per survey was low for all seasons. Wind facility-related risks to threatened or endangered species appears to be extremely low in the Shepherds Flat area, as no endangered species were encountered and only one observation of a threatened species was recorded during the entire study period. Eleven species with special status listings were observed in the project area, with Swainson's hawks, ferruginous hawks, and long-billed curlews the only species that occurred in sufficient numbers and/or at locations that warranted some concern. Other special status species occurred in such low numbers and/or were observed in areas not designated for turbine placement that wind facility-related risks appear to be very low.

Impacts associated with construction activities appear to be very low in the SP study area as nearly all turbines, including access/service roads, are proposed to be located in tilled fields. The most likely impacts to wildlife will be from disturbances related to increased traffic on area roads from construction vehicles. Construction activities in the NP study area will result in some habitat loss. The scale of the loss is small, as the proportion of project land required by the footprint of access roads and turbine pads is small in relation to the total area. The impact on wildlife from the loss of habitat is thus expected to be negligible. In the NP area, construction-related impacts to the avian community as a whole are expected to be low. There is, however, an increased risk to some avian species, including two special status species, if construction occurs during the breeding season. Horned larks, western meadowlarks, and long-billed curlews recorded their highest use estimates during the breeding season, and their breeding activity occurs in habitat proposed for turbine placement. This is particularly true for long-billed curlews in the Hurlburt Flat area. Potential impacts from construction include disruption of breeding behavior, nest abandonment or destruction, and injury or direct mortality. Impacts to breeding raptors will be primarily from disturbances caused by construction activity, and may include avoidance of the immediate area and/or nest abandonment. In particular, ferruginous hawks in the Horn Butte area may be at risk if construction vehicles use this area to gain access to nearby proposed turbine strings. Impacts to these breeding species could be prevented, or at the least substantially reduced, by performing construction activities in the NP area during the non-breeding period.

Operational impacts, including mortality, for passerines at Shepherds Flat are expected to be low based on the relatively low mean use estimate for this group. Waterfowl use in the project area is low and is primarily limited to a few large flocks of Canada geese using the area during the winter period. Waterbird use in the project area is also low, with the highest use estimate associated with long-billed curlews. Operational impacts on waterfowl and waterbirds has been low at most existing wind plants located in both agricultural and native landscapes, and is expected to be low at Shepherds Flat as well (Erickson *et al.* 2002). Raptor use estimates at Shepherds Flat are similar to raptor use estimates for the Buffalo Ridge wind project in Minnesota and the Foote Creek Rim wind project in Wyoming. Raptor mortality at all new generation wind plants with use estimates similar to Shepherds Flat has been low (Erickson *et al.* 2002). Shepherds Flat, with estimated raptor use of 0.46, is in the middle of the raptor use range of 0.27 – 0.61 at five nearby wind energy facilities (Table 9). No raptor mortality has been reported at three of these

sites. Additionally, there were no raptor mortalities at the Fossil Gulch wind plant in Idaho, where mean raptor use estimates in the adjacent Bell Rapids area were considerably higher than the raptor use estimates recorded at Shepherds Flat (Pilz & Co 2005 and Welch 2005).

Low nesting density, and the scarcity of nesting structures in and near the project site, suggest low potential for raptor breeding mortality. The potential for an adverse impact from the project on burrowing owls and Washington ground squirrels appears to be very low as well, as focused foot surveys and two years of avian surveys revealed only a few observations of burrowing owls and no activity associated with ground squirrels. From these avian use studies, raptor nesting surveys and surveys of special status species, we conclude that adverse impacts from the construction and operation of the Shepherds Flat Wind Farm on the avian community and on special status species would be low.

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Tables

Table 1: Date range of surveys and the number of surveys per plot by season.

Plots	Date Range	Number of Surveys per Plot						
		Fall 02	Winter 02 – 03	Spring 03	Summer 03	Fall 03	Winter 03 - 04	Fall 03 - 04
1 – 5	09/02 – 08/03	9	8	8	7			
6 – 7	09/02 – 11/02	9	2					
6A – 7A	11/02 – 08/03		6	8	7			
8	09/02 – 11/02	9	2					
9 – 25	09/02 – 08/03	9	8	8	7			
26 – 28	12/02 – 03/04		6	8	7	10	10	
38 – 40	03/03 – 03/04			8	7	10	10	
41 – 46	08/04 – 10/04							11

Table 2: Avian species observed during point-count, breeding bird and other surveys and assessments of the project area

Common Name	Scientific Name	Point-count Surveys NP	SP	P5	BB Surveys	Other Surveys
Passerines						
horned lark	*Eremophila alpestris*	x	x	x	x	x
western meadowlark	*Sturnella neglecta*	x	x	x	x	x
loggerhead shrike	*Lanius ludovicianus*	x	x	x	x	x
black-billed magpie	*Pica hudsonia*	x	x	x	x	x
Brewer's blackbird	*Euphagus cyanocephalus*	x	x	x	x	x
red-winged blackbird	*Agelaius phoeniceus*	x	x	x	x	x
common raven	*Corvus corax*	x	x	x	x	x
barn swallow	*Hirundo rustica*	x	x	x	x	x
bank swallow	*Riparia riparia*	x	x	x	x	x
cliff swallow	*Petrochelidon pyrrhonota*	x	x	x	x	x
white-crowned sparrow	*Zonotrichia leucophrys*	x	x	x		x
lark sparrow	*Chondestes grammacus*	x	x	x	x	x
golden-crowned sparrow	*Zonotrichia atricapilla*		x			
savannah sparrow	*Passerculus sandwichensis*	X	x			x
house sparrow	*Passer domesticus*	X		x		x
sage sparrow	*Amphispiza belli*	X				x
song sparrow	*Melospiza melodia*	X		x	x	x
western kingbird	*Tyrannus verticalis*	X	x	x	x	x
Say's phoebe	*Sayornis saya*	X	x		x	x
American robin	*Turdus migratorius*	X	x	x	x	x
American goldfinch	*Carduelis tristis*	X	x	x		x
house finch	*Carpodacus mexicanus*	X	x	x		x
sage thrasher	*Oreoscoptes montanus*		x			
European starling	*Sturnus vulgaris*	X	x	x	x	x
northern flicker	*Colaptes auratus*	X	x			x
rock wren	*Salpinctes obsoletus*	X			x	x
American pipit	*Anthus rubescens*	X				
lark bunting	*Calamospiza melanocorys*	X				
common nighthawk	*Chordeiles minor*	X			x	x
Townsend's solitaire	*Myadestes townsendi*	X				
mountain bluebird	*Sialia currucoides*	X				x
Lewis' woodpecker	*Melanerpes lewis*		x			x
Bullock's oriole	*Icterus bullockii*		x		x	
golden-crowned kinglet	*Regulus satrapa*			x		
yellow rumped warbler	*Dendroica coronata*			x	x	x
Wilson's warbler	*Wilsonia pusilla*			x		
winter wren	*Troglodytes troglodytes*					x
grasshopper sparrow	*Ammodramus savannarum*					x
calliope hummingbird	*Stellula calliope*				x	x
willow flycatcher	*Empidonax traillii*					x
brown-headed cowbird	*Molothrus ater*				x	x
northern rough-winged swallow	*Stelgidopteryx serripennis*				x	x
chipping sparrow	*Spizella passerina*				x	
western tanager	*Piranga ludoviciana*				x	
American crow	*Corvus brachyrhynchos*					x

Common Name	Scientific Name	Point-count Surveys NP	SP	P5	BB Surveys	Other Surveys
Raptor						
sharp-shinned hawk	*Accipter striatus*	X				
ferruginous hawk	*Buteo regalis*	X	x		x	x
Swainson's hawk	*Buteo swainsoni*	X	x	x	x	x
red-tailed hawk	*Buteo jamaicensis*	X	x	x	x	x
rough-legged hawk	*Buteo lagopus*	X	x	x		x
bald eagle	*Haliaeetus leucocephalus*	X				x
golden eagle	*Aquila chrysaetos*	X	x	x	x	x
American kestrel	*Falco sparverius*	X	x	x	x	x
northern harrier	*Circus cyaneus*	X	x	x	x	x
prairie falcon	*Falco mexicanus*	X	x			x
turkey vulture	*Cathartes aura*	X	x			x
merlin	*Falco columbarius*		x			x
great horned owl	*Bubo virginianus*	X				x
burrowing owl	*Athene cunicularia*	X				x
long-eared owl	*Asio otus*					x
osprey	*Pandion haliaetus*					x
Waterbird						
great blue heron	*Ardea herodias*	X		x		x
long-billed curlew	*Numenius americanus*	X	x		x	x
sandhill crane	*Grus canadensis*	X	x	x		x
ring-billed gull	*Larus delawarensis*	X		x		x
California gull	*Larus californicus*	X				x
killdeer	*Charadrius vociferus*	X		x	x	x
belted kingfisher	*Ceryle alcyon*	X				
great egret	*Ardea alba*				x	x
Virginia rail	*Rallus limicola*				x	
western gull	*Larus occidentalis*			x		x
Waterfowl						
redhead	*Aythya americana*			x		x
mallard	*Anas platyrhynchos*		x	x	X	x
Canada goose	*Branta canadensis*	X	x			x
Upland Gamebird						
California quail	*Callipepla californica*	X	x	x	X	x
ringnecked pheasant	*Phasianus colchicus*	X		x	X	x
chukar	*Alectoris chukar*	X	x		X	x
gray partridge	*Perdix perdix*		x			x
Dove						
morning dove	*Zenaida macroura*	X	x	x	X	x
rock dove	*Columba livia*		x	x		x
Total	**80**	**54**	**43**	**39**	**40**	**67**

NP = northern study area
SP = southern study area
P5 = plot No. 5

BB = breeding bird surveys
Other = incidental/in transit, raptor nesting surveys, ground squirrel/ burrowing owl surveys

Table 3. Number of surveys, number of observations, mean use, number of species and number of species per survey by season and area.

Site	Season	# Surveys	# Obs[1]	Use[2]	Species[3]	Species/survey[4]
Shepherd's Flat (NP + SP)	Fall	342	3259	9.529	41	1.74
	Winter	262	3938	15.031	30	1.53
	Spring	232	1314	5.664	40	2.59
	Summer	203	904	4.453	32	1.73
NP Study Area	Fall	182	1805	9.918	32	1.71
	Winter	170	1589	9.347	24	1.36
	Spring	160	907	5.669	32	2.69
	Summer	140	683	4.879	26	1.76
SP Study Area	Fall	160	1454	9.088	29	1.78
	Winter	92	2349	25.533	21	1.84
	Spring	72	407	5.653	28	2.35
	Summer	63	221	3.508	21	1.67

1: total number of individuals observed
2: mean number of birds observed per 20 minute survey
3: number of different species observed
4: mean of the number of species observed in each 20 minute survey

Table 4: Mean use, percent composition and percent frequency of occurrence for avian groups by season and area.

Species/Group	Fall			Winter			Spring			Summer			All Seasons		
	Use[1]	Comp[2]	Freq[3]	Use	Comp	Freq	Use	Comp	Freq	Use	Comp	Freq	Use	Comp	Freq
Shepherd's Flat (NP + SP)															
Passerines	7.968	83.6	83.6	8.714	58.0	79.0	3.875	68.4	94.8	3.429	77.0	79.8	6.355	70.1	84.2
Raptor	0.553	5.8	29.5	0.321	2.1	24.8	0.444	7.8	33.6	0.488	11.0	32.0	0.457	5.0	29.7
Waterbird	0.734	7.7	2.6	1.920	12.8	1.1	1.198	21.2	42.7	0.478	10.7	14.8	1.087	12.0	13.6
Waterfowl	0.146	1.5	0.6	3.947	26.3	7.6	0.043	0.8	1.7	0.010	0.2	0.5	1.055	11.6	2.6
Upland Gamebird	0.044	0.5	2.6	0.095	0.6	1.5	0.065	1.1	1.7	0.000	0.0	0.0	0.053	0.6	1.6
Dove	0.085	0.9	2.6	0.034	0.2	1.1	0.039	0.7	2.6	0.049	1.1	3.4	0.055	0.6	2.4
NP Study Area															
Passerines	7.824	78.9	80.2	5.094	54.5	76.5	4.075	71.9	98.1	3.850	78.9	78.6	5.339	69.8	83.3
Raptor	0.335	3.4	24.7	0.206	2.2	17.6	0.313	5.5	26.9	0.386	7.9	27.1	0.307	4.0	23.9
Waterbird	1.379	13.9	4.9	2.959	31.7	1.8	1.250	22.1	55.6	0.621	12.7	17.9	1.597	20.9	19.3
Waterfowl	0.275	2.8	1.1	1.071	11.5	5.9	0.013	0.2	0.6	0.000	0.0	0.0	0.359	4.7	2.0
Upland Gamebird	0.071	0.7	4.4	0.012	0.1	0.6	0.006	0.1	0.6	0.000	0.0	0.0	0.025	0.3	1.5
Dove	0.033	0.3	2.2	0.006	0.1	0.6	0.013	0.2	1.3	0.021	0.4	2.1	0.018	0.2	1.5
SP Study Area															
Passerines	8.131	89.5	87.5	15.402	60.3	83.7	3.431	60.7	87.5	2.492	71.0	82.5	8.067	70.5	85.8
Raptor	0.800	8.8	35.0	0.533	2.1	38.0	0.736	13.0	48.6	0.714	20.4	42.9	0.711	6.2	39.5
Waterbird	0.000	0.0	0.0	0.000	0.0	0.0	1.083	19.2	13.9	0.159	4.5	7.9	0.227	2.0	3.9
Waterfowl	0.000	0.0	0.0	9.261	36.3	10.9	0.111	2.0	4.2	0.032	0.9	1.6	2.227	19.5	3.6
Upland Gamebird	0.013	0.1	0.6	0.250	1.0	3.3	0.194	3.4	2.8	0.000	0.0	0.0	0.101	0.9	1.6
Dove	0.144	1.6	3.1	0.087	0.3	2.2	0.097	1.7	5.6	0.111	3.2	6.3	0.116	1.0	3.9

1: mean number of birds observed per 20 minute survey
2: mean use of the group divided by the total mean use of all groups
3: percent of surveys in which a member of the group was observed

Table 5: Number of observations, mean use, number of surveys in which observed and percent frequency of occurrence by species and season for total project area.

	Fall (342 surveys)				Winter (262 surveys)				Spring (232 surveys)				Summer (203 surveys)			
Species/Group	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq
Passerines																
Horned lark	1414	4.135	225	65.8	1674	6.389	157	59.9	487	2.099	171	73.7	439	2.163	122	60.1
Western meadowlark	175	0.512	58	17.0	49	0.187	33	12.6	202	0.871	121	52.2	77	0.379	45	22.2
loggerhead shrike	4	0.012	3	0.9	0	0.000	0	0.0	5	0.022	5	2.2	3	0.015	2	1.0
unidentified shrike	2	0.006	2	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Black-billed magpie	33	0.096	19	5.6	22	0.084	14	5.3	3	0.013	3	1.3	7	0.034	4	2.0
Brewer's blackbird	89	0.260	3	0.9	0	0.000	0	0.0	17	0.073	6	2.6	7	0.034	2	1.0
red-winged blackbird	0	0.000	0	0.0	0	0.000	0	0.0	15	0.065	5	2.2	12	0.059	3	1.5
Common raven	219	0.640	88	25.7	167	0.637	72	27.5	84	0.362	54	23.3	70	0.345	29	14.3
Barn swallow	15	0.044	3	0.9	0	0.000	0	0.0	1	0.004	1	0.4	3	0.015	3	1.5
Bank swallow	1	0.003	1	0.3	0	0.000	0	0.0	2	0.009	1	0.4	27	0.133	14	6.9
Cliff swallow	0	0.000	0	0.0	0	0.000	0	0.0	21	0.091	8	3.4	4	0.020	2	1.0
unidentified swallow	2	0.006	1	0.3	0	0.000	0	0.0	2	0.009	1	0.4	3	0.015	2	1.0
unidentified passerine	340	0.994	35	10.2	145	0.553	10	3.8	9	0.039	7	3.0	8	0.039	5	2.5
White-crowned sparrow	29	0.085	5	1.5	5	0.019	1	0.4	8	0.034	2	0.9	0	0.000	0	0.0
unidentified sparrow	2	0.006	1	0.3	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Lark sparrow	1	0.003	1	0.3	0	0.000	0	0.0	1	0.004	1	0.4	8	0.039	4	2.0
Golden-crowned sparrow	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
savannah sparrow	5	0.015	3	0.9	0	0.000	0	0.0	8	0.034	6	2.6	0	0.000	0	0.0
house sparrow	0	0.000	0	0.0	0	0.000	0	0.0	6	0.026	2	0.9	0	0.000	0	0.0
Sage sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
Song sparrow	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Western kingbird	1	0.003	1	0.3	0	0.000	0	0.0	11	0.047	4	1.7	17	0.084	11	5.4
say's phoebe	10	0.029	10	2.9	1	0.004	1	0.4	2	0.009	2	0.9	0	0.000	0	0.0
unidentified flycatcher	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american robin	0	0.000	0	0.0	3	0.011	2	0.8	6	0.026	2	0.9	0	0.000	0	0.0
american goldfinch	50	0.146	6	1.8	43	0.164	4	1.5	0	0.000	0	0.0	0	0.000	0	0.0
house finch	7	0.020	2	0.6	113	0.431	3	1.1	4	0.017	1	0.4	0	0.000	0	0.0
unidentified finch	5	0.015	1	0.3	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Sage thrasher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	3	0.015	1	0.5
Eurasian starling	96	0.281	5	1.5	37	0.141	5	1.9	3	0.013	1	0.4	1	0.005	1	0.5
Northern flicker	4	0.012	3	0.9	3	0.011	3	1.1	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (342 surveys)				Winter (262 surveys)				Spring (232 surveys)				Summer (203 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq
Rock wren	7	0.020	7	2.0	0	0.000	0	0.0	0	0.000	0	0.0	5	0.025	3	1.5
american pipit	209	0.611	3	0.9	11	0.042	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Lark bunting	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Common nighthawk	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
townsend's solitaire	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
mountain bluebird	0	0.000	0	0.0	6	0.023	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Lewis' woodpecker	0	0.000	0	0.0	0	0.000	0	0.0	2	0.009	1	0.4	0	0.000	0	0.0
Bullock's oriole	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Raptor																
sharp-shinned hawk	2	0.006	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Ferruginous hawk	1	0.003	1	0.3	0	0.000	0	0.0	10	0.043	8	3.4	9	0.044	6	3.0
swainson's hawk	60	0.175	18	5.3	0	0.000	0	0.0	23	0.099	17	7.3	21	0.103	13	6.4
Red-tailed hawk	31	0.091	27	7.9	13	0.050	11	4.2	12	0.052	11	4.7	26	0.128	20	9.9
Rough-legged hawk	19	0.056	14	4.1	22	0.084	20	7.6	14	0.060	13	5.6	0	0.000	0	0.0
Bald eagle	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
golden eagle	13	0.038	12	3.5	11	0.042	11	4.2	11	0.047	11	4.7	1	0.005	1	0.5
american kestrel	26	0.076	22	6.4	12	0.046	12	4.6	3	0.013	3	1.3	12	0.059	8	3.9
Northern harrier	16	0.047	14	4.1	14	0.053	12	4.6	24	0.103	22	9.5	14	0.069	14	6.9
Prairie falcon	5	0.015	5	1.5	5	0.019	5	1.9	0	0.000	0	0.0	0	0.000	0	0.0
unidentified buteo	11	0.032	10	2.9	6	0.023	5	1.9	4	0.017	4	1.7	13	0.064	11	5.4
Turkey vulture	0	0.000	0	0.0	0	0.000	0	0.0	1	0.004	1	0.4	1	0.005	1	0.5
unidentified accipiter	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Merlin	3	0.009	2	0.6	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0
great horned owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
burrowing owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
unidentified falcon	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Waterbird																
great blue heron	0	0.000	0	0.0	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0
Long-billed curlew	0	0.000	0	0.0	0	0.000	0	0.0	179	0.772	94	40.5	75	0.369	24	11.8
Sandhill crane	0	0.000	0	0.0	0	0.000	0	0.0	31	0.134	2	0.9	0	0.000	0	0.0
Ring-billed gull	0	0.000	0	0.0	0	0.000	0	0.0	3	0.013	1	0.4	18	0.089	5	2.5
California gull	0	0.000	0	0.0	0	0.000	0	0.0	7	0.030	1	0.4	0	0.000	0	0.0
unidentified gull	0	0.000	0	0.0	0	0.000	0	0.0	52	0.224	5	2.2	3	0.015	3	1.5
Killdeer	247	0.722	7	2.0	503	1.920	3	1.1	5	0.022	4	1.7	1	0.005	1	0.5
belted kingfisher	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified shorebird	3	0.009	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (342 surveys)				Winter (262 surveys)				Spring (232 surveys)				Summer (203 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq
Waterfowl																
Mallard	0	0.000	0	0.0	9	0.034	3	1.1	8	0.034	3	1.3	2	0.010	1	0.5
canada goose	50	0.146	2	0.6	1025	3.912	17	6.5	2	0.009	1	0.4	0	0.000	0	0.0
Upland Gamebird																
California quail	9	0.026	5	1.5	3	0.011	2	0.8	14	0.060	2	0.9	0	0.000	0	0.0
ringnecked pheasant	4	0.012	4	1.2	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Chukar	2	0.006	1	0.3	11	0.042	1	0.4	1	0.004	1	0.4	0	0.000	0	0.0
gray partridge	0	0.000	0	0.0	11	0.042	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Dove																
Morning dove	8	0.023	5	1.5	2	0.008	2	0.8	9	0.039	6	2.6	4	0.020	4	2.0
rock dove	21	0.061	4	1.2	7	0.027	1	0.4	0	0.000	0	0.0	6	0.030	3	1.5
Total	**3259**	**9.529**			**3938**	**15.031**			**1314**	**5.664**			**904**	**4.453**		

1: number of individual birds observed per 20 minute survey
2: mean number of birds observed per survey
3: number of surveys in which a member of the species was observed
4: percent of surveys in which a member of the species was observed

Table 6: Number of observations, mean use, number of surveys in which observed and frequency of occurrence by species and season for northern (native landscape) project area.

	Fall (182 surveys)				Winter (170 surveys)				Spring (160 surveys)				Summer (140 surveys)			
Species/Group	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Passerines																
Horned lark	588	3.231	106	58.2	449	2.641	91	53.5	339	2.119	121	75.6	340	2.429	82	58.6
Western meadowlark	146	0.802	43	23.6	36	0.212	22	12.9	162	1.013	91	56.9	69	0.493	38	27.1
loggerhead shrike	2	0.011	2	1.1	0	0.000	0	0.0	2	0.013	2	1.3	3	0.021	2	1.4
unidentified shrike	2	0.011	2	1.1	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
black-billed magpie	23	0.126	13	7.1	15	0.088	11	6.5	2	0.013	2	1.3	7	0.050	4	2.9
brewer's blackbird	22	0.121	1	0.5	0	0.000	0	0.0	15	0.094	4	2.5	0	0.000	0	0.0
red-winged blackbird	0	0.000	0	0.0	0	0.000	0	0.0	10	0.063	2	1.3	1	0.007	1	0.7
Common raven	97	0.533	40	22.0	108	0.635	45	26.5	78	0.488	48	30.0	58	0.414	19	13.6
barn swallow	2	0.011	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	2	0.014	2	1.4
bank swallow	0	0.000	0	0.0	0	0.000	0	0.0	2	0.013	1	0.6	20	0.143	8	5.7
cliff swallow	0	0.000	0	0.0	0	0.000	0	0.0	5	0.031	3	1.9	3	0.021	1	0.7
unidentified swallow	2	0.011	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	2	0.014	1	0.7
unidentified passerine	217	1.192	17	9.3	74	0.435	5	2.9	7	0.044	5	3.1	3	0.021	3	2.1
white-crowned sparrow	27	0.148	4	2.2	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified sparrow	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
lark sparrow	0	0.000	0	0.0	0	0.000	0	0.0	1	0.006	1	0.6	8	0.057	4	2.9
Golden-crowned sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
savannah sparrow	2	0.011	2	1.1	0	0.000	0	0.0	8	0.050	6	3.8	0	0.000	0	0.0
House sparrow	0	0.000	0	0.0	0	0.000	0	0.0	6	0.038	2	1.3	0	0.000	0	0.0
sage sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
song sparrow	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Western kingbird	0	0.000	0	0.0	0	0.000	0	0.0	10	0.063	3	1.9	15	0.107	10	7.1
say's phoebe	7	0.038	7	3.8	1	0.006	1	0.6	1	0.006	1	0.6	0	0.000	0	0.0
unidentified flycatcher	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american robin	0	0.000	0	0.0	3	0.018	2	1.2	0	0.000	0	0.0	0	0.000	0	0.0
american goldfinch	28	0.154	4	2.2	13	0.076	2	1.2	0	0.000	0	0.0	0	0.000	0	0.0
House finch	6	0.033	1	0.5	108	0.635	2	1.2	4	0.025	1	0.6	0	0.000	0	0.0
unidentified finch	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
sage thrasher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Eurasian starling	30	0.165	2	1.1	37	0.218	5	2.9	0	0.000	0	0.0	1	0.007	1	0.7
Northern flicker	3	0.016	2	1.1	3	0.018	3	1.8	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (182 surveys) # Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	Winter (170 surveys) # Obs	Use	Srvys Obs	% Freq	Spring (160 surveys) # Obs	Use	Srvys Obs	% Freq	Summer (140 surveys) # Obs	Use	Srvys Obs	% Freq
rock wren	7	0.038	7	3.8	0	0.000	0	0.0	0	0.000	0	0.0	5	0.036	3	2.1
american pipit	209	1.148	3	1.6	11	0.065	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
lark bunting	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
common nighthawk	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
townsend's solitaire	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
mountain bluebird	0	0.000	0	0.0	6	0.035	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
Lewis' woodpecker	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Bullock's oriole	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Raptor																
sharp-shinned hawk	2	0.011	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Ferruginous hawk	1	0.005	1	0.5	0	0.000	0	0.0	7	0.044	5	3.1	7	0.050	4	2.9
swainson's hawk	1	0.005	1	0.5	0	0.000	0	0.0	9	0.056	7	4.4	7	0.050	6	4.3
red-tailed hawk	9	0.049	9	4.9	7	0.041	5	2.9	6	0.038	6	3.8	12	0.086	10	7.1
rough-legged hawk	6	0.033	4	2.2	3	0.018	3	1.8	3	0.019	3	1.9	0	0.000	0	0.0
bald eagle	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
golden eagle	11	0.060	10	5.5	10	0.059	10	5.9	7	0.044	7	4.4	0	0.000	0	0.0
american kestrel	15	0.082	12	6.6	3	0.018	3	1.8	1	0.006	1	0.6	8	0.057	7	5.0
northern harrier	9	0.049	7	3.8	7	0.041	6	3.5	15	0.094	14	8.8	11	0.079	11	7.9
prairie falcon	2	0.011	2	1.1	2	0.012	2	1.2	0	0.000	0	0.0	0	0.000	0	0.0
unidentified buteo	4	0.022	4	2.2	2	0.012	2	1.2	1	0.006	1	0.6	7	0.050	5	3.6
turkey vulture	0	0.000	0	0.0	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0
unidentified accipiter	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Merlin	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
great horned owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
burrowing owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
unidentified falcon	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Waterbird																
great blue heron	0	0.000	0	0.0	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0
long-billed curlew	0	0.000	0	0.0	0	0.000	0	0.0	170	1.063	87	54.4	66	0.471	20	14.3
Sandhill crane	0	0.000	0	0.0	0	0.000	0	0.0	5	0.031	1	0.6	0	0.000	0	0.0
ring-billed gull	0	0.000	0	0.0	0	0.000	0	0.0	3	0.019	1	0.6	18	0.129	5	3.6
california gull	0	0.000	0	0.0	0	0.000	0	0.0	7	0.044	1	0.6	0	0.000	0	0.0
unidentified gull	0	0.000	0	0.0	0	0.000	0	0.0	9	0.056	3	1.9	2	0.014	2	1.4
Killdeer	247	1.357	7	3.8	503	2.959	3	1.8	5	0.031	4	2.5	1	0.007	1	0.7
belted kingfisher	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified shorebird	3	0.016	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (182 surveys)				Winter (170 surveys)				Spring (160 surveys)				Summer (140 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Waterfowl																
Mallard	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Canada goose	50	0.275	2	1.1	182	1.071	10	5.9	2	0.013	1	0.6	0	0.000	0	0.0
Upland Gamebird																
california quail	7	0.038	4	2.2	2	0.012	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
Ringnecked pheasant	4	0.022	4	2.2	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Chukar	2	0.011	1	0.5	0	0.000	0	0.0	1	0.006		0.0	0	0.000	0	0.0
gray partridge	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Dove																
morning dove	6	0.033	4	2.2	1	0.006	1	0.6	2	0.013	2	1.3	3	0.021	3	2.1
rock dove	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Total	**1805**	**9.918**			**1589**	**9.347**			**907**	**5.669**			**683**	**4.879**		

1: number of individual birds observed per 20 minute survey
2: mean number of birds observed per survey
3: number of surveys in which a member of the species was observed
4: percent of surveys in which a member of the species was observed

Table 7: Number of observations, mean use, number of surveys in which observed and frequency of occurrence by species and season for southern (agricultural) area.

	Fall (160 surveys)				Winter (92 surveys)				Spring (72 surveys)				Summer (63 surveys)			
Species/Group	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Passerines																
Horned lark	826	5.163	119	74.4	1225	13.315	66	71.7	148	2.056	50	69.4	99	1.571	40	63.5
Western meadowlark	29	0.181	15	9.4	13	0.141	11	12.0	40	0.556	30	41.7	8	0.127	7	11.1
loggerhead shrike	2	0.013	1	0.6	0	0.000	0	0.0	3	0.042	3	4.2	0	0.000	0	0.0
unidentified shrike	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Black-billed magpie	10	0.063	6	3.8	7	0.076	3	3.3	1	0.014	1	1.4	0	0.000	0	0.0
brewer's blackbird	67	0.419	2	1.3	0	0.000	0	0.0	2	0.028	2	2.8	7	0.111	2	3.2
red-winged blackbird	0	0.000	0	0.0	0	0.000	0	0.0	5	0.069	3	4.2	11	0.175	2	3.2
Common raven	122	0.763	48	30.0	59	0.641	27	29.3	6	0.083	6	8.3	12	0.190	10	15.9
Barn swallow	13	0.081	2	1.3	0	0.000	0	0.0	1	0.014	1	1.4	1	0.016	1	1.6
Bank swallow	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	7	0.111	6	9.5
cliff swallow	0	0.000	0	0.0	0	0.000	0	0.0	16	0.222	5	6.9	1	0.016	1	1.6
unidentified swallow	0	0.000	0	0.0	0	0.000	0	0.0	2	0.028	1	1.4	1	0.016	1	1.6
unidentified passerine	123	0.769	18	11.3	71	0.772	5	5.4	2	0.028	2	2.8	5	0.079	2	3.2
White-crowned sparrow	2	0.013	1	0.6	5	0.054	1	1.1	8	0.111	2	2.8	0	0.000	0	0.0
unidentified sparrow	2	0.013	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
lark sparrow	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Golden-crowned sparrow	0	0.000	0	0.0	1	0.011	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
savannah sparrow	3	0.019	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
House sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Sage sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Song sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Western kingbird	1	0.006	1	0.6	0	0.000	0	0.0	1	0.014	1	1.4	2	0.032	1	1.6
say's phoebe	3	0.019	3	1.9	0	0.000	0	0.0	1	0.014	1	1.4	0	0.000	0	0.0
unidentified flycatcher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american robin	0	0.000	0	0.0	0	0.000	0	0.0	6	0.083	2	2.8	0	0.000	0	0.0
american goldfinch	22	0.138	2	1.3	30	0.326	2	2.2	0	0.000	0	0.0	0	0.000	0	0.0
House finch	1	0.006	1	0.6	5	0.054	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
unidentified finch	5	0.031	1	0.6	1	0.011	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
Sage thrasher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	3	0.048	1	1.6
Eurasian starling	66	0.413	3	1.9	0	0.000	0	0.0	3	0.042	1	1.4	0	0.000	0	0.0
Northern flicker	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (160 surveys)				Winter (92 surveys)				Spring (72 surveys)				Summer (63 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
rock wren	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american pipit	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
lark bunting	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Common nighthawk	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
townsend's solitaire	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
mountain bluebird	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Lewis' woodpecker	0	0.000	0	0.0	0	0.000	0	0.0	2	0.028	1	1.4	0	0.000	0	0.0
Bullock's oriole	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Raptor																
Sharp-shinned hawk	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Ferruginous hawk	0	0.000	0	0.0	0	0.000	0	0.0	3	0.042	3	4.2	2	0.032	2	3.2
swainson's hawk	59	0.369	17	10.6	0	0.000	0	0.0	14	0.194	10	13.9	14	0.222	7	11.1
red-tailed hawk	22	0.138	18	11.3	6	0.065	6	6.5	6	0.083	5	6.9	14	0.222	10	15.9
Rough-legged hawk	13	0.081	10	6.3	19	0.207	17	18.5	11	0.153	10	13.9	0	0.000	0	0.0
bald eagle	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
golden eagle	2	0.013	2	1.3	1	0.011	1	1.1	4	0.056	4	5.6	1	0.016	1	1.6
american kestrel	11	0.069	10	6.3	9	0.098	9	9.8	2	0.028	2	2.8	4	0.063	1	1.6
Northern harrier	7	0.044	7	4.4	7	0.076	6	6.5	9	0.125	8	11.1	3	0.048	3	4.8
Prairie falcon	3	0.019	3	1.9	3	0.033	3	3.3	0	0.000	0	0.0	0	0.000	0	0.0
unidentified buteo	7	0.044	6	3.8	4	0.043	3	3.3	3	0.042	3	4.2	6	0.095	6	9.5
Turkey vulture	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.016	1	1.6
unidentified accipiter	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Merlin	3	0.019	2	1.3	0	0.000	0	0.0	1	0.014	1	1.4	0	0.000	0	0.0
great horned owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
burrowing owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified falcon	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Waterbird																
great blue heron	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
long-billed curlew	0	0.000	0	0.0	0	0.000	0	0.0	9	0.125	7	9.7	9	0.143	4	6.3
sandhill crane	0	0.000	0	0.0	0	0.000	0	0.0	26	0.361	1	1.4	0	0.000	0	0.0
ring-billed gull	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
California gull	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified gull	0	0.000	0	0.0	0	0.000	0	0.0	43	0.597	2	2.8	1	0.016	1	1.6
Killdeer	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
belted kingfisher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified shorebird	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (160 surveys)				Winter (92 surveys)				Spring (72 surveys)				Summer (63 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Waterfowl																
Mallard	0	0.000	0	0.0	9	0.098	3	3.3	8	0.111	3	4.2	2	0.032	1	1.6
Canada goose	0	0.000	0	0.0	843	9.163	7	7.6	0	0.000	0	0.0	0	0.000	0	0.0
Upland Gamebird																
California quail	2	0.013	1	0.6	1	0.011	1	1.1	14	0.194	2	2.8	0	0.000	0	0.0
Ringnecked pheasant	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Chukar	0	0.000	0	0.0	11	0.120	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
Gray partridge	0	0.000	0	0.0	11	0.120	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
Dove																
morning dove	2	0.013	1	0.6	1	0.011	1	1.1	7	0.097	4	5.6	1	0.016	1	1.6
Rock dove	21	0.131	4	2.5	7	0.076	1	1.1	0	0.000	0	0.0	6	0.095	3	4.8
Total	**1454**	**9.088**			**2349**	**25.533**			**407**	**5.653**			**221**	**3.508**		

1: number of individual birds observed per 20 minute survey
2: mean number of birds observed per survey
3: number of surveys in which a member of the species was observed
4: percent of surveys in which a member of the species was observed

Table 8: Seasonal pre- and post-construction avian use estimates at modern wind facilities.

	Mean Raptor Use[1]				
Project	**Spring**	**Summer**	**Fall**	**Winter**	**Average**
Shepherds Flat (OR)	0.444	0.488	0.553	0.321	0.457
Nine Canyon (WA)	0.354	0.199	0.156	0.312	0.258
Zintel Canyon (WA)	0.194	0.299	0.700	0.507	0.443
Stateline/Vansycle (OR/WA)	0.524	0.333	0.260	0.494	0.410
Foote Creek Rim, Foote Creek Rim (WY)	0.735	0.702	0.839	0.238	0.562
Foote Creek Rim, Foote Creek Rim UV (WY)	0.464	0.518	0.608	0.224	0.417
Foote Creek Rim, Morton's Pass reference (WY)	0.480	0.329	0.287	0.153	0.279
Foote Creek Rim, Simpson's Ridge (WY)	0.373	0.280	0.261	0.123	0.233
Buffalo Ridge, Phase I (MN)	0.636	0.431	0.761	0.133	0.424
Buffalo Ridge, Phase II (MN)	0.841	0.694	0.827	0.100	0.523
Buffalo Ridge, Phase III (MN)	0.638	0.537	0.845	0.181	0.484
Condon (OR)	0.528	0.325	0.293	0.453	0.400
Klondike I (OR)	0.468	0.389	0.386	0.566	0.468
	Mean Waterfowl/Water Bird Use				
Project	**Spring**	**Summer**	**Fall**	**Winter**	**Average**
Shepherds Flat (OR)	1.241	0.488	0.880	5.867	2.142
Nine Canyon (WA)	0.417	0.043	0.017	0.907	0.424
Zintel Canyon (WA)	0.056	0.042	0.422	34.850	13.186
Stateline/Vansycle (OR/WA)	0.350	0.083	0.000	0.000	0.079
Foote Creek Rim, Foote Creek Rim (WY)	0.416	0.224	0.056	0.224	0.221
Foote Creek Rim, Foote Creek Rim UV (WY)	0.858	0.032	0.000	0.002	0.151
Foote Creek Rim, Morton's Pass reference (WY)	0.036	0.049	0.007	0.041	0.035
Foote Creek Rim, Simpson's Ridge (WY)	0.600	0.978	0.901	0.043	0.549
Buffalo Ridge, Phase I (MN)	7.298	0.303	5.839	10.300	6.371
Buffalo Ridge, Phase II (MN)	8.086	1.997	10.129	4.681	5.713
Buffalo Ridge, Phase III (MN)	6.165	0.942	8.979	0.583	3.352
Condon (OR)	0.014	0.000	0.029	0.000	0.008
Klondike I (OR)	0.000	0.019	0.357	30.125	11.376

1: mean number of birds observed per 20 minute survey

Data other than that for Shepherds Flat were taken from Erickson *et al.* 2002. Use data are given for 20 minute surveys at 800 meters.

Table 9: Avian use and avian mortality at modern wind facilities in the region of the Shepherds Flat project

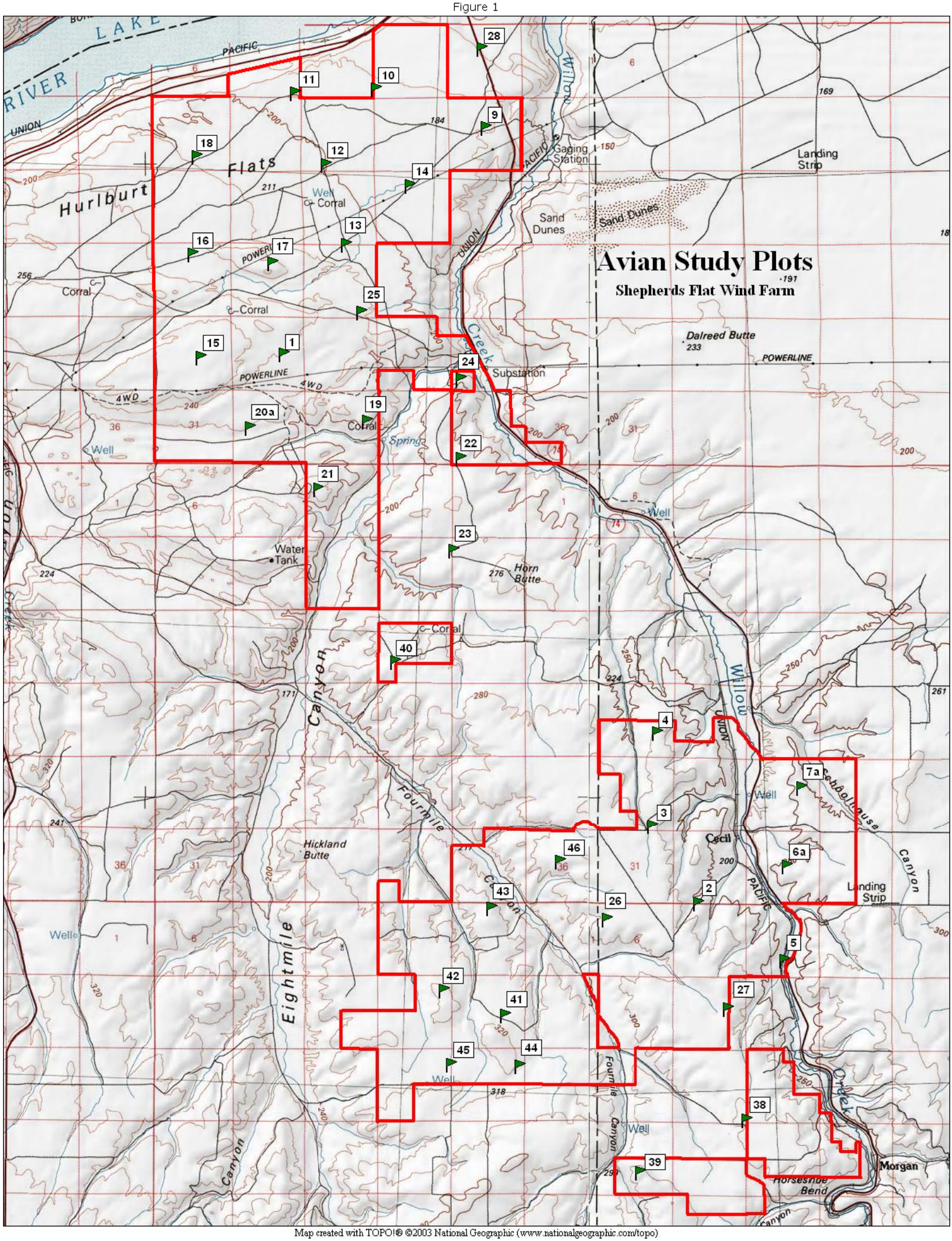
	All birds	
Project	**Use**	**Mortality**
Shepherds Flat (OR)	9.06	na
Vansycle, OR	7.06	0.63
Stateline, OR	8.77	1.93
Combine Hills, OR	4.11	2.56
Nine Canyon (WA)	6.28	3.59
Klondike I	9.34	1.42
	Raptors	
Project	**Use**	**Mortality**
Shepherds Flat (OR)	0.46	na
Vansycle, OR	0.51	0
Stateline, OR	0.41	0.053
Combine Hills, OR	0.61	0
Nine Canyon (WA)	0.27	0.065
Klondike I (OR)	0.42	0

1: mean number of birds observed per 20 minute survey

Data other than that for Shepherds Flat were taken from Young *et al.* 2006. Use data are given for 20 minute surveys at 800 meters.

Figure 1 appears on the next page.

Figure 1



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Date: March 18, 2004
To: Patricia Pilz, Lifeline Renewable Energy, Inc.
From: Rick Welch, Energy Northwest
Subject: Impact determination of tower A01-01 (E5)

Reference: Wildlife Assessment for the Shepherds Ridge Wind Farm, December 2003.

This memorandum provides the results of a study performed to address the proposed location of turbine A01-01 (identified on the most recent maps as E5) and the potential risk to raptor species using this area. Turbine A01-01 represents the northern-most tower of a turbine string extending along a north/south running ridgeline that separates Schoolhouse Canyon from the Willow Creek valley. The ridgeline ends on a point of land overlooking the mouth of Schoolhouse Canyon, approximately 700 meters N/NW of turbine A01-01. Baseline avian use studies indicated that some raptors cut across the ridge to gain access to Schoolhouse Canyon, and that their flight path might be in close proximity to the proposed turbine. Also discussed in the baseline study was the fact that the observation point from which the baseline data were obtained (plot 7A) was sufficiently removed from the location of A01-01 that raptor activity in this area was difficult to define. These findings warranted further investigation prior to final turbine siting. The current study was designed to more accurately identify raptor flight patterns in the vicinity of the proposed turbine to assess if impacts to raptors might occur from constructing the turbine at the currently designated location.

Surveys of raptor activity were performed on March 5, 9, and 17, 2004, from an observation point established at the proposed location of turbine A01-01. Two observers performed continuous monitoring of raptor movement from sunrise to 1100 hours on each survey day, totaling twenty-seven man-hours of observation time. Weather information, including precipitation, cloud cover, wind direction, wind speed, visibility, and temperature, were recorded for each survey period. Time, species identification, number of individuals, distance from observation point when initially observed, closest distance, flight height (initial, minimum, and maximum), and description of behavior were recorded for each observation. In addition, flight patterns of each observation were plotted on a topographic map of the survey area.

A total of forty-seven observations, representing five raptor species, were recorded during the three surveys, with thirteen, eighteen, and sixteen observations being recorded on March 5, 9, and 17, respectively. The five species were golden eagle, red-tailed hawk, rough-legged hawk, northern harrier, and merlin. Forty-three observations (91.5%) had flight paths considered to be at no risk with regards to turbine A01-01 and the remaining turbines comprising the string progressing to the south. Of these forty-three observations, the majority had flight paths that were parallel to the ridge edge. Four observations (8.5%) displayed flight paths cutting across the ridge. Two were located north (250 meters and 300 meters) of the proposed location of A01-01, and two to the south (both 300 meters). The two observations recorded north of A01-01 would also be considered at

no risk due to their location outside the influence of A01-01 and the rest of the turbine string. The two observations recorded south of A01-01 are outside of the influence A01-01 but had flight paths intersecting the turbine string. These could be considered at some risk if they did not alter their path to avoid a turbine.

Results from the current study indicate that the majority of raptor activity in the vicinity of turbine A01-01 is parallel to the ridge, and thus parallel to the proposed turbine string as well. This was also a finding of the baseline study. In addition, the low percentage of raptors observed crossing the ridge suggests a major route or flyway does not exist at this location. Based on these results, we conclude that the proposed location of turbine A01-01 would not adversely impact raptor species using this area.

Wildlife Assessment for the Shepherds Ridge Wind Farm

Prepared for:
LifeLine Renewable Energy, Inc.

Prepared by:
Rick Welch, Environmental Scientist
Energy Northwest Environmental Services

December 2003

Overview

This report summarizes one year of environmental monitoring data collected at Shepherds Ridge Wind Farm, including results of avian use studies, raptor nesting surveys, and ground squirrel and burrowing owl surveys. The subject property (as defined in Reference 1) includes approximately 7,750 acres located near Cecil, in Morrow County, Oregon.

No threatened or endangered avian species were observed during the course of the study, nor were any indications of either burrowing owls or ground squirrels found. Of sensitive avian species, only Swainson's hawks were found in significant numbers. Raptor nesting surveys identified only three active nests within close proximity of the proposed turbine locations. Richness of avian species and mean use estimates were low, similar to those found at other wind conversion facilities in the region. Passerine use was generally lower and raptor use generally higher than observed at other regional facilities. Overall, raptor use was similar to that observed at the Buffallo Ridge Minnesota facility, where only one raptor mortality was found during a four year study.

Adverse avian impacts from construction or operation of the Shepherds Ridge Wind Farm are expected to be low, as generally seen in modern wind conversion facilities. Only one of the proposed turbine locations presents what may be an unusual risk for raptors, which could be ameliorated by turbine micrositing with raptor use in mind.

Methods

Avian Surveys

Northwest Wildlife Consultants (NWC) was responsible for the initial program design as well as performance of the fall study. The methods implemented by NWC were used throughout the study period for consistency purposes. Energy Northwest Environmental Services performed the winter, spring, and summer studies and was responsible for all data interpretation.

Fixed-point circular plots, each with a viewing area approximately 800 m in radius, were used to assess avian use within the project area. Observations were performed during daylight hours, with each plot surveyed for 20 minutes. The number of observations, mean use estimates (number of birds/20 minute survey) and frequency of occurrence estimates (how often a species was observed during a 20 minute survey, expressed as % of surveys) within 800 m were calculated by species and season

Observations were initiated in September 2002 at seven survey plots numbered 2 through 8. Property boundary adjustments following conclusion of the fall study resulted in the deletion of one plot (8) and relocation and re-labeling of two plots (6 and 7, changed to 6A and 7A). Two additional plots (26 and 27) were established prior to the initiation of the winter study to provide coverage for expansion of the project onto the Heidemen property. Information obtained from observations at plot 5 is not included in this analysis because plot 5 was not representative of the habitat type associated with the turbine strings (valley bottom riparian vs. ridge top dry-land wheat) and its viewing area did not encompass any of the turbine locations.

To facilitate comparison of seasonal use estimates from this study with results from other wind projects, designation of seasons are defined as follows:

Fall	August 16 – October 31
Winter	November 1 – March 15
Spring	March 16 – May 15
Summer	May 16 – August 15

In the fall, weekly surveys commenced September 6 and ran through October 28, 2002. Information obtained from observations at plots 2, 3, 4, 6, 7, and 8 was used for assessing this period. A total of 54 surveys were performed during 9 visits. Winter surveys were conducted every other week beginning December 22, 2002 and ending March 5, 2003. Data from plots 2, 3, 4, 6A, 7A, 26, and 27 (Attachment 1) were used to assess the winter period. A total of 42 surveys were performed during 6 visits. Spring surveys were performed on a weekly basis, beginning March 19 and ending May 14, 2003. Data from plots 2, 3, 4, 6A, 7A, 26, and 27 were used to assess the spring period. A total of 56 surveys were performed during 8 visits. In summer, surveys were conducted every other week May 21 through August 14. Data from plots 2, 3, 4, 6A, 7A, 26, and 27 were used to assess the summer period. A total of 49 surveys were performed during 7 visits.

Other assessments

Foot and vehicle raptor nest surveys of the Shepherds Ridge study area were performed on April 17 and May 29, 2003. The project site and a buffer zone of approximately two miles were included in the survey. Habitat and/or structures suitable for nesting, including cliff areas, trees, and power poles, were examined.

Foot surveys were performed near proposed turbine string locations within areas of suitable habitat, including hillsides and field edges, for evidence of activity associated with burrowing owls and ground squirrels. These surveys were performed in conjunction with avian plot surveys. The period of focused observation was from early March through mid-June 2003. Field notes of observations both on and off survey plots were recorded from December 2002 through August 2003. These notes included avian and mammalian observations.

Results

A total of 1344 individual bird sightings were recorded from 201 20-minute point-count surveys conducted from September 6, 2002 through August 14, 2003. Thirty-four species were documented (Table 1). Spring had the highest number of species observed (24), followed by fall (19), summer (18) and winter (12). No threatened or endangered species were observed at any of the study plots. Special status species observed within the study plots include ferruginous hawk, Swainson's hawk, golden eagle, loggerhead shrike, long-billed curlew, and greater sandhill crane.

The mean number of bird species observed per survey (species richness) was highest in the spring (2.4 species/survey), followed by fall (2.2), summer (1.6), and winter (1.3). Avian use was highest in the fall (11 birds/survey), followed by spring (5.9), winter (5.8), and summer (3.3).

Table 1: Number of observations, mean use estimate and frequency of occurrence by species

	Fall (54 surveys)			Winter (42 surveys)			Spring (56 surveys)			Summer (49 surveys)		
Species/Group	**# Obs**	**Use**	**% Freq**	**# Obs**	**Use**	**% Freq**	**# Obs**	**Use**	**% Freq**	**# Obs**	**Use**	**% Freq**
Passerines												
horned lark	325	6.0	80	148	3.5	60	114	2.0	68	72	1.5	61
western meadowlark	24	0.44	24	4	0.095	9.5	33	0.59	45	6	0.12	10
loggerhead shrike	0	0	0	0	0	0	2	0.036	3.6	0	0	0
white-crowned sparrow	2	0.037	1.9	0	0	0	8	0.14	3.6	0	0	0
black-billed magpie	9	0.17	9.3	3	0.071	2.4	1	0.018	1.8	0	0	0
barn swallow	0	0	0	0	0	0	1	0.018	1.8	0	0	0
red-winged blackbird	0	0	0	0	0	0	5	0.089	5.4	11	0.23	4.1
common raven	39	0.72	33	21	0.50	19	5	0.089	8.9	7	0.14	12
bank swallow	0	0	0	0	0	0	0	0	0	4	0.082	8.2
cliff swallow	0	0	0	0	0	0	3	0.054	1.8	0	0	0
unidentified passerine	66	1.2	9.3	0	0	0	1	0.018	1.8	4	0.082	2.0
unidentified swallow	0	0	0	0	0	0	2	0.036	1.8	1	0.020	2.0
western kingbird	0	0	0	0	0	0	1	0.018	1.8	0	0	0
brewer's blackbird	52	0.96	1.9	0	0	0	1	0.018	1.8	2	0.041	2.0
american robin	0	0	0	0	0	0	6	0.11	3.6	0	0	0
lark sparrow	1	0.019	1.9	0	0	0	0	0	0	0	0	0
say's phoebe	2	0.037	3.7	0	0	0	0	0	0	0	0	0
american goldfinch	22	0.41	3.7	0	0	0	0	0	0	0	0	0
house finch	1	0.019	1.9	0	0	0	0	0	0	0	0	0
unidentified finch	5	0.093	1.9	0	0	0	0	0	0	0	0	0
sage thrasher	0	0	0	0	0	0	0	0	0	3	0.061	2.0
unidentified sparrow	2	0.037	1.9	0	0	0	0	0	0	0	0	0
Raptor												
ferruginous hawk	0	0	0	0	0	0	2	0.036	3.6	2	0.041	4.1
swainson's hawk	13	0.24	3.7	0	0	0	14	0.25	18	13	0.27	12
red-tailed hawk	9	0.17	11	2	0.048	4.8	5	0.089	7.1	7	0.14	10
rough-legged hawk	8	0.15	9.3	6	0.14	12	6	0.11	8.9	0	0	0
golden eagle	0	0	0	1	0.024	2.4	4	0.071	7.1	1	0.020	2.0
american kestrel	3	0.056	5.6	2	0.048	4.8	2	0.036	3.6	4	0.082	2.0
northern harrier	4	0.074	7.4	1	0.024	2.4	3	0.054	5.4	2	0.041	4.1
prairie falcon	1	0.019	1.9	2	0.048	4.8	0	0	0	0	0	0
unidentified buteo	0	0	0	0	0	0	2	0.036	3.6	4	0.082	8.2
turkey vulture	0	0	0	0	0	0	0	0	0	1	0.020	2.0
Waterbird												
long-billed curlew	0	0	0	0	0	0	9	0.16	13	9	0.18	8.2
sandhill crane	0	0	0	0	0	0	26	0.46	1.8	0	0	0
unidentified gull	0	0	0	0	0	0	43	0.77	3.6	1	0.020	2.0
Waterfowl												
Mallard	0	0	0	9	0.21	7.1	8	0.14	5.4	2	0.041	2.0
canada goose	4	0.074	1.9	45	1.1	4.8	0	0	0	0	0	0
Upland Gamebird												
California quail	2	0.037	1.9	0	0	0	14	0.25	3.6	0	0	0
Dove												
morning dove	0	0	0	0	0	0	7	0.13	7.1	1	0.020	2.0
rock dove	19	0.35	5.6	0	0	0	0	0	0	2	0.041	2.0
Total	**613**	**11**		**244**	**5.8**		**328**	**5.9**		**159**	**3.3**	

Mean use, percent composition, and frequency of occurrence for avian groups by season were also calculated (Table 2). Waterbird use was influenced greatly by one flock of sandhill crane (26 individuals) and one flock of unidentified gull (38). These two observations, recorded during the spring surveys, account for approximately 82% of the total observations for waterbirds. Waterfowl use in the winter was higher than all other groups except passerines due to one flock of Canada geese (40 individuals) observed at plot 26 in January. This observation accounted for 74% of the waterfowl use recorded during the winter. Raptor use was highest in the fall (0.71 birds/survey), followed by summer (0.69), spring (0.68), and winter (0.34). Raptor mean use for the fall was influenced somewhat by a large group of Swainson's hawks (12 individuals) observed at site 8 on September 11. This event accounted for 92% of the observations for this species for the entire fall period. Passerine use was highest in the fall (10 birds/survey), followed by winter (4.2) and spring (3.3), and lowest in the summer (2.3). Raptors with the highest use within the study area were Swainson's hawk, red-tailed hawk, rough-legged hawk, and northern harrier. Passerines with the highest use were horned lark, western meadowlark, common raven, and Brewer's blackbird.

Table 2: Number of observations, mean use estimate and frequency of occurrence by group

	Fall			Winter			Spring			Summer		
Species/Group	**Use**	**% Comp**	**% Freq**	**Use**	**% Comp**	**% Freq**	**Use**	**% Comp**	**% Freq**	**Use**	**% Comp**	**% Freq**
Passerines	10	90	93	4.2	72	71	3.3	56	89	2.3	69	80
Raptor	0.71	6.2	30	0.34	5.7	24	0.68	12	45	0.69	21	41
Waterbird	0	0	0	0	0	0	1.4	24	18	0.20	6.3	10
Waterfowl	0.070	0.65	1.9	1.3	22	12	0.14	2.4	5.4	0.04	1.3	2.0
Upland Gamebird	0.044	0.33	1.9	0	0	0	0.25	4.3	3.6	0	0	0
Dove	0.35	3.1	5.6	0	0	0	0.13	2.1	7.2	0.06	1.9	4.1
Total	**11**			**5.8**			**5.9**			**3.3**		

Fall

A total of 19 species were identified out of 613 observations. Overall mean use was 11 birds/survey. Horned lark (6.0 birds/survey), unidentified passerine (1.2), Brewer's blackbird (0.96), American goldfinch (0.41), and rock dove (0.35), were the five small bird species with the highest fall use. Common raven (0.72 birds/survey), Swainson's hawk (0.24), black-billed magpie (0.17), red-tailed hawk (0.17), and rough-legged hawk (0.15), were the five large bird species with the highest fall use. Passerines were the most abundant avian group (10 birds/survey), followed by raptors (0.71). Passerines made up 90% of the avian use, followed by raptors at 6.2% and doves at 3.1%. Common raven (33%) had the highest frequency of occurrence for large bird species, followed by red-tailed hawk (11%), black-billed magpie (9.3%), rough-legged hawk (9.3%), northern harrier (7.4%), and American kestrel (5.6%). Horned lark (80%) and western meadowlark (24%) were the two small bird species observed during more than ten percent of the surveys. Passerines were observed during 93% of the surveys, followed by raptors at 30% and doves at 5.6%. Waterfowl and upland game-birds were observed during less than 5% of the surveys.

Winter

During the winter, 12 species were identified out of 244 total observations. Overall mean use was 5.8 birds/survey. Horned lark (3.5 birds/survey) and western meadowlark (0.095) were the only small bird species observed during the winter. Canada goose (1.1 birds/survey), common raven (0.50), mallard duck (0.21), and rough-legged hawk (0.14), were the four large bird species with the highest winter use. Passerines were the most abundant avian group (4.2 birds/survey), followed by waterfowl (1.3) and raptors (0.34). Passerines made up 72% of the avian use, followed by waterfowl (22%) and raptors (5.7%). Common raven (19%) had the highest frequency of occurrence for large bird species, followed by rough-legged hawk (12%), mallard duck (7.1%), red-tailed hawk (4.8%), American kestrel (4.8%), prairie

falcon (4.8%), and Canada goose (4.8%). Horned lark (60%) and western meadowlark (9.5%) had the highest frequency of occurrence for small bird species. Passerines were observed during 71% of the surveys, followed by raptors (24%) and waterfowl (12%).

Spring

In spring, 24 species were identified out of 328 total observations. Overall mean use was 5.9 birds/survey. Horned lark (2.0 birds/survey), western meadowlark (0.59), white-crowned sparrow (0.14), American robin (0.11), and red-winged blackbird (0.089) were the small bird species with the highest spring use. Unidentified gull (0.77 birds/survey) had the highest spring use for large birds, followed by sandhill crane (0.46), California quail (0.25), Swainson's hawk (0.25), long-billed curlew (0.16), and mallard duck (0.14). Passerines were the most abundant avian group (3.3 birds/survey), followed by waterbirds (1.4) and raptors (0.68). Passerines made up 56% of the avian use, followed by waterbirds (24%) and raptors (12%). Swainson's hawk (18%) had the highest frequency of occurrence for large bird species, followed by long-billed curlew (13%), common raven (8.9%), rough-legged hawk (8.9%), red-tailed hawk (7.1%), and golden eagle (7.1%). Horned lark (68%) and western meadowlark (45%) were the two small bird species with a frequency of occurrence greater than 10%. Passerines were observed during 89% of the surveys, followed by raptors (45%) and waterbirds (18%).

Summer

During summer surveys, 18 species were identified out of 159 total observations. Overall mean use was 3.3 birds/survey. Horned lark (1.5 birds/survey), red-winged blackbird (0.23), and western meadowlark (0.12) were the three small bird species with the highest summer use. Swainson's hawk (0.27 birds/survey) had the highest summer use for large birds, followed by long-billed curlew (0.18), common raven (0.14), and red-tailed hawk (0.14). Passerines were the most abundant avian group (2.3 birds/survey), followed by raptors (0.69). Passerines made up 69% of the avian use, followed by raptors (21%). Common raven (12%) and Swainson's hawk (12%) had the highest frequency of occurrence for large bird species during the summer period, followed by red-tailed hawk (10%), unidentified buteo (8.2%), and long-billed curlew (8.2%). Horned lark (61%), western meadowlark (10%), and bank swallow (8.2%) were the only small bird species with frequencies greater than 5%. Passerines were observed during 80% of the surveys, with raptors at 41%.

Other Surveys

Suitable nesting habitat is scarce in the project area. Nesting activity was very low, with only three active and one inactive nest sites being identified. All three active nests were occupied by red-tailed hawks. Two of the nests were located in the Willow Creek valley, with the nearest nest approximately 0.3 miles east of the nearest proposed turbine string. The other nest is located in Fourmile Canyon and is approximately 0.5 miles west of the nearest proposed turbine string. Other nests in the area include a common raven nest approximately 5.5 miles south of the project along Fourmile Canyon Road, and a golden eagle and red-tailed hawk nest in metal power-line towers approximately 7.0 miles to the north of the project boundary.

Surveys of habitat suitable for burrowing owls and ground squirrels showed no evidence of activity associated with these species. No indications of the presence of these species were found in the area of the proposed facility during the spring period of focused observation, nor were any found during the balance of the year. Evidence of agricultural pests, such as pocket gophers, was encountered.

Discussion

Comparisons to other sites

Passerine use at Shepherds Ridge was compared to other wind conversion facilities in the region. Use was higher than found at Nine Canyon and Zintel Canyon wind projects during the fall, and lower than Nine Canyon and Zintel Canyon in the winter, spring, and summer (References 2 and 3).

Mean raptor use estimates for Shepherds Ridge Wind Farm were compared to raptor use estimates from several different wind projects in and outside of the Pacific Northwest (Reference 4). Winter use estimates were not included in the comparison because of the reduced survey period at Shepherds Ridge. Raptor use at Shepherds Ridge was similar to Buffalo Ridge Reference Area for spring and fall periods, and Buffalo Ridge Phase II and Foote Creek Rim for summer. Raptor use was lower at Shepherds Ridge than at Buffalo Ridge Phase II, Foote Creek Rim, and Columbia Hills in the spring and fall. Fall, spring, and summer use was higher at Shepherds Ridge than at Condon, Klondike, and Nine Canyon. For study areas within agricultural landscapes, mean raptor use at Shepherds Ridge appears to be most similar to the Buffalo Ridge projects.

General observations of raptors

Raptor use was fairly uniform throughout the study area, with slight differences being associated with individual species. Golden eagles and northern harriers were more often observed at plots located on the east side of the study area, whereas American kestrels and rough-legged hawks were more common at plots located on the west side. Red-tailed hawks and Swainson's hawks were distributed fairly evenly throughout the study area.

Plots of flight paths of raptors during winter, spring, and summer periods (seasons for which information was available), indicate that the majority of observations were associated with the edges or rims of the ridges. Of the 86 raptor observations, 66 (76.7%) fell within this definition and the majority of these had flight paths that were parallel to the ridge edge. For all raptor observations, 75% had flight paths considered to have a very low probability of intersecting proposed turbine strings, 19% were observed in the area of the proposed strings, and 6% were moderately close to proposed turbine strings.

Conclusion

The primary goal of the ecological studies conducted at Shepherds Ridge Wind Farm was to estimate the potential for an adverse impact from the project on the avian community, specifically raptors and special status species. Results of the avian use studies indicate relatively low use and diversity in the project area. Only 34 species were identified during the yearlong study, and mean number of species observed per survey was low for all seasons. Wind plant-related risks to threatened or endangered species appears to be extremely low in the Shepherds Ridge area, as none were observed during the entire study year. Swainson's hawk was the only sensitive species occurring in the area with numbers sufficient to warrant discussion.

Passerines are the most common group of birds killed at new generation wind plants, although the number is considered insignificant when compared to the overall annual avian collision mortality estimate (Reference 4). Mortality for passerines at Shepherds Ridge is expected to be low based on the relatively low mean use estimate for this group. Waterbirds and waterfowl occur in such low numbers within the project area that low mortality is expected for these groups as well. Raptors are usually considered the primary group of interest when assessing impacts related to wind projects. Raptor use estimates at Shepherds Ridge are similar to raptor use estimates for the Buffalo Ridge wind project in Minnesota.

Raptor mortality at all new generation wind plants located in agricultural areas has been very low; only one mortality was recorded during a four-year study at Buffalo Ridge (Reference 4). Another factor indicating low potential for raptor impact is that the majority of the observations of raptors at Shepherds Ridge were concentrated near ridge edges, with the majority of flight patterns parallel to both the ridges and proposed turbine strings.

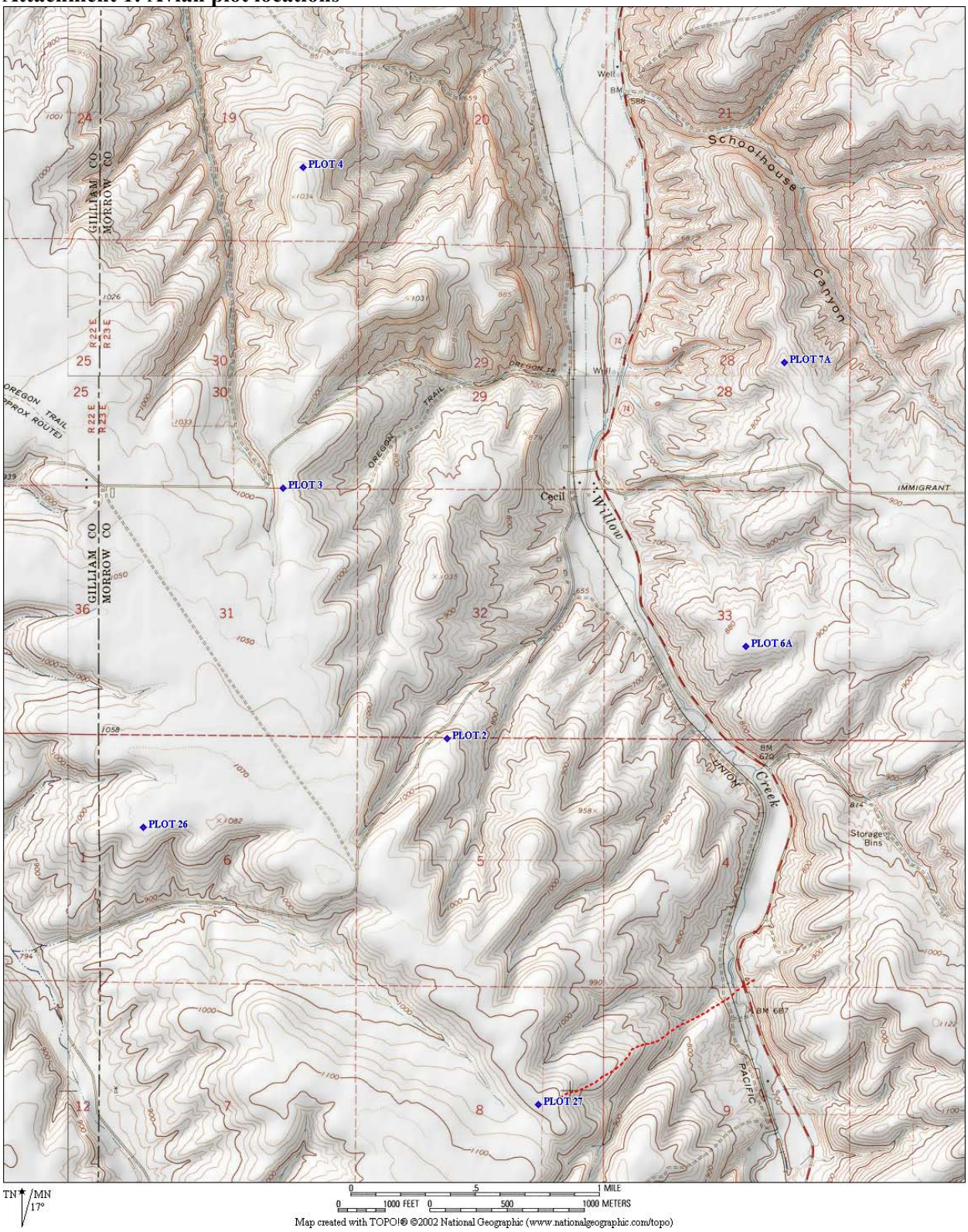
Only one area warrants special attention – the turbine designated A 01-01. Review of flight patterns in this area indicates that some raptors cut across this point to gain access to Schoolhouse Canyon. Their flight path is close to or over the proposed location of the turbine; the survey site is sufficiently distant to make an exact determination difficult. This may not present a significant risk, since the presence of the turbine string could result in an alteration of raptor flight path. However, we suggest that final micrositing of this turbine take avian usage into consideration.

Low nesting density and the scarcity of nesting structures in and near the project site suggests low potential for raptor breeding mortality. The potential for an adverse impact from the project on burrowing owls and ground squirrels appears to be very low as well, as specific foot surveys and yearlong avian surveys revealed no observations of nor activity associated with these species. From these avian use studies, raptor nesting surveys and surveys of special status species, we conclude that adverse impacts from the construction and operation of the Shepherds Ridge Wind Farm on the avian community and on special status species would be low.

References:

1. Preliminary Findings of Fact, Conditional Use Request, Application No. CUP-N-192
2. Wildlife Baseline Study for the Nine Canyon Wind Project, West, Inc.
3. Ecological Baseline Study for the Zintel Canyon Wind Project, West, Inc.
4. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments, West, Inc.

Attachment 1: Avian plot locations



Vegetative Characteristics of the Shepherds Flat Wind Farm

Prepared for:

LifeLine Renewable Energy, Inc.

Prepared by:

Steven O. Link Ph.D.[†], Richard E. Welch,

Randy M. Hermann, and Terry E. Northstrom Ph.D.

Environmental Solutions[†] and

Energy Northwest Environmental Services

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Introduction

At the request of LifeLine Renewable Energy, Inc., a preliminary assessment of the vegetative characteristics of a proposed wind power conversion facility site was conducted in preparation for environmental regulatory reviews. The study area, known as the Shepherds Flat Wind Farm, is located in north-central Oregon between the City of Arlington and Heppner Junction, immediately south of the Columbia River. Shepherds Flat Wind Farm is comprised of two distinct areas: the northern property, which includes Hurlburt Flats, Eightmile Canyon, and Horn Butte; and the southern or Cecil area property. This study focused on a portion of the northern property situated north and west of Eightmile Canyon, including Hurlburt Flats and the area immediately north and south of Rhea Road. Eightmile Canyon and the Horn Butte area were not included in this assessment.

Climatically, this area can be classified as arid to semiarid with low precipitation, hot dry summers, and cold winters. Annual precipitation averages 23.1 cm (9.1 in), with the majority of the precipitation occurring in the late fall and winter periods (November through February). According to the Western Regional Climate Center (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?orarli) maximum temperatures usually occur in July (monthly average highs 32.8° C (91° F)), and minimum temperatures in January (monthly average lows –2.2° C (28° F)).

Traditional use of the study area has been for the grazing of sheep. Discussions with the current landowner indicate that grazing of the property has been an annual event since approximately 1917. Typically, sheep are brought in from their summer range in mid- to late November and remain on the property until mid-January, at which time they are transported to the ranch headquarters for lambing operations. The sheep are returned to the property in mid- to late February and remain until mid- to late May.

Vegetation surveys were performed at nine locations within the array of proposed wind power generator sites. At each survey site, a representative area was selected and characterized by identifying all species present, determining species frequency and determining percent cover of species and other cover categories. The sites were classified into associations commonly described in the Columbia Basin (Daubenmire 1970). Species were grouped into native and invasive alien species to create a measure of rangeland condition. The presence of noxious weeds and other plants of concern were described. The conclusions drawn from the study are subject to the conditions of the study. Late fall allows for identification of a subset of the flora of the area. An examination at other times of the year would reveal most if not all of the species present in the study area.

Materials and Methods

The study area was visited on November 25 and December 5, 2002. Nine (9) survey sites were selected (Figure 1) and characterized by: 1) identifying all species present, and 2) determining species frequency and percent cover of plant species and other cover categories (litter, soil, soil cryptogam, and feces). Photographs were taken of each area.

A species inventory was developed by inspecting a circular area (approximately 200 m in diameter) at each survey site. Unknown species were collected for later identification using Hitchcock and Cronquist (1973). Specific epithets follow current convention (http://plants.usda.gov/).

Each survey site was selected as being representative of the general area. A 100 m tape was placed on the ground and rebar driven into the ground at each end of the tape. A red flag was also driven into the ground at each end for future reference. Species frequencies were determined by placing a 0.1 m^2 metal rectangular frame every 5 m along the tape for a total of 21 observations. In each frame, all species were identified and recorded. Even though the plot size is relatively small, it represents a widely accepted method of assigning a level of native plant abundance within each site. The exact location of the frame was recorded for future repeated measures if needed.

Cover was estimated by identifying what was present at each 1 m hash mark on the tape (Bonham 1989). If the plant was above the hash mark then it was recorded. Otherwise, the first recognizable entity directly below the hash mark was identified. The entities included vascular plant species, litter, soil, feces, and soil cryptogams. Litter is defined as plant material that was broken off and lying on the ground or was too small to recognize as still attached or broken. Standing dead vegetation was identified to species.

Results and Discussion

There were a total of 36 species identified at the nine (9) survey sites. Of these, 25 (69%) are native (Table 1). The identification of a few species was tentative because of the time of year that sampling was conducted. This is noted with 'cf' in the species names in Table 1.

Table 1. Plant species found at the Shepherds Flat Wind Farm.

Family *Species*	**Common Name**	**Native or Alien**	**Life cycle**	**Life form**
Boraginaceae				
Cryptantha cf *pterocarya*	Winged cryptantha	Native	annual	herb
Caryophyllaceae				
Holosteum umbellatum	Jagged chickweed	Alien	annual	herb
Chenopodiaceae				
Salsola kali	Russian thistle	Alien	annual	herb
Compositae				
Antennaria dimorpha	Low pussytoes	Native	perennial	herb
Artemisia tridentata	Big sagebrush	Native	perennial	shrub
Centaurea diffusa	Diffuse knapweed	Alien	annual/biennial	herb
Centaurea solstitialis	Yellow starthistle	Alien	annual/biennial	herb
Chrysothamnus viscidiflorus	Green rabbitbrush	Native	perennial	shrub
Cirsium undulatum	Wavy-leaved thistle	Native	perennial	herb

Family *Species*	**Common Name**	**Native or Alien**	**Life cycle**	**Life form**
Conyza canadensis	Horseweed	Native	annual	herb
cf *Crocidium multicaule*	Spring gold	Native	annual	herb
Ericameria nauseosa	Gray rabbitbrush	Native	perennial	shrub
Gutierrezia sarothrae	Matchbrush	Native	perennial	shrub
Lactuca serriola	Prickly lettuce	Alien	annual	herb
Tragopogon dubius	Salsify	Alien	annual	herb
Cruciferae				
Descurainia pinnata	Pinnate tansymustard	Native	annual/biennial	herb
Draba verna	Spring-whitlow grass	Alien	annual	herb
Sisymbrium altissimum	Tumblemustard	Alien	annual	herb
Cupressaceae				
Juniperus occidentalis	Western juniper	Native	perennial	tree
Geraniaceae				
Erodium cicutarium	Redstem storksbill	Alien	annual	herb
Graminae				
Agropyron cf *dasytachyum*	Thick-spike wheatgrass	Native	perennial	grass
Bromus tectorum	Cheatgrass	Alien	annual	grass
Elymus elymoides	Bottlebrush squirreltail	Native	perennial	bunchgrass
Hesperostipa comata	Needle-and-thread grass	Native	perennial	bunchgrass
Poa secunda	Sandberg's bluegrass	Native	perennial	bunchgrass
Pseudoroegneria spicata	Bluebunch wheatgrass	Native	perennial	bunchgrass
Taeniatherum caput-medusae	Medusa head	Alien	annual	grass
Vulpia cf *octoflora*	Six-weeks fescue	Native	annual	grass
Leguminosae				
Astragalus purshii	Wooly-pod milkvetch	Native	perennial	herb
Lupinus sp.	Lupine	Native	perennial	herb
Liliaceae				
Calochortus macrocarpus	Mariposa lily	Native	perennial	herb
Onagraceae				
Epilobium paniculatum	Tall willowherb	Native	annual	herb
Polemoniaceae				
Phlox longifolia	Longleaf phlox	Native	perennial	subshrub
Polygonaceae				
Eriogonum cf *strictum*	Buckwheat	Native	perennial	subshrub
Rosaceae				
Purshia tridentata	Bitterbrush	Native	perennial	shrub
Santalaceae				
Comandra umbellata	Bastard toadflax	Native	perennial	herb

There are approximately 20 vascular plant species listed as federal and/or state species of interest at various levels of concern for Gilliam and Morrow counties (Oregon Natural Heritage Program 2001) that potentially could occur on the property. None were observed at or near any of the survey sites.

There are three species listed by the Oregon Department of Agriculture (http://oda.state.or.us/plant/weed_control/index.html) as noxious weeds on the property. They are *Centaurea diffusa* (diffuse knapweed), *Centaurea solstitialis* (yellow starthistle), and *Taeniatherum caput-medusae* (medusa head). All are listed as 'B' designated weeds. 'B' designated weeds are weeds of economic importance which are regionally abundant, but which may have limited distribution in some counties. *Centaurea solstitialis* is also listed as a type 'T' species. 'T' designated weeds are priority noxious weeds designated by the State Weed Board as target weed species on which the Department will implement statewide management plans. *Centaurea solstitialis* is not yet common on the property, being observed at only two sites. While *Bromus tectorum* (cheatgrass) is not listed as a noxious weed, it is very invasive and is considered a cause for increased fire frequency (Whisenant 1990). It should be noted, however, that cheatgrass makes up a large portion of the available forage for the sheep which now graze the property during the fall, winter and spring months of the year. A native species that is of some risk to the property is *Gutierrezia sarothrae* (matchbrush). This species is near the northern limit of its recognized geographic distribution in the West (Hitchcock and Cronquist 1973). It is often found in rangelands and presents a potential poisoning problem to cattle and sheep (Whitson *et al*. 1992).

The species composition at each survey site is presented in Table 2. *Bromus tectorum* and *Poa secunda,* which are common grasses, were found at each site while *Artemisia tridentata* (big sagebrush) was only found at two sites. *Artemisia tridentata* is becoming less common in this region because of frequent exposure to fire, which it cannot tolerate. A number of native species were only found at one site. The percent of species that are native ranged from 55 to 82% across the sites. Species richness ranged from 11 to 23 species among sites.

Table 2. Species present (1) or absent (0) at each survey site.

Family *Species*	**Site**								
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
Boraginaceae									
Cryptantha cf *pterocarya*	0	0	1	0	0	1	1	1	1
Caryophyllaceae									
Holosteum umbellatum	1	1	1	1	1	1	1	1	1
Chenopodiaceae									
Salsola kali	0	0	1	1	0	0	0	0	0
Compositae									
Antennaria dimorpha	0	0	0	0	1	0	1	0	0
Artemisia tridentata	0	0	0	0	1	0	0	1	0
Centaurea diffusa	0	0	1	1	0	0	0	0	1
Centaurea solstitialis	0	0	0	0	0	0	0	1	1
Chrysothamnus viscidiflorus	1	0	0	0	0	0	0	0	0
Cirsium undulatum	1	1	1	1	1	1	1	1	1
Conyza canadensis	0	0	0	1	0	0	0	0	0
cf *Crocidium multicaule*	0	0	1	1	0	0	1	1	0

Family *Species*	**Site**								
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
Ericameria nauseosa	1	1	1	1	1	1	1	1	1
Gutierrezia sarothrae	1	1	1	1	1	1	1	1	1
Lactuca serriola	0	0	0	1	0	0	1	1	0
Tragopogon dubius	0	0	1	1	1	0	1	0	1
Cruciferae									
Descurainia pinnata	0	0	0	0	0	1	0	1	1
Draba verna	1	1	1	1	1	1	1	1	1
Sisymbrium altissimum	0	0	1	1	0	0	0	1	0
Cupressaceae									
Juniperus occidentalis	0	0	0	0	1	0	1	1	0
Geraniaceae									
Erodium cicutarium	0	0	0	0	0	0	0	0	1
Graminae									
Agropyron cf *dasytachyum*	1	0	0	0	0	0	0	0	0
Bromus tectorum	1	1	1	1	1	1	1	1	1
Elymus elymoides	0	0	0	1	0	1	0	1	1
Hesperostipa comata	1	1	1	0	1	1	1	1	1
Poa secunda	1	1	1	1	1	1	1	1	1
Pseudoroegneria spicata	0	1	1	1	1	1	1	1	1
Taeniatherum caput-medusae	0	0	1	1	1	0	1	1	1
Vulpia cf *octoflora*	0	1	1	1	1	1	1	1	1
Leguminosae									
Astragalus purshii	0	0	0	0	0	0	0	0	1
Lupinus sp.	0	0	0	0	0	1	0	0	1
Liliaceae									
Calochortus macrocarpus	1	0	0	1	1	1	1	0	1
Onagraceae									
Epilobium paniculatum	1	1	1	1	1	1	1	1	1
Polemoniaceae									
Phlox longifolia	0	0	0	0	0	0	0	0	1
Polygonaceae									
Eriogonum cf *strictum*	0	0	0	0	1	0	0	0	0
Rosaceae									
Purshia tridentata	0	0	0	0	0	1	0	0	0
Santalaceae									
Comandra umbellata	0	0	0	0	1	0	0	0	0
Species richness	**12**	**11**	**18**	**20**	**19**	**17**	**19**	**21**	**23**
Percent native	**75**	**73**	**56**	**55**	**74**	**82**	**68**	**71**	**65**

Species frequency is a measure of how widely distributed and common species are across the nine survey sites (Table 3). *Bromus tectorum* (cheatgrass) was found in all but two of the 189 plots in the study area and is the most common plant on the property. *Holosteum umbellatum*, *Draba verna*, and the unknown forb were also very common. It is likely that the unknown forb is *Holosteum umbellatum* and/or *Draba verna*. Both of these species are very small annuals and easily overlooked. *Poa secunda* is the most common native plant and perennial. Each site can be ordered on the relative frequency of native and alien species. Native species are often considered characteristic of high quality lands having few invasive species and at lower risk of fire (Whisenant 1990). The highest rating of quality would be where every native species in a study area was found in all sample plots. None of these sites exceeded 13% in native species frequency. Site 03 had the highest average native frequency, at 12.9%, while site 06 had the lowest, at 5.2%.

Table 3. Species frequency within each survey site. Values are the percentage of species occurrence in the twenty-one 0.1 m^2 plots surveyed at each site.

Species	**Site**								
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
Bromus tectorum	90	100	100	100	100	100	100	100	100
Poa secunda	100	100	86	52	81	29	71	100	95
Unknown forb	62	95	100	90	48	95	95	100	95
Holosteum umbellatum	90	81	90	90	57	95	95	100	100
Draba verna	67	38	67	81	29	71	24	62	62
Vulpia cf *octoflora*	0	19	67	0	43	19	19	0	33
Hesperostipa comata	0	43	43	0	0	0	0	0	0
cf *Crocidium multicaule*	0	0	14	14	0	0	14	10	0
Taeniatherum caput-medusae	0	0	0	95	0	0	0	62	0
Pseudoroegneria spicata	0	0	0	0	57	0	19	5	0
Epilobium paniculatum	0	0	14	0	0	5	5	0	0
Gutierrezia sarothrae	0	0	0	14	0	5	14	0	5
Cryptantha cf *pterocarya*	0	0	0	19	0	10	0	0	0
Sisymbrium altissimum	0	0	0	10	0	5	0	0	0
Descurainia pinnata	0	0	0	0	0	5	0	5	0
Erodium cicutarium	0	0	0	0	0	0	0	0	43
Agropyron cf *dasytachyum*	19	0	0	0	0	0	0	0	0
Elymus elymoides	0	0	0	0	0	0	0	0	10
Conyza Canadensis	0	0	0	5	0	0	0	0	0
Lupinus sp.	0	0	0	0	0	0	0	0	5
Centaurea diffusa	0	0	0	0	0	0	0	0	5
Phlox longifolia	0	0	0	0	0	0	0	0	5
Average native frequency	**8.5**	**11.6**	**16**	**7.4**	**12.9**	**5.2**	**10.1**	**8.6**	**10.9**
Average alien frequency	**38.6**	**39.3**	**44.6**	**58.3**	**29.3**	**45.7**	**39.3**	**53**	**50.6**

Percent cover of each plant species and other cover category is the relative amount of the ground covered by the species or category. Just as *Bromus tectorum* had the greatest frequency across sites, it also had the greatest cover of any species across sites. Species were grouped into native and alien classes to provide another means of ordering sites. Site 05 had the greatest percent cover of native species while site 08 had the lowest. A measure of good condition is the sum of native vegetation, soil, and soil cryptogam percent cover, while poor condition is the sum of alien vegetation and litter cover. A high value for poor condition would indicate a site at relatively high risk of fire. A site is in poor condition if the percent cover of alien species and litter is greater than 50%. Site 05 had high good cover as well as site 03. Site 08 had the lowest good cover value. Photographs and plant association classifications for each site are presented in Figures 2 – 10.

Table 4. Percent cover of species and other classes at the nine survey sites.

Species/Cover Classes	Site								
	01	02	03	04	05	06	07	08	09
Bromus tectorum	9	26	8	27	23	42	45	68	54
Poa secunda	34	25	29	1	8	3	7	7	11
Litter	30	24	10	36	12	30	26	15	18
Soil	21	16	11	5	1	11	4	1	3
Unknown forb	3	4	15	11	2	4	1	1	1
Agropyron cf *dasytachyum*	3	0	0	0	0	0	0	0	0
Feces	1	0	0	0	0	1	1	0	0
Hesperostipa comata	0	4	14	0	0	0	2	0	0
Pseudoroegneria spicata	0	1	0	0	28	3	8	0	1
Vulpia cf *octoflora*	0	0	12	5	26	3	1	0	5
Sisymbrium altissimum	0	0	1	0	0	0	0	0	0
Holosteum umbellatum	0	0	1	0	0	0	0	0	0
Taeniatherum caput-medusae	0	0	0	10	0	0	4	5	0
Elymus elymoides	0	0	0	1	0	0	0	1	0
Gutierrezia sarothrae	0	0	0	5	0	0	1	2	2
Epilobium paniculatum	0	0	0	0	1	1	0	0	0
Cryptantha cf *pterocarya*	0	0	0	0	0	1	0	0	0
Ericameria nauseosa	0	0	0	0	0	2	0	0	1
Soil cryptogam	0	0	0	0	0	0	1	1	2
Erodium cicutarium	0	0	0	0	0	0	0	0	1
Native species	**37**	**30**	**55**	**12**	**63**	**13**	**19**	**10**	**20**
Alien species	**12**	**30**	**25**	**48**	**25**	**46**	**50**	**74**	**56**
Good condition (native + soil + soil cryptogam)	**59**	**46**	**66**	**17**	**64**	**25**	**25**	**12**	**25**
Poor condition (alien + litter)	**42**	**54**	**35**	**84**	**37**	**76**	**76**	**89**	**75**

Summary and Conclusion

Overall, 36 plant species were identified with approximately 69 percent of these being native. No federal and/or state rare, threatened, or endangered species were found in or near the survey

sites. Three species designated as noxious weeds were identified on the property, although in limited distribution. The most common noxious weed was *Taeniatherum caput-medusae* (medusa head), being present at six sites but identified in only three sites for cover classification and two sites for species frequency. The least common noxious weed, but probably most important because of its "priority" rating, was *Centaurea solstitialis* (yellow starthistle), being present at two sites but not identified in any plots for species frequency or cover classification. *Bromus tectorum* (cheatgrass) was the most common species encountered in the assessment area; it had the greatest average frequency and average percent cover across all nine sites. *Poa secunda* (Sandberg's bluegrass) was the most common native species. Alien species demonstrated consistently higher frequencies of occurrence than native species at all sites. The lowest average alien frequency (29.3 % at Site 05) was considerably higher than the highest average native frequency (16.0 % at Site 03). Six of the nine sites were rated in poor condition with respect to cover classes, with five of the six sites being dominated by alien species and producing values characteristic of sites at high risk of fire.

Daubenmire (1970) defines shrub-steppe as "a physiognomic subdivision of steppe (perennial grassland) in which there are conspicuous (but discontinuous) layers of shrubs." Shrub-steppe would be characterized by a shrub layer composed primarily of *Artemisia tridentata*, and an understory of perennial grasses, dominated by *Pseudoroegneria spicata* and *Poa secunda* and perennial forbs. Annual grasses and forbs would be represented as minor components. Geographically, the plant community in the assessment area would fall within the *Artemisia tridentata/ Pseudoroegneria spicata* (formerly *Agropyron spicatum*) zonal association. The plant species identified at the nine survey sites are generally representative of the shrub-steppe communities described by Daubenmire. However, the current land use practices and wildfires have altered the climax vegetation presently found in the area.

The property studied in this assessment has a history of land-use practices related to grazing activities dating back to at least the early 1900's and potentially as far back as the late 1800's. This activity, along with wildfire, has played an important role in sculpting the vegetative community now in existence in the study area. Grazing tends to eliminate the larger perennial grasses, particularly *Pseudoroegneria spicata*, and to increase annual grasses, particularly *Bromus tectorum*. Fire seriously affects the dominant shrub, *Artemisia tridentata*, as it is fire sensitive and can be completely eliminated from an area (Franklin and Dyrness, 1973).

Data from this study demonstrate that all sites within the study area have been impacted to various degrees by disturbances related to grazing activities and wildfire events. The distribution of alien species (specifically *Bromus tectorum*), the presence of noxious weeds, and the relative absence of the dominant native species common to the *Artemisia tridentata/Pseudoroegneria spicata* community, are indicative of successional changes brought about by these disturbances. As a result, typical native shrub-steppe habitat, as defined in the classical sense, is largely absent from the study area.

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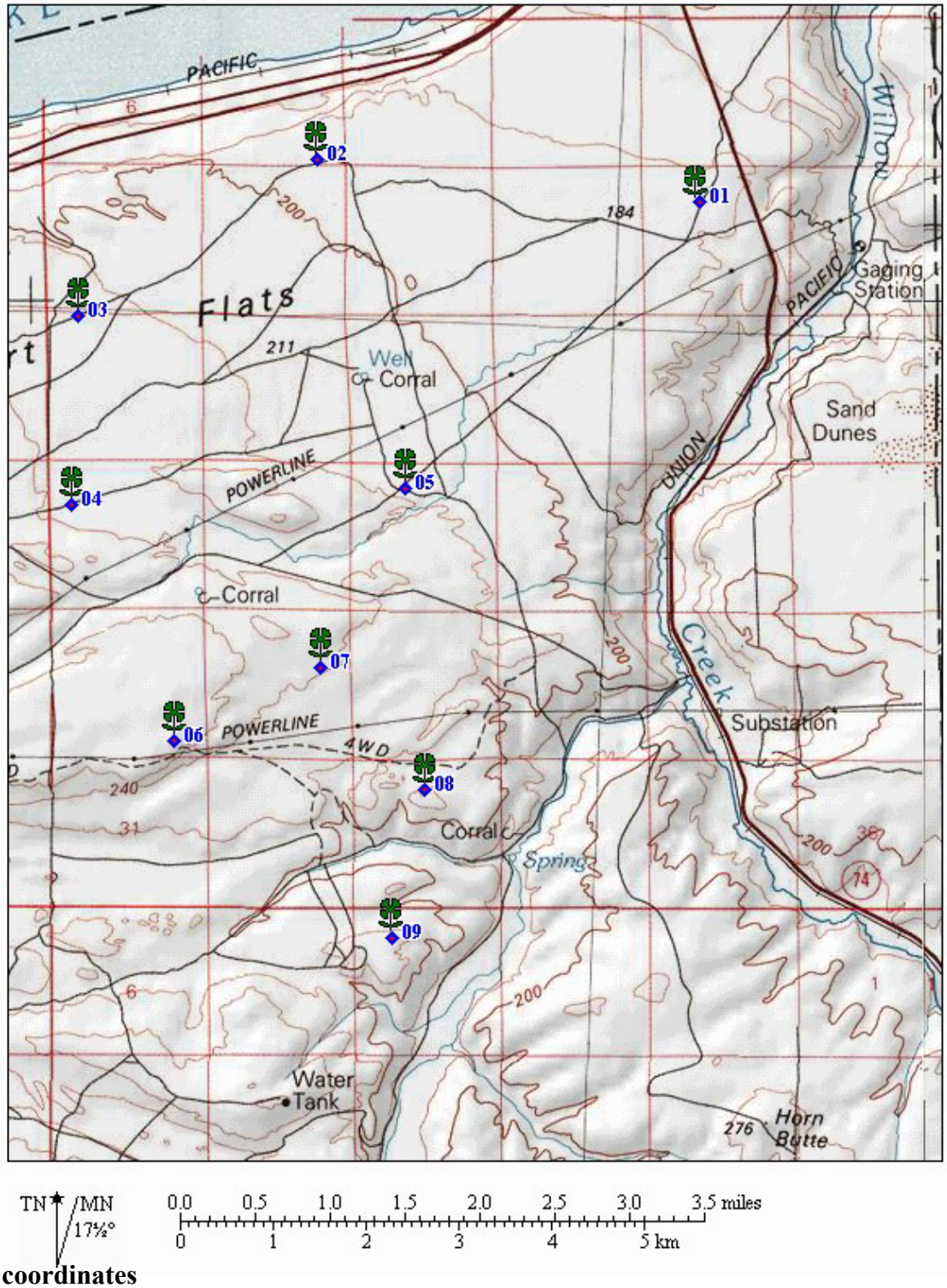

GPS coordinates

01 730778mE 5071597mN	**02** 726614mE 5071901mN	**03** 724065mE 5070110mN
04 724072mE 5068068mN	**05** 727692mE 5068367mN	**06** 725289mE 5065532mN
07 726848mE 5066401mN	**08** 728028mE 5065101mN	**09** 727727mE 5063483mN

Figure 1. Shepherds Flat Wind Farm vegetation survey sites.

Figure 2. Site 01, classified as a *Poa secunda – Bromus tectorum* association.

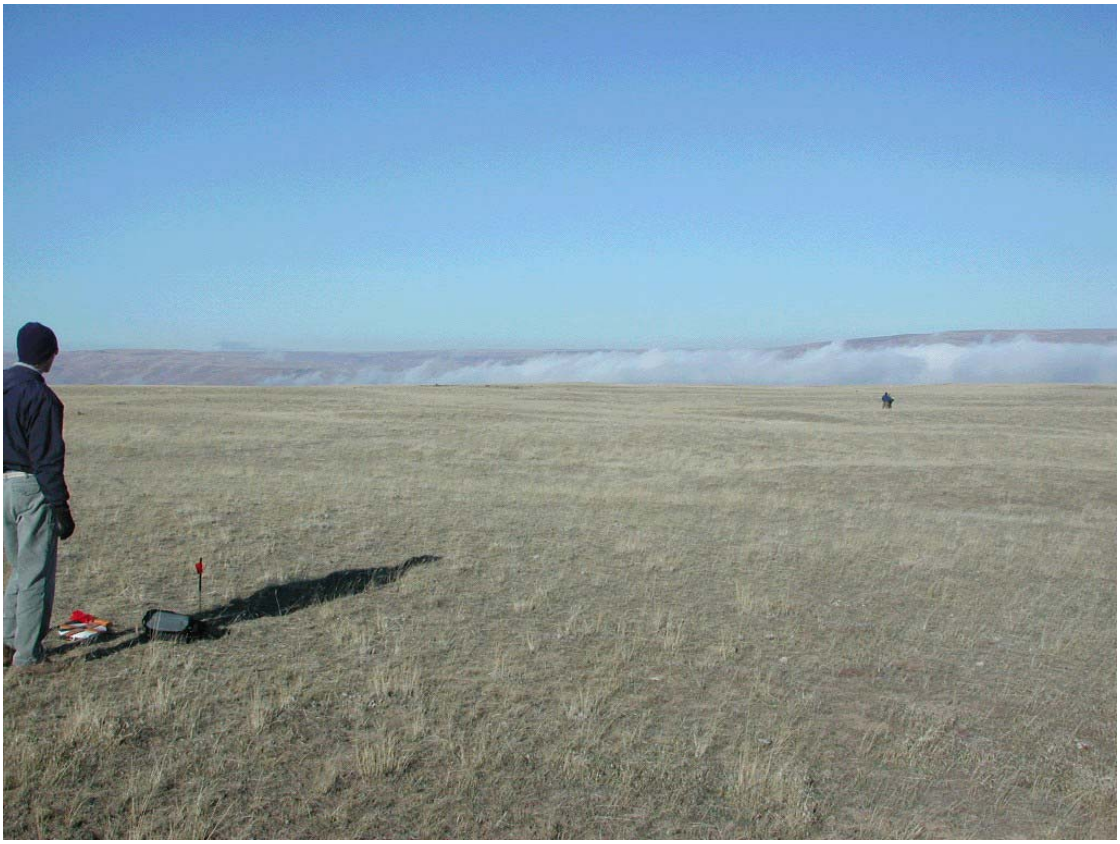

Figure 3. Site 02, classified as a *Hesperostipa comata – Poa secunda – Bromus tectorum* association.

Figure 4. Site 03, classified as a *Hesperostipa comata – Poa secunda – Bromus tectorum* association.

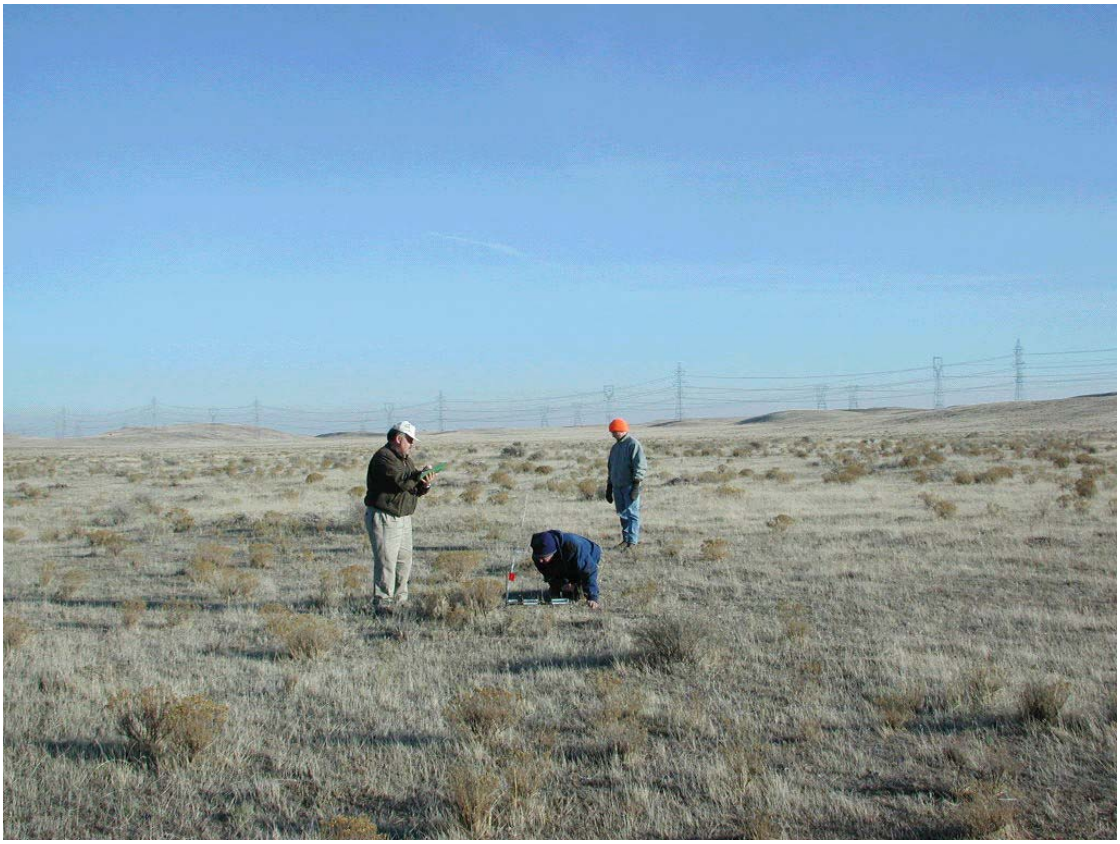

Figure 5. Site 04, classified as a *Gutierrezia sarothrae – Bromus tectorum* - *Taeniatherum caput-medusae* association.

Figure 6. Site 05, classified as a *Pseudoroegneria spicata – Bromus tectorum - Poa secunda* association.

Figure 7. Site 06, classified as a *Bromus tectorum – Gutierrezia sarothrae* association.

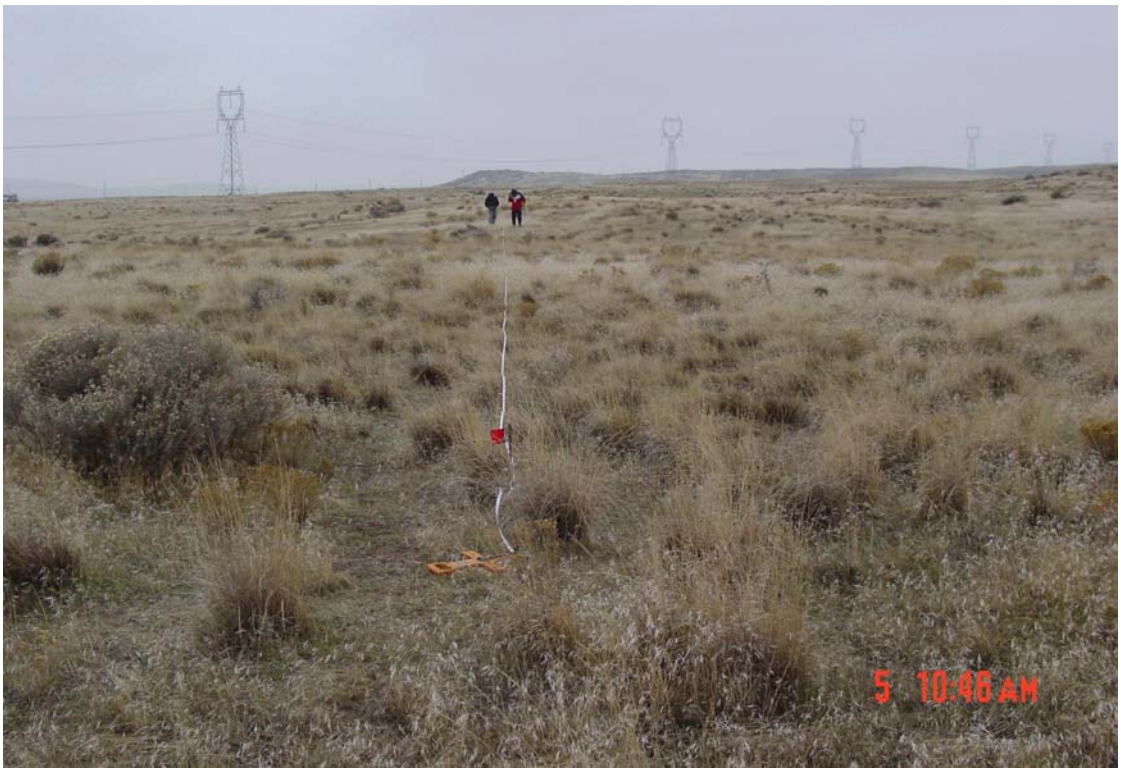

Figure 8. Site 07, classified as a *Pseudoroegneria spicata – Bromus tectorum - Poa secunda* association.

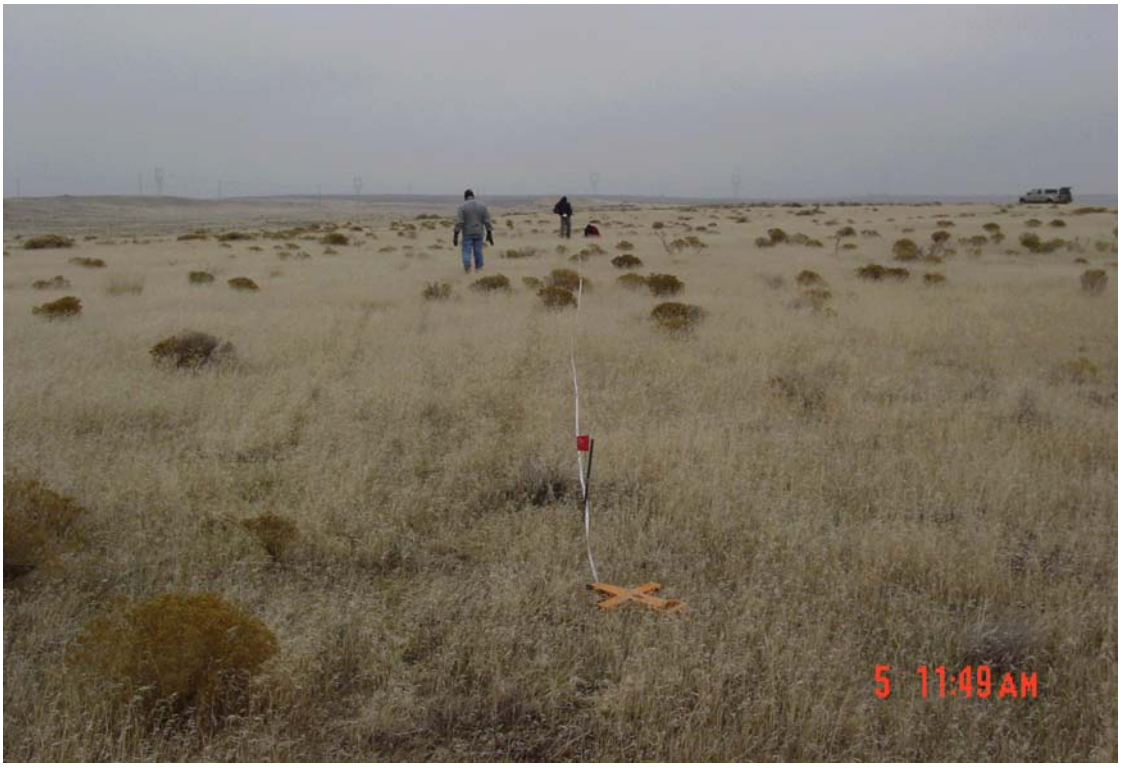

Figure 9. Site 08, classified as a *Gutierrezia sarothrae - Poa secunda - Bromus tectorum* association.

Figure 10. Site 09, classified as a *Bromus tectorum* - *Poa secunda* association with *Gutierrezia sarothrae*.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

Reply To: 8330.8931(02)
File Name: Sp893.wpd
TS Number: 02-6754

August 2, 2002

Patricia Pilz
Life Line Renewable Energy, Inc.
656 San Miguel Way
Sacramento, CA 95819-

Subject: Arlington Wind Plant Project
USFWS Reference # (1-7-02-SP-893)

Dear Ms. Pilz:

This is in response to your Species List Request Form, dated July 18, 2002, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Arlington Wind Plant Project in Gilliam County. The U.S. Fish and Wildlife Service (Service) received your correspondence on July 18, 2002.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Arlington Wind Plant Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Bonneville Power Administration (BPA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, BPA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 402.12.

If BPA determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, BPA is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

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Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published June 13, 2002, in the Federal Register (Vol. 67, No. 114, 40657) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, BPA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, BPA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages BPA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Stacy Sroufe at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact National Marine Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,

John Marshall

Acting for Kemper M. McMaster
State Supervisor

Attachments
1-7-02-SP-893

cc: OFWO-ES
ODFW (nongame)
Sarah McNary BPA

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE ARLINGTON WIND PLANT PROJECT
1-7-02-SP-893

LISTED SPECIES[1/]

Birds		
Bald eagle[2/]	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Middle Columbia River)[3/]	*Oncorhynchus mykiss*	**T
Steelhead (Upper Columbia River)[4/]	*Oncorhynchus mykiss*	** E
Steelhead (Snake River Basin)[4/]	*Oncorhynchus mykiss*	** T
Sockeye salmon	*Oncorhynchus nerka*	CH **E
Salmon River tributary to the Snake River, Idaho.		
Chinook salmon (Upper Columbia River)[5/]	*Oncorhynchus tshawytscha*	** E
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River spring/summer runs		
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River fall runs		

PROPOSED SPECIES

None

CANDIDATE SPECIES

Mammals	
Washington ground squirrel[6/]	*Spermophilus washingtoni*
Birds	
Yellow-billed cuckoo[7/]	*Coccyzus americanus*
Plants	
Northern wormwood	*Artemisia campestris* ssp. *wormskioldii*

SPECIES OF CONCERN

Mammals	
Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*

<u>Birds</u>	
Western burrowing owl	*Athene cunicularia hypugea*
Ferruginous hawk	*Buteo regalis*
Willow flycatcher	*Empidonax trailli adastus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
<u>Amphibians and Reptiles</u>	
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
<u>Fish</u>	
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorhynchus mykiss gibbsi*
<u>Plants</u>	
Laurence's milk-vetch	*Astragalus collinus* var. *laurentii*
Disppearing monkeyflower	*Mimulus evanescens*
Little mousetail	*Myosurus minimus* ssp. *apus* (=var. *sessiliflorus*)

(E) - Listed Endangered	*(T) - Listed Threatened*	*(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered	*(PT) - Proposed Threatened*	*(PCH) - Critical Habitat has been proposed for this species*
(S) - Suspected	*(D) - Documented*	

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

** *Consultation with National Marine Fisheries Service may be required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, <u>Endangered and Threatened</u> <u>Wildlife and Plants</u>, 50 CFR 17.11 and 17.12*

2/ *Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle*

3/ *Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead*

4/ *Federal Register Vol. 62, No. 159, August 18, 1997, Final Rule-Upper Columbia and Snake River Steelhead*

5/ *Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon*

6/ *Federal Register Vol. 66, No. 210, October 30, 2001, Notice of Review - Candidate or Proposed Animals and Plants*

7/ *Federal Register Vol. 66, No. 143, July 25, 2001, 12-Month Finding for a Petition To List the Yellow-billed Cuckoo*

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects[1]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

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[1] A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332. (2)c). On projects other that construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

Reply To: 8330.9971(02)
File Name: Sp997.wpd
TS Number: 02-7612

September 17, 2002

Amanda Pilz
Life Line Renewable Energy, Inc.
656 San Miguel Way
Sacramento, CA 95819

Subject: Shepherds Flat Wind Farm Project
USFWS Reference # (1-7-02-SP-997)

Dear Ms. Pilz:

This is in response to your letter, dated September 3, 2002, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Shepherds Flat Wind Farm Project in Gilliam County. The U.S. Fish and Wildlife Service (Service) received your correspondence on September 3, 2002.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Shepherds Flat Wind Farm Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Bonneville Power Administration (BPA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, BPA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 402.12.

If BPA determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, BPA is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published June 13, 2002, in the Federal Register (Vol. 67, No. 114, 40657) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, BPA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, BPA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages BPA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Stacy Sroufe at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact National Marine Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,

Willa Nehlsen

for Kemper M. McMaster
State Supervisor

Attachments
1-7-02-SP-997

cc: OFWO-ES
ODFW (nongame)
Sarah McNary BPA

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE SHEPHERDS FLAT WIND FARM PROJECT
1-7-02-SP-997

LISTED SPECIES[1/]

Birds		
Bald eagle[2/]	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Middle Columbia River)[3/]	*Oncorhynchus mykiss*	**T
Steelhead (Upper Columbia River)[4/]	*Oncorhynchus mykiss*	** E
Steelhead (Snake River Basin)[4/]	*Oncorhynchus mykiss*	** T
Sockeye salmon	*Oncorhynchus nerka*	CH **E
Salmon River tributary to the Snake River, Idaho.		
Chinook salmon (Upper Columbia River)[5/]	*Oncorhynchus tshawytscha*	** E
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River spring/summer runs		
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River fall runs		

PROPOSED SPECIES

None

CANDIDATE SPECIES

Mammals	
Washington ground squirrel[6/]	*Spermophilus washingtoni*
Birds	
Yellow-billed cuckoo[7/]	*Coccyzus americanus*

SPECIES OF CONCERN

Mammals	
Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
Birds	
Western burrowing owl	*Athene cunicularia hypugea*
Ferruginous hawk	*Buteo regalis*
Willow flycatcher	*Empidonax trailli adastus*

Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
<u>Amphibians and Reptiles</u>	
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
<u>Fish</u>	
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorhynchus mykiss gibbsi*
<u>Plants</u>	
Laurence's milk-vetch	*Astragalus collinus* var. *laurentii*
Disppearing monkeyflower	*Mimulus evanescens*
Little mousetail	*Myosurus minimus* ssp. *apus* (=var. *sessiliflorus*)

(E) - Listed Endangered	*(T) - Listed Threatened*	*(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered	*(PT) - Proposed Threatened*	*(PCH) - Critical Habitat has been proposed for this species*
(S) - Suspected	*(D) - Documented*	

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

** *Consultation with National Marine Fisheries Service may be required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, <u>Endangered and Threatened</u> <u>Wildlife and Plants</u>, 50 CFR 17.11 and 17.12*

2/ *Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle*

3/ *Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead*

4/ *Federal Register Vol. 62, No. 159, August 18, 1997, Final Rule-Upper Columbia and Snake River Steelhead*

5/ *Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon*

6/ *Federal Register Vol. 66, No. 210, October 30, 2001, Notice of Review - Candidate or Proposed Animals and Plants*

7/ *Federal Register Vol. 66, No. 143, July 25, 2001, 12-Month Finding for a Petition To List the Yellow-billed Cuckoo*

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects[1]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

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SFWAPPDoc2

APPLICATION

FOR A SITE CERTIFICATE FOR THE

SHEPHERDS FLAT WIND FARM

PREPARED FOR

OREGON ENERGY FACILITY SITING COUNCIL

AMENDED FEBRUARY 2007

PREPARED BY

CAITHNESS SHEPHERDS FLAT, LLC

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ACRONYMS AND ABBREVIATIONS

Applicant	Caithness Shepherds Flat, LLC
CFR	Code of Federal Regulations
Council	Oregon Energy Facility Siting Council
Department	Oregon Department of Energy
DEQ	Oregon Department of Environmental Quality
NOI	Applicant's Notice of Intent to Apply for a Site Certificate
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statute
SFWF	Shepherds Flat Wind Farm
WTG	Wind turbine generator

EXHIBIT A

APPLICANT INFORMATION

Information about the applicant and participating persons, including:

(A) The name and address of the applicant including all co-owners of the proposed facility, the name, mailing address and telephone number of the contact person for the application, and if there is a contact person other than the applicant, the name, title, mailing address and telephone number of that person;

(B) The contact name, address and telephone number of all participating persons, other than individuals, including but not limited to any parent corporation of the applicant, persons upon whom the applicant will rely for third-party permits or approvals related to the facility, and, if known, other persons upon whom the applicant will rely in meeting any facility standard adopted by the Council.

(C) If the applicant is a corporation, it shall give:

(i) The full name, official designation, mailing address and telephone number of the officer responsible for submitting the application;
(ii)The date and place of its incorporation;
(iii) A copy of its articles of incorporation and its authorization for submitting the application; and
(iv) In the case of a corporation not incorporated in Oregon, the name and address of the resident attorney-in-fact in this state and proof of registration to do business in Oregon.

(D) If the applicant is a wholly owned subsidiary of a company, corporation, or other business entity, in addition to the information required by paragraph (C), it shall give the full name and business address of each of the applicant's full or partial owners;

(E) If the applicant is an association of citizens, a joint venture or a partnership, it shall give:

(i) The full name, official designation, mailing address and telephone number of the person responsible for submitting the application;
(ii) The name, business address and telephone number of each person participating in the association, joint venture or partnership and the percentage interest held by each;
(iii) Proof of registration to do business in Oregon;
(iv) A copy of its articles of association, joint venture agreement or partnership agreement and a list of its members and their cities of residence; and
(v) If there are no articles of association, joint venture agreement or partnership agreement, the applicant shall state that fact over the signature of each member;

(F) If the applicant is a public or governmental entity, it shall give:

(i) The full name, official designation, mailing address and telephone number of the person responsible for submitting the application; and
(ii) Written authorization from the entity's governing body to submit an application;

(G) If the applicant is an individual, the individual shall give his or her mailing address and telephone number;

APPLICANT INFORMATION

Name and address of applicant:	Caithness Shepherds Flat, LLC c/o Caithness Corporation 565 Fifth Avenue, 29th Floor New York, NY 10017
Date of formation:	June 29, 2006
Place of formation:	Delaware
Contact person for applicant:	Derrel A. Grant Caithness Shepherds Flat, LLC c/o Caithness Corporation 565 Fifth Avenue, 29th Floor New York, NY 10017 (212) 921-9099
Contact person for application:	Patricia Pilz 656 San Miguel Way Sacramento, CA 95819 (916) 456-7651
Applicant is wholly-owned by:	Caithness Energy, L.L.C. c/o Caithness corporation 565 Fifth Avenue, 29th Floor New York, NY 10017 (212) 921-9099
Person responsible for submitting application:	Christopher McCallion Executive Vice President Chief Financial Officer Caithness Shepherds Flat, LLC 565 Fifth Avenue, 29th Floor New York, NY 10017 (212) 921-9099
Affidavit as to truth and accuracy:	Included in Attachment A
Authorization for submitting application:	Included in Attachment A
Proof of registration to do business in Oregon:	Included in Attachment A

Oregon attorney-in-fact:	Corporation Service Company 285 Liberty Street, N.E. Salem, OR 97301
Applicant's limited liability company agreement:	Included in Attachment A

EXHIBIT B

DESCRIPTION OF PROPOSED FACILITY

Information about the proposed facility, construction schedule and temporary disturbances of the site, including:

(A) A description of the proposed energy facility, including as applicable:

(i) Major components, structures and systems, including a description of the size, type and configuration of equipment used to generate electricity and useful thermal energy;

(ii) A site plan and general arrangement of buildings, equipment and structures;

(iii) Fuel and chemical storage facilities, including structures and systems for spill containment;

(iv) Equipment and systems for fire prevention and control;

(v) Structures, systems and equipment for waste management and waste disposal, including, to the extent known, the amount of wastewater the applicant anticipates and the applicant's plans for disposal of wastewater and storm water. If the applicant has submitted any permit applications to the Office, as described in OAR 345-021-0000(4), that contain this information, the applicant may copy relevant sections of those documents into this exhibit or include in this exhibit cross-references to the relevant sections of those documents;

(vi) For thermal power plants and electric generating facilities producing energy from wind, solar or geothermal energy:

(I) A discussion of the source, quantity, availability, and energy content of all fuels (Btu, higher heating value) or the wind, solar or geothermal resource used to generate electricity or useful thermal energy. For the purpose of this subparagraph, "source" means the coal field, natural gas pipeline, petroleum distribution terminal or other direct source;

(II) Fuel cycle and usage including the maximum hourly fuel use at net electrical power output at average annual conditions for a base load gas plant and the maximum hourly fuel use at nominal electric generating capacity for a non-base load power plant or a base load gas plant with power augmentation technologies, as applicable;

(III) The gross capacity as estimated at the generator output terminals for each generating unit. For a base load gas plant, gross capacity is based on the average annual ambient conditions for temperature, barometric pressure and relative humidity. For a non-base load plant, gross capacity is based on the average temperature, barometric pressure and relative humidity at the site during the times of year when the facility is intended to operate. For a baseload gas plant with power augmentation, gross capacity in that mode is based on the average temperature, barometric pressure and relative humidity at the site during the times of year when the facility is intended to operate with power augmentation.

(IV) A table showing a reasonable estimate of all on-site electrical loads and losses greater than 50 kilowatts, including losses from on-site transformers, plus a factor for incidental loads, that are required for the normal operation of the plant when the plant is at its designed full power operation.

(V) Process flow, including power cycle and steam cycle diagrams to describe the energy flows within the system;

(VI) Equipment and systems for disposal of waste heat;

(VII) The maximum number of hours per year and energy content (Btu per year, higher heating value) of alternate fuel use;

(VIII) The nominal electric generating capacity;

(IX) The fuel chargeable to power heat rate;

(vii) For transmission lines, the rated voltage, load carrying capacity, and type of current;

(viii) For pipelines, the operating pressure and delivery capacity in thousand cubic feet per day;

(ix) For surface facilities related to underground gas storage, estimated daily injection and withdrawal rates, horsepower compression required to operate at design injection or withdrawal rates, operating pressure range and fuel type of compressors; and

(x) For facilities to store liquefied natural gas, the volume, maximum pressure, liquefication and gasification capacity in thousand cubic feet per hour;

(B) A description of major components, structures and systems of each related or supporting facility;

(C) The approximate dimensions of major facility structures and visible features;

(D) If the proposed energy facility is a pipeline or a transmission line or has, as a related or supporting facility, a transmission line or pipeline that, by itself, is an energy facility under the definition in ORS 469.300, a corridor selection assessment explaining how the applicant selected the corridor(s) for analysis in the application. In the assessment, the applicant shall evaluate the corridor adjustments the office has described in the project order, if any. The applicant may select any corridor for analysis in the application and may select more than one corridor. However, if the applicant selects a new corridor, then the applicant must explain why the applicant did not present the new corridor for comment at an informational meeting under OAR 345-015-0130. In the assessment, the applicant shall discuss the reasons for selecting the corridor(s), based upon evaluation of the following factors:

(i) Least disturbance to streams, rivers and wetlands during construction;

(ii) Least percentage of the total length of the pipeline or transmission line that would be located within areas of Habitat Category 1, as described by the Oregon Department of Fish and Wildlife;

(iii) Greatest percentage of the total length of the pipeline or transmission line that would be located within or adjacent to public roads, as defined in ORS 368.001, and existing pipeline or transmission line rights-of-way;

(iv) Least percentage of the total length of the pipeline or transmission line that would be located within lands that require zone changes, variances or exceptions;

(v) Least percentage of the total length of the pipeline or transmission line that would be located in a protected area as described in OAR 345-022-0040;

(vi) Least disturbance to areas where historical, cultural or archaeological resources are likely to exist; and

(vii) Greatest percentage of the total length of the pipeline or transmission line that would be located to avoid seismic, geological and soils hazards;

(viii) Least percentage of the total length of the pipeline or transmission line that would be located within lands zoned for exclusive farm use;

(E) For the corridor(s) the applicant selects under paragraph (D) and for any related or supporting facility that is a pipeline or transmission line, regardless of size:

(i) The length of the pipeline or transmission line;
(ii) The proposed right-of-way width of the pipeline or transmission line, including to what extent new right-of way will be required or existing right-of-way will be widened;
(iii) If the proposed corridor follows or includes public right-of-way, a description of where the facility would be located within the public right of way, to the extent known. If the applicant might choose to located all or part of the facility adjacent to but not within the public right-of way, describe the reasons the applicant would use to justify locating the facility outside the public right-of-way. The applicant must include a set of clear and objective criteria and a description of the type of evidence that would support locating the facility outside the public right-of-way, based on those criteria.
(iv) The diameter and location, above or below ground, of each pipeline; and
(v) A description of transmission line structures and their dimensions;

(F) A construction schedule including the date by which the applicant proposes to begin construction and the date by which the applicant proposes to complete construction. Construction is defined in OAR 345-001-0010. The applicant shall describe in this exhibit all work on the site that the applicant intends to begin before the Council issues a site certificate. The applicant shall include an estimate of the cost of that work. For the purpose of this exhibit, "work on the site" means any work within a site or corridor, other than surveying, exploration or other activities to define or characterize the site or corridor, that the applicant anticipates or has performed as of the time of submitting the application;
(G) A map showing all areas that may be temporarily disturbed by any activity related to the design, construction and operation of the proposed facility;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit B as follows:

> All paragraphs apply except (A)(viii), (A)(ix), (A)(x) and (D).
> [Applicant] must provide specifications on all turbine types that might be used at the SFWF (if specific turbine types are not known, [Applicant] must provide information on the range of turbine types that might be used). Specifications include: peak generating capacity, turbine hub height in meters, rotor diameter in meters, maximum sound power level (and octave band data), overall weight of metals in the tower and nacelle per turbine in net (U.S.) tons, estimated cubic yards of concrete per turbine in the tower foundation to a depth of three feet below grade (that is, the concrete in the foundation above that depth) and the maximum diameter of the foundation. If the project might include more than one size of turbine (generating capacity), [Applicant] must state the maximum number of turbines in each turbine size that would be built.
> [Applicant] must include a physical description and description of the location of all components of the facility (turbines, met towers, access roads, transmission lines

(including collector lines), substations, operations and maintenance buildings). Corridors for turbine strings, access roads and transmission lines may be defined by GPS coordinates and a distance from centerline. [Applicant] must describe any improvement or modification of existing structures, including roads.

FACILITY DESCRIPTION

Caithness Shepherds Flat, LLC (Applicant) proposes the construction of a wind power generation facility in Gilliam and Morrow Counties, Oregon. The facility, the Shepherds Flat Wind Farm (SFWF) will contain up to 303 wind turbine generators (WTGs), with a nameplate generating capacity of from 696.9 megawatts (MW) to 909 MW, depending of the turbine selected. The location of the SFWF, and its site plan, may be found in Exhibit C to this Application.

Facility components include:

- three hundred three wind turbines
- ten meteorological towers
- an interconnected electrical system
- a facility communications system
- sixty eight miles of new project roads
- two facility substations

Wind Turbines

Several WTGs are under consideration for the facility, and their specifications, as known, are included in the following table:

Specification		Siemens SWT-2.3-93	Clipper 2.5 MW Liberty	Vestas V90	GE Energy 2.5xl
Peak Generating Capacity (kW)		2,300	2,500	3,000	2,500
Hub Height (meters)		80	80	105	100
Rotor Diameter (meters)		93	96	90	100
Maximum Sound Power Level		na	na	na	na
Octive Band Data		na	na	na	na
Weight of Tower (US tons)		179	na	314	na
Weight of Nacelle (US tons)		90	na	77	na
Maximum Diameter of Turbine Foundation		na	na	na	na
Concrete in Tower Foundation		na	na	na	na
Maximum Number of Turbines		303	303	303	303
Nameplate Facility Capacity (MW)		696.9	757.5	909	757.5

na=not available at this time

The three-bladed wind turbines are the most prominent structures of the proposed facility, with a total height at the highest point of blade rotation of 415 to 492 feet. Their component parts are discussed below:

Foundations

Turbine foundations are excavated to a depth of approximately 35 feet (as conditions warrant). A donut-shaped concrete ring is poured, anchor bolts are set into the ring, and after the concrete cures the center of the donut is back-filled with soil. Excavation for the foundation will be required at each turbine site, and blasting may be required in some locations. A portion of the excavated material may be used as fill for road and site grading, and the remaining material will be stockpiled at the turbine site while the concrete foundations are poured and cured. The stockpiled material will be properly protected with coverings, and the surrounding area will be protected with fences, hay bales, and other barriers to contain sediment flow. Once the foundations have properly cured, the excavated material will be used as backfill around and above the foundations. The area that will be exposed at the surface will be only slightly larger than the diameter of the tower base. A pad-mounted transformer will be installed next to the base of each tower. The transformer will require a concrete pad that will be approximately 10 feet by 12 feet.

Towers

The tower of the wind turbine supports the nacelle and the rotor. The total height of the tower, to the hub of the rotor blades, is from 262 to 344 feet. Towers are made of heavy rolled steel and are fabricated off-site. The towers are conical with their diameter increasing towards the bottom for strength. Each of three to four tower sections includes flanges on both ends, and they are bolted together on-site. The towers feature a locked entry door just above ground level, and house internal control and communication electronics. An internal maintenance access ladder with safety platforms provides entry to the nacelle. The towers are smooth, with no avian perch opportunities, are neutral in color, and have a non-reflective finish.

Nacelles and Generators

The nacelle, located at the top of the tower, houses the key operating components of the wind turbine, including the gearbox and the electrical generator that transforms motion into electricity. Each turbine is equipped with a yaw system, which uses electrical motors to turn the nacelles and rotors into the wind. The yaw mechanism is operated by an electrical controller, which receives the wind direction from an anemometer mounted atop the nacelle. The anemometer constantly checks the wind speed and direction, and sends signals to a pitch actuator to adjust the angle of the blades to capture the energy from the wind in the most efficient manner. Service personnel enter the nacelles from the tower.

Rotors

Each wind turbine has three rotor blades, each constructed of one piece of fiberglass or fiberglass composite. Blades are from 150 to 164 feet in length. Ground clearance of the blades, when the tips are closest to the ground, from 100 to 160 feet. Blades are finished with a smooth white outer surface. At the peak of energy production, the blades will turn at approximately 17 – 22 rpm.

Blades and nacelles are fabricated off-site and shipped to the project location. Blades will be attached to the nacelle on the ground and raised, with the nacelle, into position with a crane. Should adjustments be required, blades can be temporarily removed from the turbine and rotated or replaced.

Meteorological Towers

There will be ten permanent, unguyed, meteorological towers (weather stations) located within the facility site. Anemometers located at different heights on the towers will relay information back to the off-site control center via the communication system.

Electrical System

Pad-mounted step-up transformers will be located at the base of each wind turbine to raise the voltage of the electricity generated. The electricity will then be transmitted to the interconnect point of the utility system.

Wind turbines generate low voltage electricity. Low voltage cables installed underground carry the power from the base of the wind turbine tower to its step-up transformer, which is installed on a concrete foundation (or pad). The pad-mounted step-up transformers raise the voltage from 575 volts or 4,160 volts (depending on the technology selected) to 34.5 kilovolts (kV). Medium voltage (34.5 kV) collector cables connect the step-up transformers and then carry the power to one of two facility substations.

The underground cables will be installed in a trench of a depth of approximately three to four feet that will generally run along the edge of the project roads. Depending on terrain, collection cables may become overhead lines.

Communication System

Turbine control and monitoring systems use communications lines, which are either copper lines (similar to telephones lines) or fiber optic lines. These lines run underground parallel with the low and medium voltage power collection lines.

Project Access Roads

A network of roads will be required to operate and maintain the wind turbines. Project access roads will be finished to single-lane width, have a compacted base of native soil, and will be graveled to a depth of four to six inches. Final road base and construction plans will be adapted to conditions at the site. During construction, the temporary disturbance-width of project access roads may be up to 50 feet. After construction is complete, project access roads will be finished for long-term use. Vehicle turnouts for construction and operations and maintenance vehicles at turbine pads—typically graveled to a depth of four inches depending on soil conditions—will be located at the base of each turbine. Project access roads will interconnect with each other, and will be available for use by both project staff and the landowner.

Substations

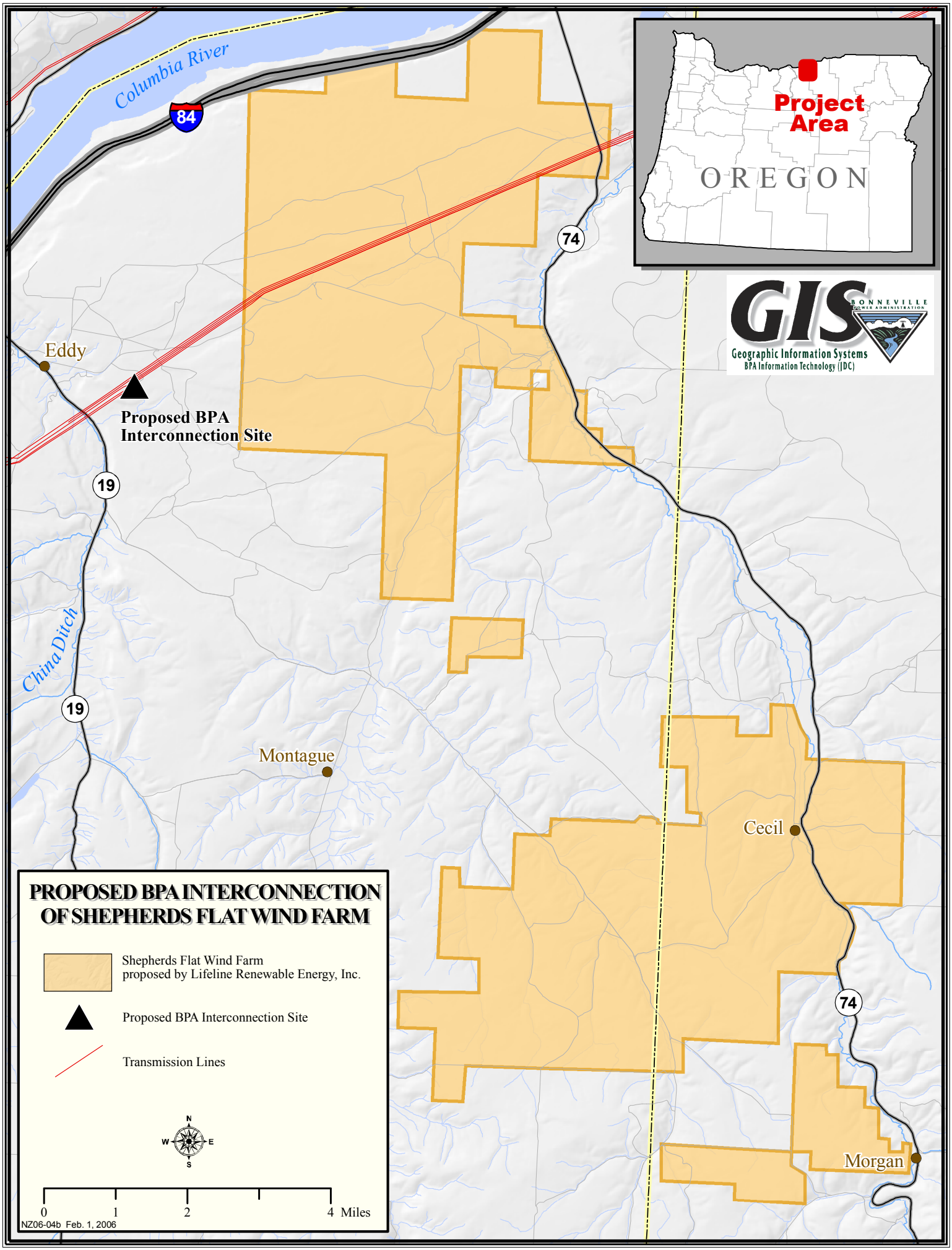
Two facility substations are proposed: one each in the northern and southern project areas.

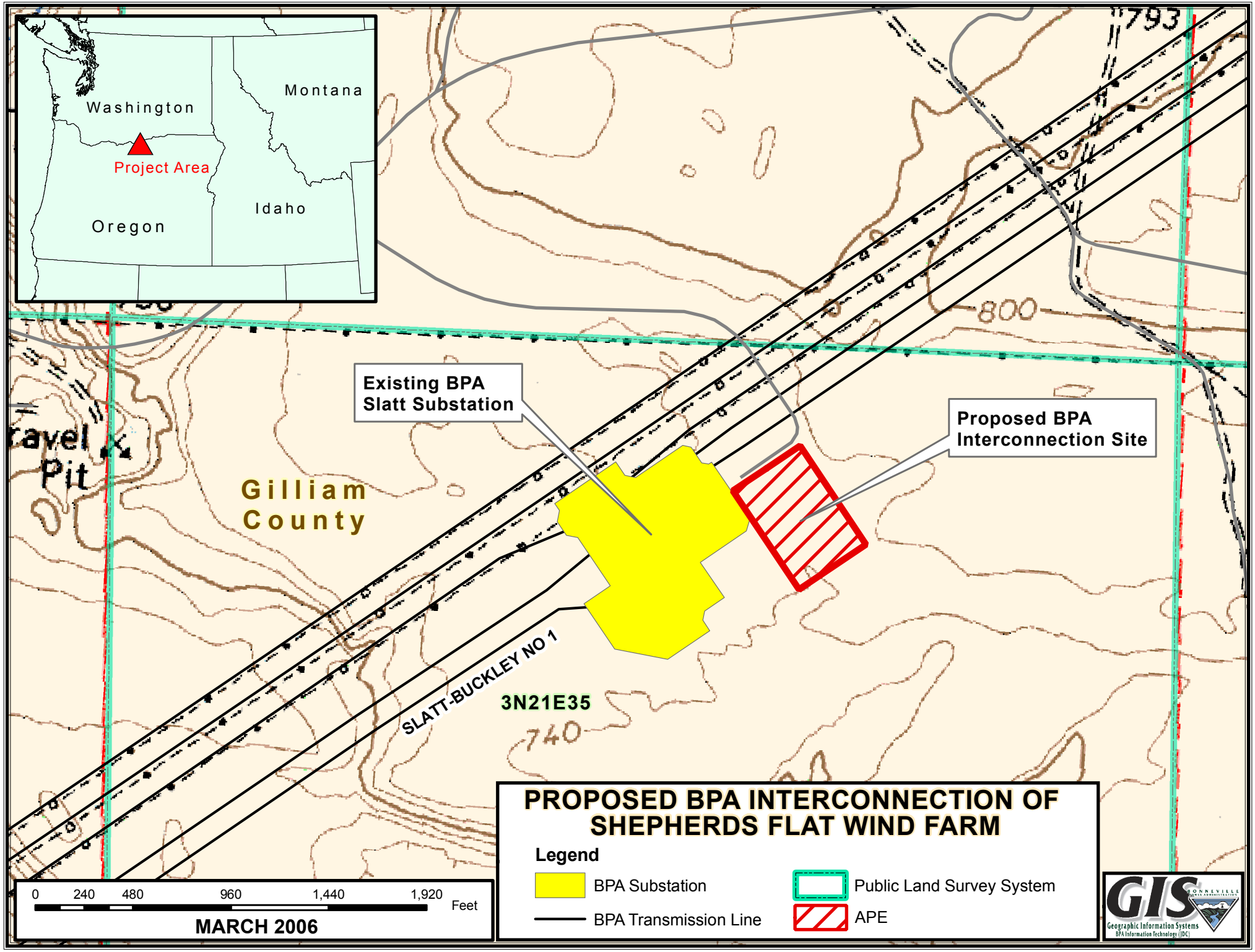
Interconnect

Applicant has submitted a request to the Bonneville Power Administration (BPA) for interconnection to the Federal Columbia River Transmission System for up to 750 megawatts of electricity generated by the facility. BPA's studies propose a plan of service to interconnect the facility to any of several parallel BPA 500 kV transmission lines in Gilliam County. The proposed interconnection site is adjacent to BPA's Slatt switching station, within property owned by BPA. See figures B-1 and B-2. Applicant expects that it can secure easements between the project leased land and Slatt.

Construction Schedule

- Micrositing and staking of facility components — January 2008
- Commencement of road-building — February 2008
- Commencement of turbine erection — November 2008
- First 250 MW fully operational — April 2009
- Second 250 MW fully operational — April 2010
- Balance of facility fully operational — April 2011


Columbia River
84
74
19
19
74
Eddy
Proposed BPA
Interconnection Site
China Ditch
Montague
Cecil
Morgan
Project
Area
OREGON
GIS
Geographic Information Systems
BPA Information Technology (IDC)
BONNEVILLE POWER ADMINISTRATION
PROPOSED BPA INTERCONNECTION
OF SHEPHERDS FLAT WIND FARM
Shepherds Flat Wind Farm
proposed by Lifeline Renewable Energy, Inc.
Proposed BPA Interconnection Site
Transmission Lines
N
W
E
S
0
1
2
4 Miles
NZ06-04b Feb. 1, 2006



nz_slatt_ape.mxd

EXHIBIT C

LOCATION OF PROPOSED FACILITY

Information about the location of the proposed facility, including:

(A) A map or maps, including a 7.5-minute quadrangle map, showing the proposed locations of the energy facility site, and all related or supporting facility sites, in relation to major roads, water bodies, cities and towns, important landmarks and topographic features; and

(B) A description of the location of the proposed energy facility site and the proposed site of each related or supporting facility, including the approximate land area of each. If a proposed pipeline or transmission line is to follow an existing road, pipeline or transmission line, the applicant shall state to which side of the existing road, pipeline or transmission line the proposed facility will run, to the extent this is known;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit C as follows:

> Maps included in Exhibit C should provide enough information for property owners potentially affected by the facility to determine whether their property is within or adjacent to the site. Major roads should be named. The application should include identification of lands enrolled in the Conservation Reserve Program and lands currently used for commercial agriculture. [Applicant] should include maps drawn to a scale of 1 inch = 2,000 feet when necessary to show detail.
>
> [Applicant] should include maps that show the site boundary. "Site boundary" is the area defined in OAR 345-001-0010(53) plus the area within any requested micrositing corridors for turbines or other components. The proposed turbine string layout should be indicated (including alternative layouts if the use of different turbine sizes would result in different turbine string alignments).
>
> **Note:** Exhibit G of the NOI includes a map showing the Shepherds Flat "project area" in five unconnected sections. Because the components of a wind facility must be connected by access roads and transmission infrastructure, [Applicant] should include maps in the site certificate application that show how the project segments would be connected.

LOCATION OF PROPOSED FACILITY

The location of the proposed facility straddles Gilliam and Morrow Counties immediately south of the Columbia River in north-central Oregon.

The site has a northern and southern area, linked by the Willow Creek Valley on the west, and Eightmile and Fourmile Canyons in the center. Because the northern and southern areas differ in topography, land use, and habitat value, they will be discussed separately, where appropriate, throughout this Application.

	Leased Acres	Acres within the Site Boundary	Conservation Reserve Program Acres
Northern area	15,580	14,880	0
Southern area	16,520	12,640	1,718
Total area	32,100	27,520	1,718

The Shepherds Flat Wind Farm (SFWF) was named in honor of the generations of shepherds who have tended, and continue to tend, winter-grazing livestock in the northern project area. All of the northern area is grazed, none of the northern area is tilled. Most of the southern area is cultivated and planted in dry-land wheat.

Maps

Figure C-1	Quadrangle map showing the facility site in relation to major landmarks
Figure C-2a	Facility layout, northern section
Figure C-2b	Facility layout, southern section
Figure C-3	Conservation Reserve Program lands within the site boundary
Figure C-4	Analysis areas
Figures C-5 through C-25	Detail maps of leased-land boundary for other landowner reference

Permanent project facilities footprint

Component	Unit of Measure	Area of Footprint Each	Number of Components	Total Footprint (acres)
Turbine pads	square feet	6,000 sq ft	303	42
Substations	acres	1 acre	2	2
Transmission lines	mile			
Meteorological towers	square feet	25 sq ft	10	0.006
New project roads	mile	132,000 sq ft	68	205
				249

Temporary project facilities footprint

Component	Unit of Measure	Area of Footprint Each	Number of Components	Total Footprint (acres)
Turbine pads (including laydown areas)	square feet	9,500 sq ft	303	66
Substations	acres	1.25 acre	2	2.5
Transmission lines	mile			
New project roads	mile	211,200 sq ft	68	328
Temporary widening of existing roads	mile	79,200 sq ft	1.2	2
Staging areas	square feet	225,000 sq ft	4	21
Total				**419**

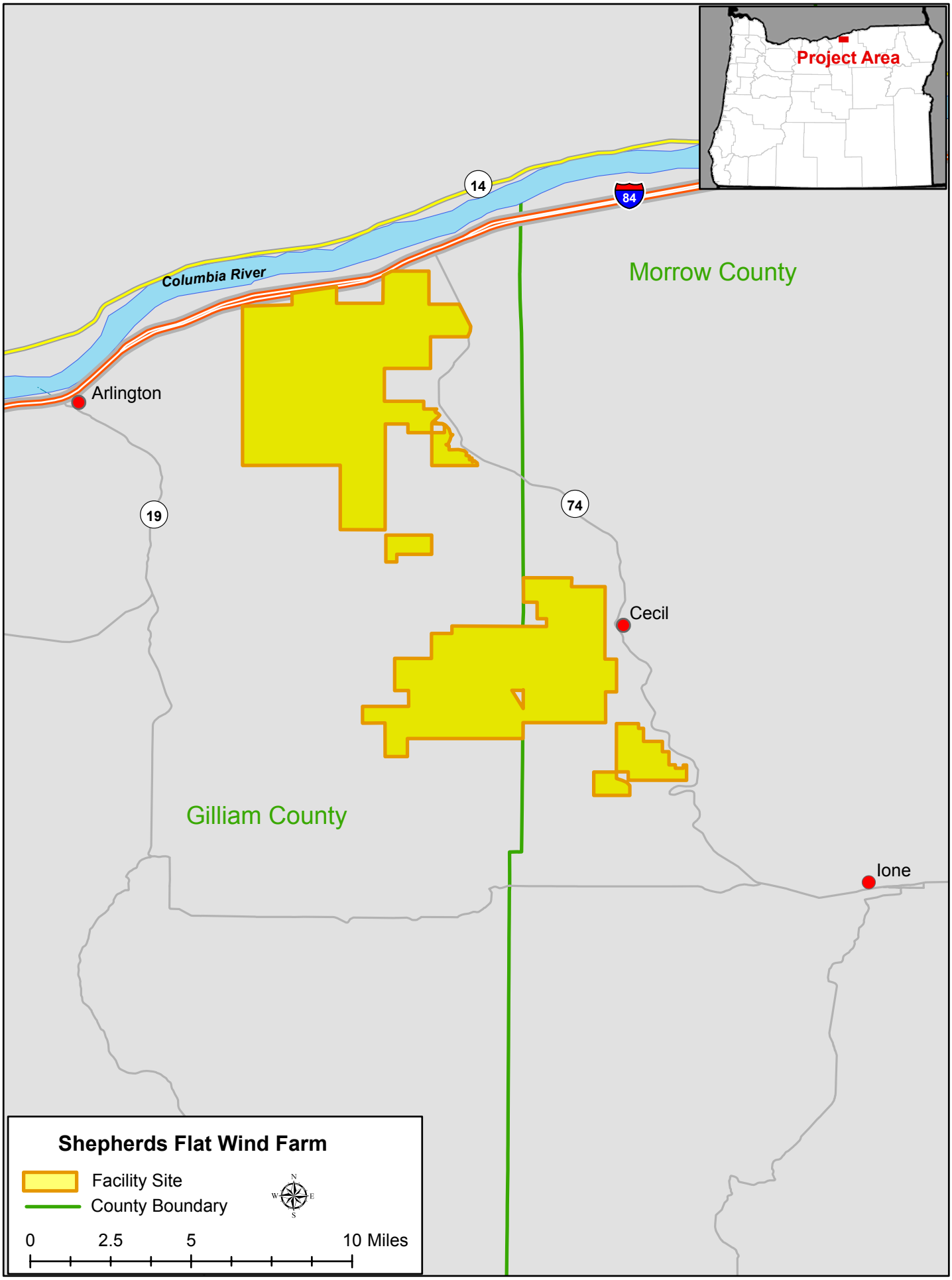
UNCONNECTED SECTIONS

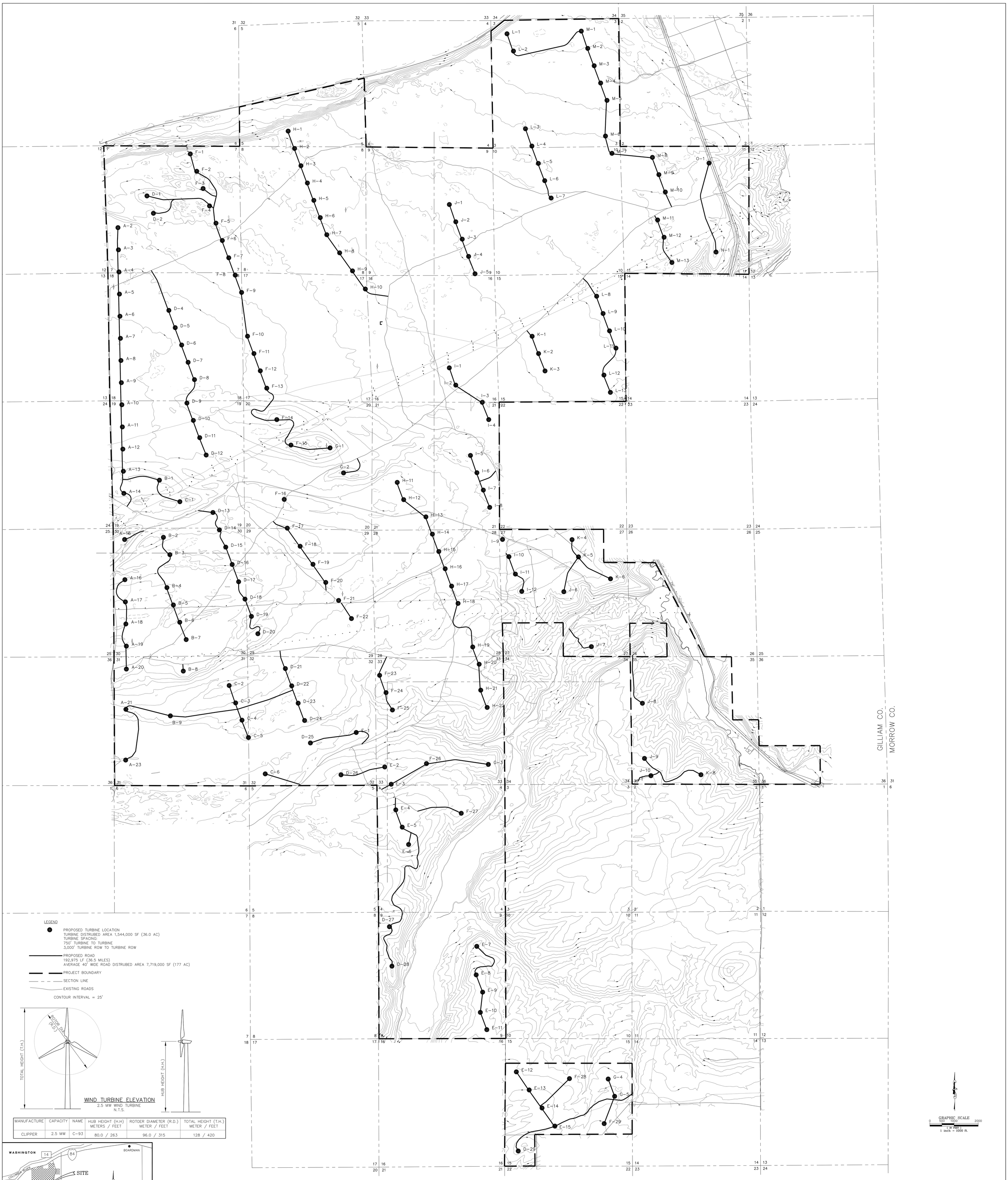
The northern project area contains one "unconnected section" which will be joined to the main northern project area via underground transmission and communications lines. Applicant believes that the necessary easements for these lines can be secured.

The southern project area contains three "unconnected sections" which will be joined to the main southern project area via underground transmission and communications lines. Applicant believes that the necessary easements for these lines can be secured.

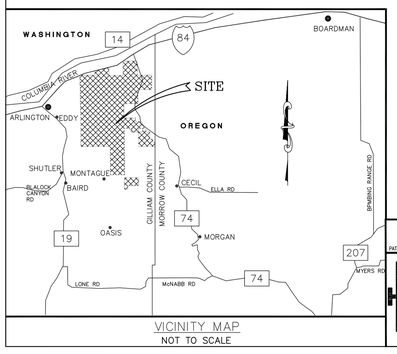
Applicant proposes to connect the northern and southern project areas via overhead transmission and communications lines along county road rights-of-way through Fourmile Canyon and through private property through Eightmile Canyon. Applicant believes that the necessary easements for these lines can be secured.

Figure C-1


Project Area
14
84
Columbia River
Morrow County
Arlington
19
74
Cecil
Gilliam County
Ione
Shepherds Flat Wind Farm
Facility Site
County Boundary
N
W
E
S
0
2.5
5
10 Miles



MANUFACTURE	CAPACITY	NAME	HUB HEIGHT (H.H) METERS / FEET	ROTOER DIAMETER (R.D.) METER / FEET	TOTAL HEIGHT (T.H.) METER / FEET
CLIPPER	2.5 MW	C-93	80.0 / 263	96.0 / 315	128 / 420



VICINITY MAP
NOT TO SCALE

PATRICK AND HENDERSON, INC. PLOTTED ON 02/02/07

PATRICK & HENDERSON INC. CIVIL & GEOTECHNICAL ENGINEERING

1965 AIRPORT DRIVE
BAKERSFIELD, CALIFORNIA 93308
(661) 391-9854
FAX: (661) 391-9926

Consulting Engineers
Foundation & Structural Engineering
Land Planning
Land Surveying
Soils Testing

DATE: 01/26/06
SCALE: AS SHOWN
DRAWN BY: JK
APPROVED:

DATE	REVISION DESCRIPTION	BY
02/02/07	REMOVED TURINBES A-1, D-3, K-7; ROADS TO TURBINES	JK

192 PROPOSED TURBINES

PRELIMINARY

PREPARED FOR:
LIFELINE
656 SAN MIGUEL WAY
SACRAMENTO, CA 95819
TELEPHONE: 916-456-7651

SITE PLAN

DESCRIPTION:
PROJECTED ROAD ALIGNMENTS
FOR
WIND TURBINE PROJECT
SHEPHERDS FLAT, OREGON

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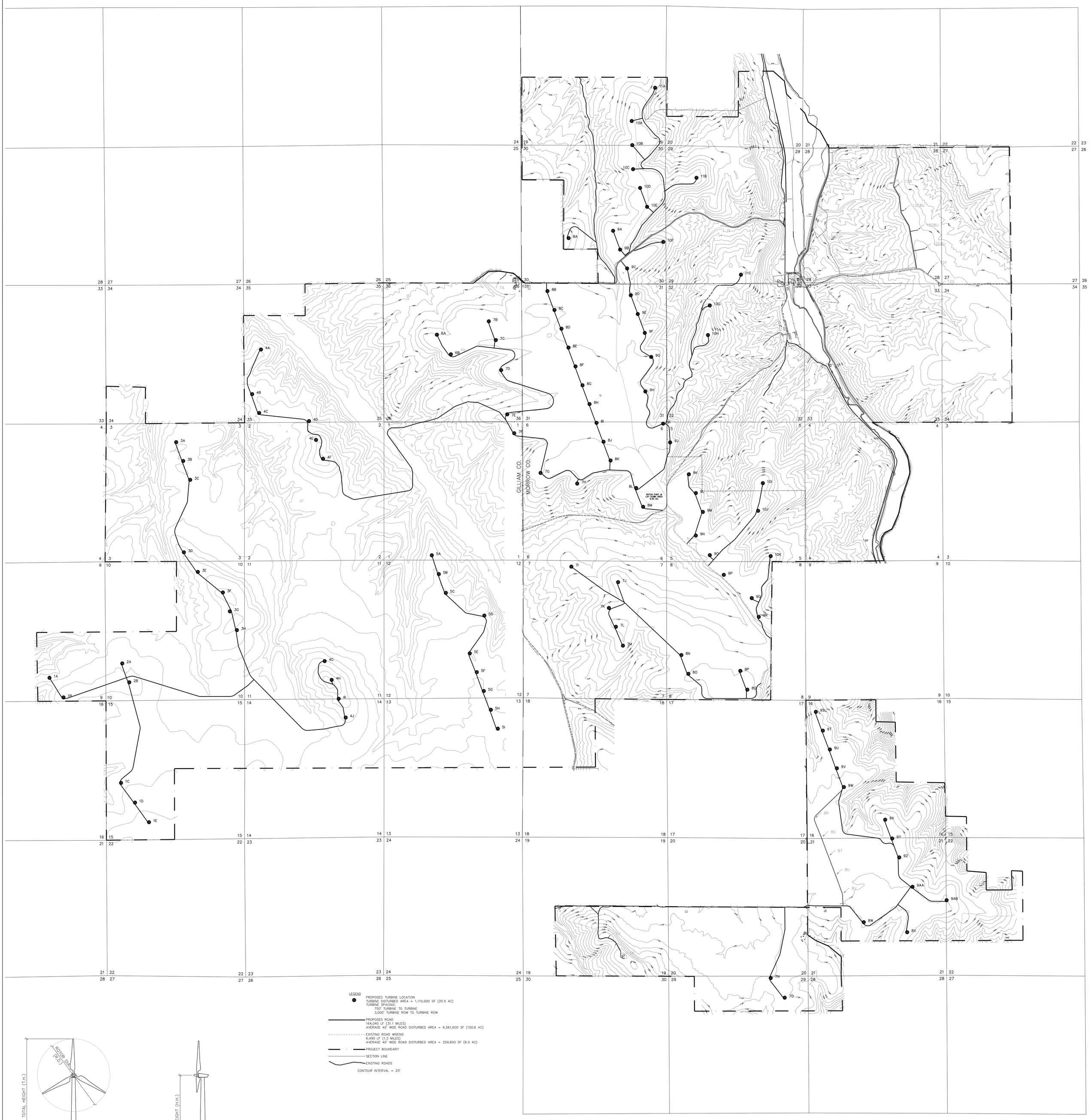
BY
PATRICK & HENDERSON, INC.

SHEET: 1 of 1 SHEETS

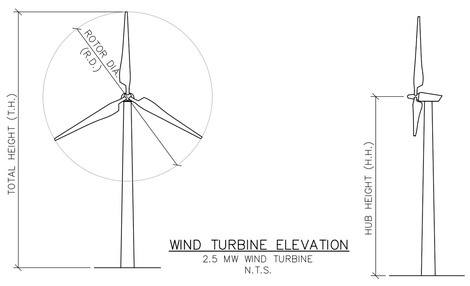
JOB NO.: 06-007



LEGEND

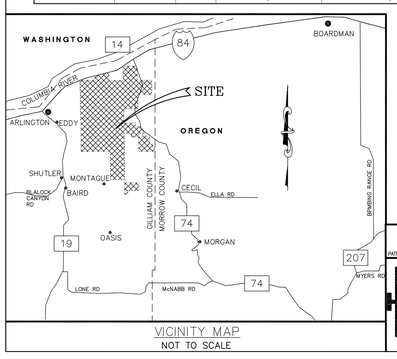
- PROPOSED TURBINE LOCATION
  TURBINE DISTURBED AREA = 1,110,000 SF (25.5 AC)
  TURBINE SPACING:
  750' TURBINE TO TURBINE
  3,000' TURBINE ROW TO TURBINE ROW
- PROPOSED ROAD
  164,040 LF (31.1 MILES)
  AVERAGE 40' WIDE ROAD DISTURBED AREA = 6,561,600 SF (150.6 AC)
- EXISTING ROAD WIDEND
  6,490 LF (1.2 MILES)
  AVERAGE 40' WIDE ROAD DISTURBED AREA = 259,600 SF (6.0 AC)
- PROJECT BOUNDARY
- SECTION LINE
- EXISTING ROADS

CONTOUR INTERVAL = 25'



WIND TURBINE ELEVATION
2.5 MW WIND TURBINE
N.T.S.

MANUFACTURE	CAPACITY	NAME	HUB HEIGHT (H.H) METERS / FEET	ROTOER DIAMETER (R.D.) METER / FEET	TOTAL HEIGHT (T.H.) METER / FEET
CLIPPER	2.5 MW	C-93	80.0 / 263	96.0 / 315	128 / 420



VICINITY MAP
NOT TO SCALE

GRAPHIC SCALE
0 500 1000 2000
(IN FEET)
1 inch = 1000 ft.

PATRICK AND HENDERSON, INC. PLOTTED ON 02/02/07

PATRICK & HENDERSON INC. CIVIL & GEOTECHNICAL ENGINEERING

1965 AIRPORT DRIVE
BAKERSFIELD, CALIFORNIA 93308
(661) 391-9854
FAX: (661) 391-9926

Consulting Engineers
Foundation & Structural Engineering
Land Planning
Land Surveying
Soils Testing

DATE: 05/08/06
SCALE: AS SHOWN
DRAWN BY: JK
APPROVED:

111 PROPOSED TURBINES — PRELIMINARY

DATE	REVISION DESCRIPTION	BY
02/02/07	REMOVEDS STRING BR-BV, 12A-12G, 5J-5K, & 7A; REVISED ROAD LF'S	JK

PREPARED FOR:
LIFELINE
656 SAN MIGUEL WAY
SACRAMENTO, CA 95819
TELEPHONE: 916-456-7651

SITE PLAN

DESCRIPTION:
PROJECTED ROAD ALIGNMENTS
FOR
WIND TURBINE PROJECT
SHEPHERDS FLAT SOUTH, OREGON

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SHEET: 1 of 1 SHEETS
JOB NO.: 06-

Figure C-3

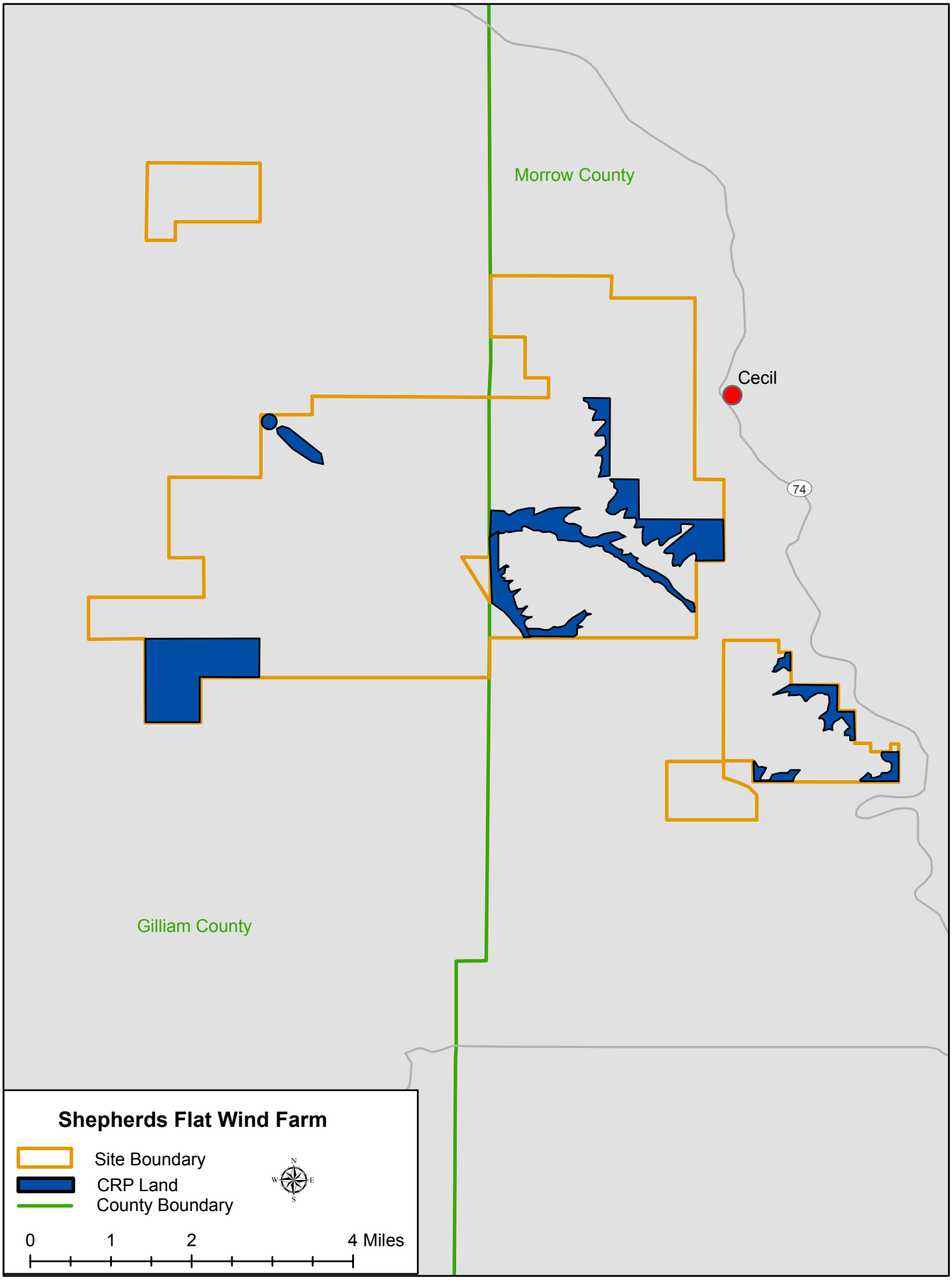

Morrow County
Cecil
74
Gilliam County
Shepherds Flat Wind Farm
Site Boundary
CRP Land
County Boundary
N
W
E
S
0
1
2
4 Miles

Figure C-4

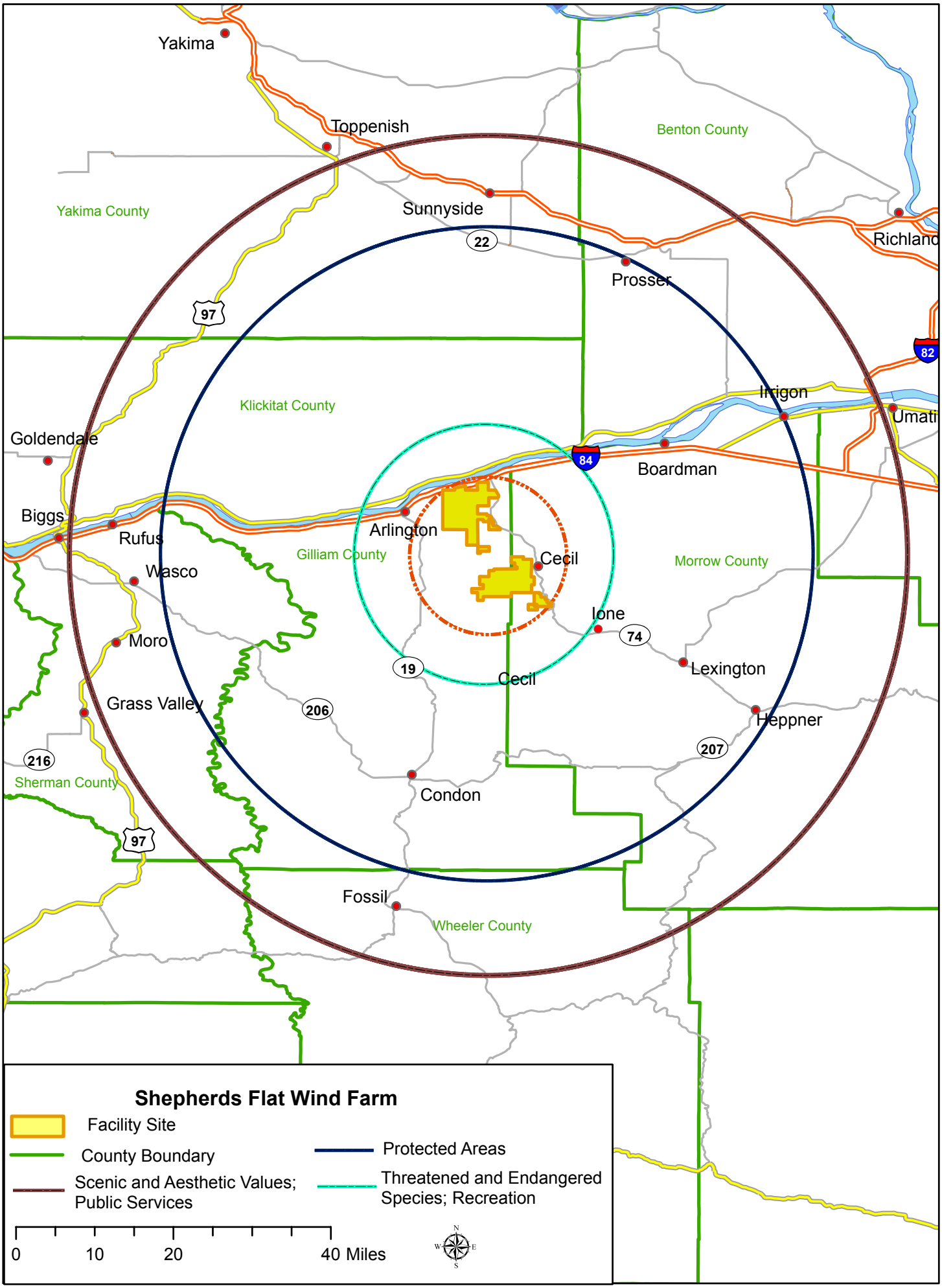
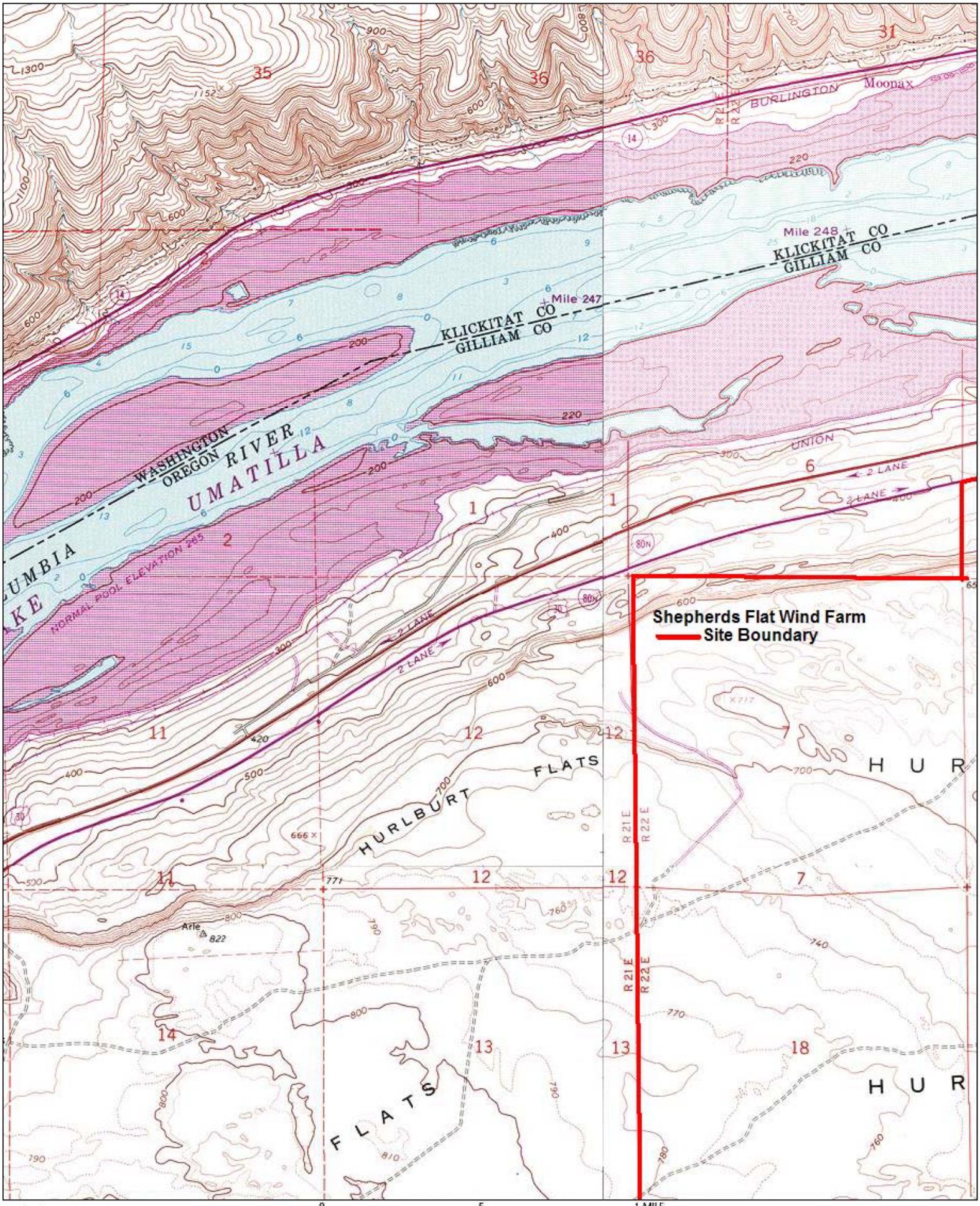

Yakima
Toppenish
Benton County
Yakima County
Sunnyside
22
Richland
Prosser
97
82
Klickitat County
Irrigon
Umati
Goldendale
84
Boardman
Biggs
Arlington
Rufus
Gilliam County
Cecil
Morrow County
Wasco
Ione
74
Moro
19
Cecil
Lexington
Grass Valley
206
Heppner
207
216
Sherman County
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Facility Site
County Boundary
Protected Areas
Scenic and Aesthetic Values; Public Services
Threatened and Endangered Species; Recreation
0
10
20
40 Miles
N
W
E
S

Figure C-5



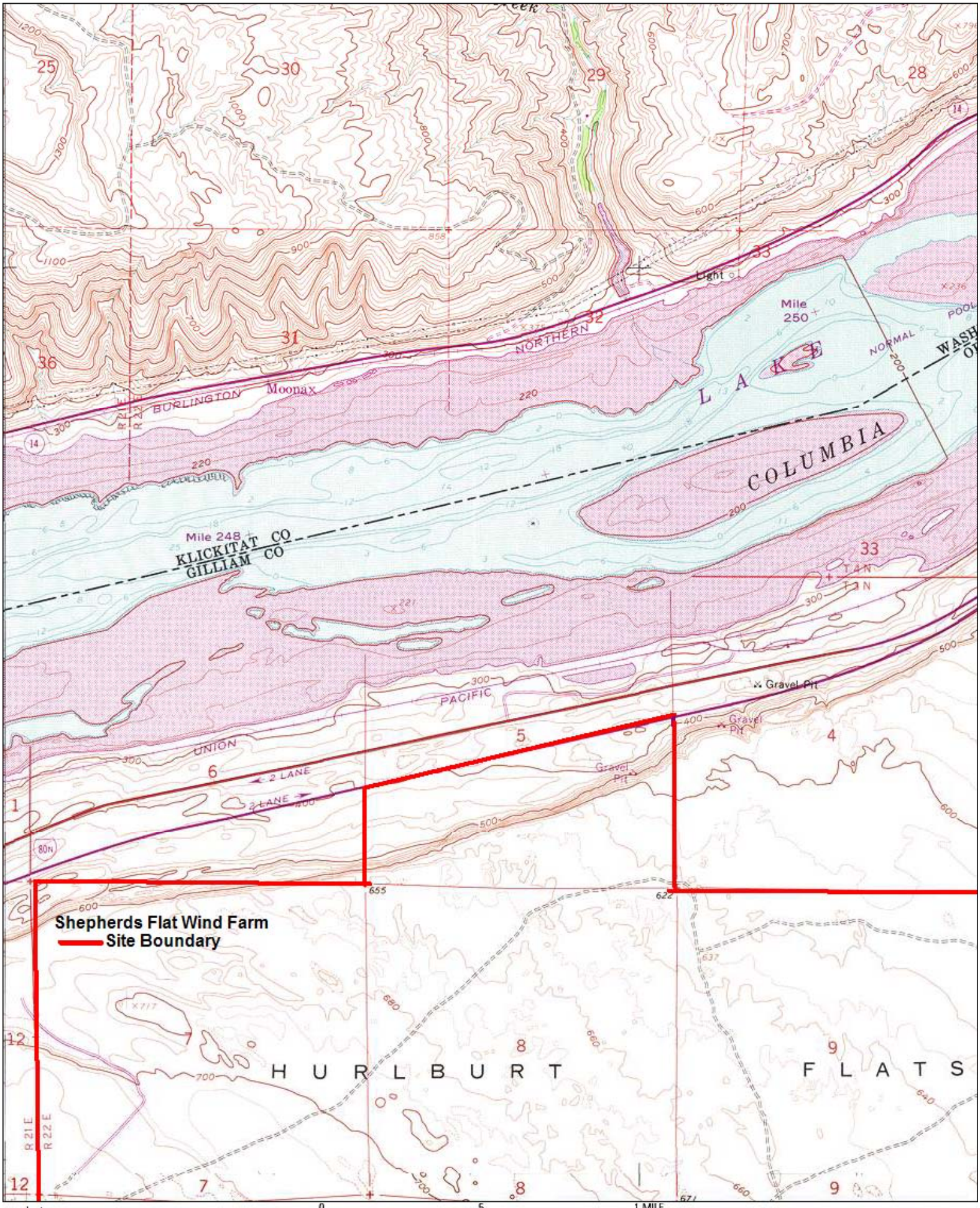
TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

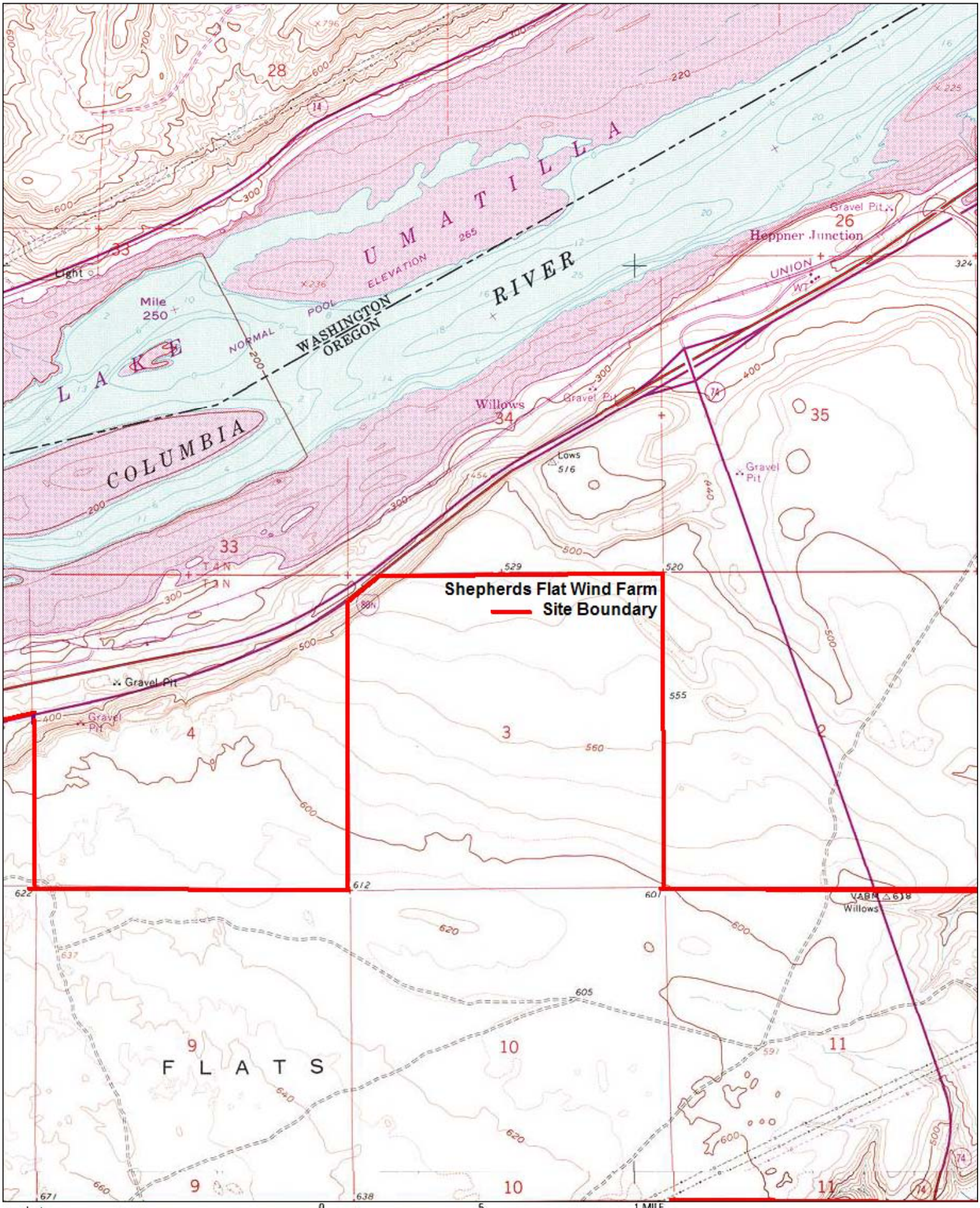
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-6



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-7



TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-8

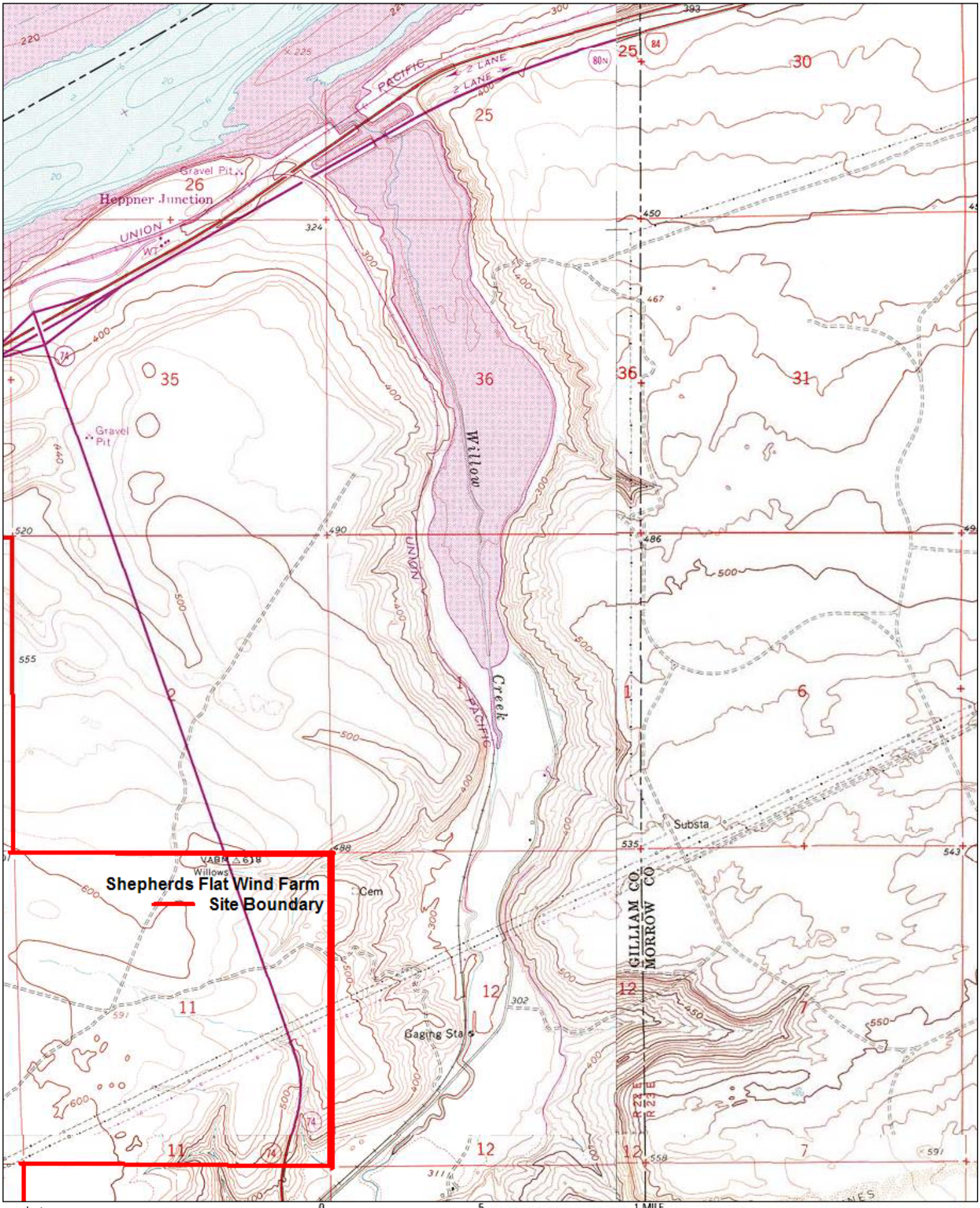


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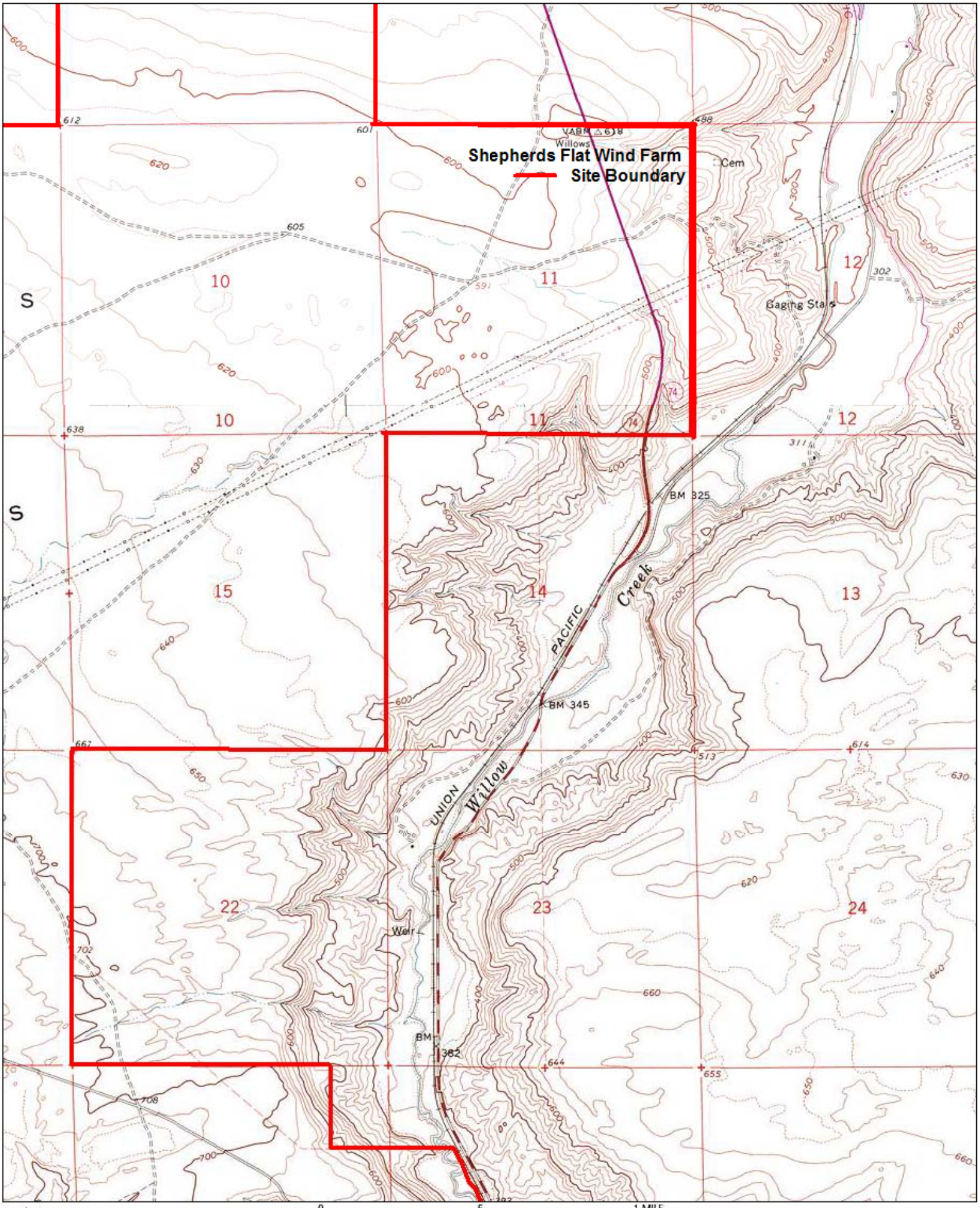
Figure C-9



TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-10

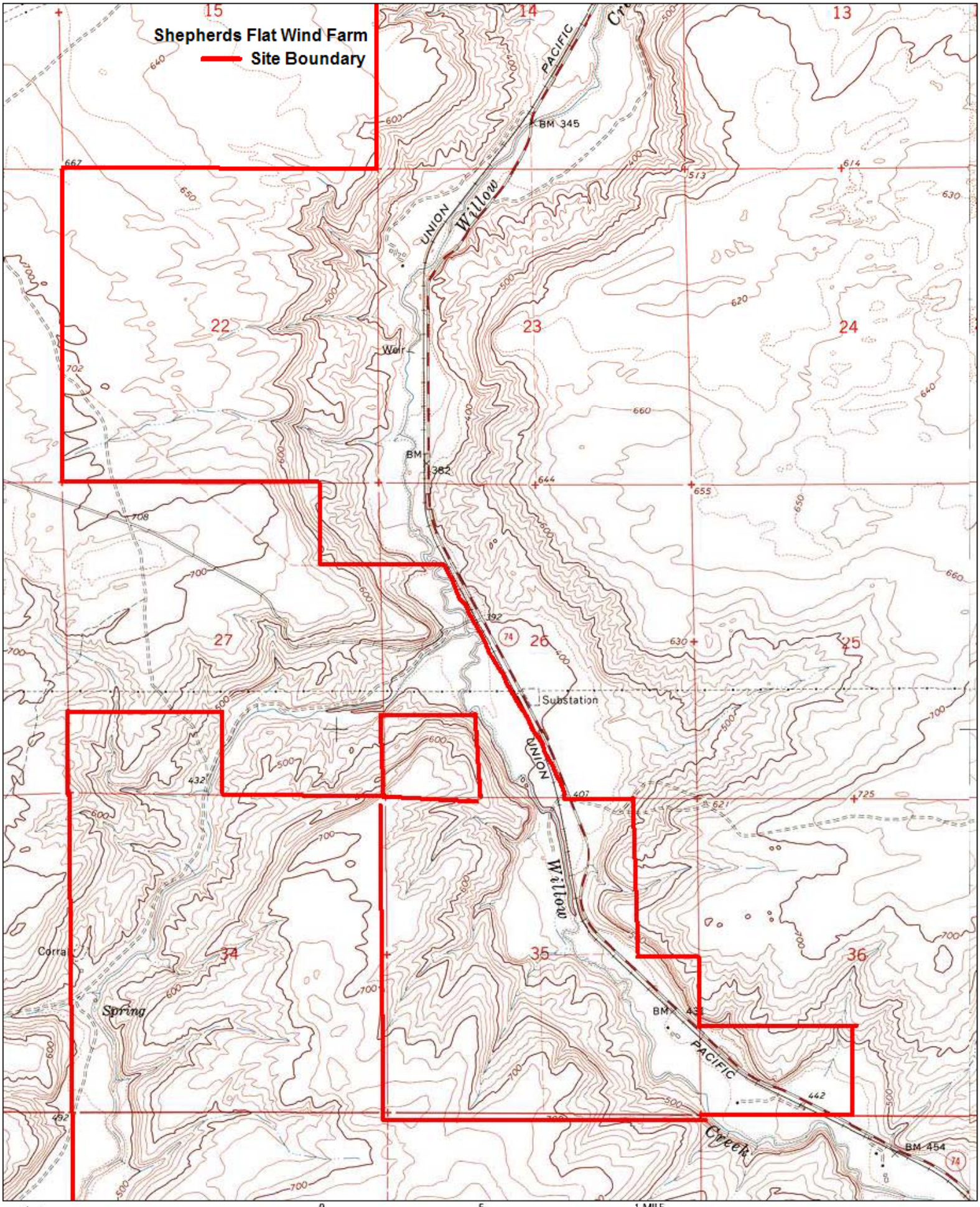


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Figure C-11

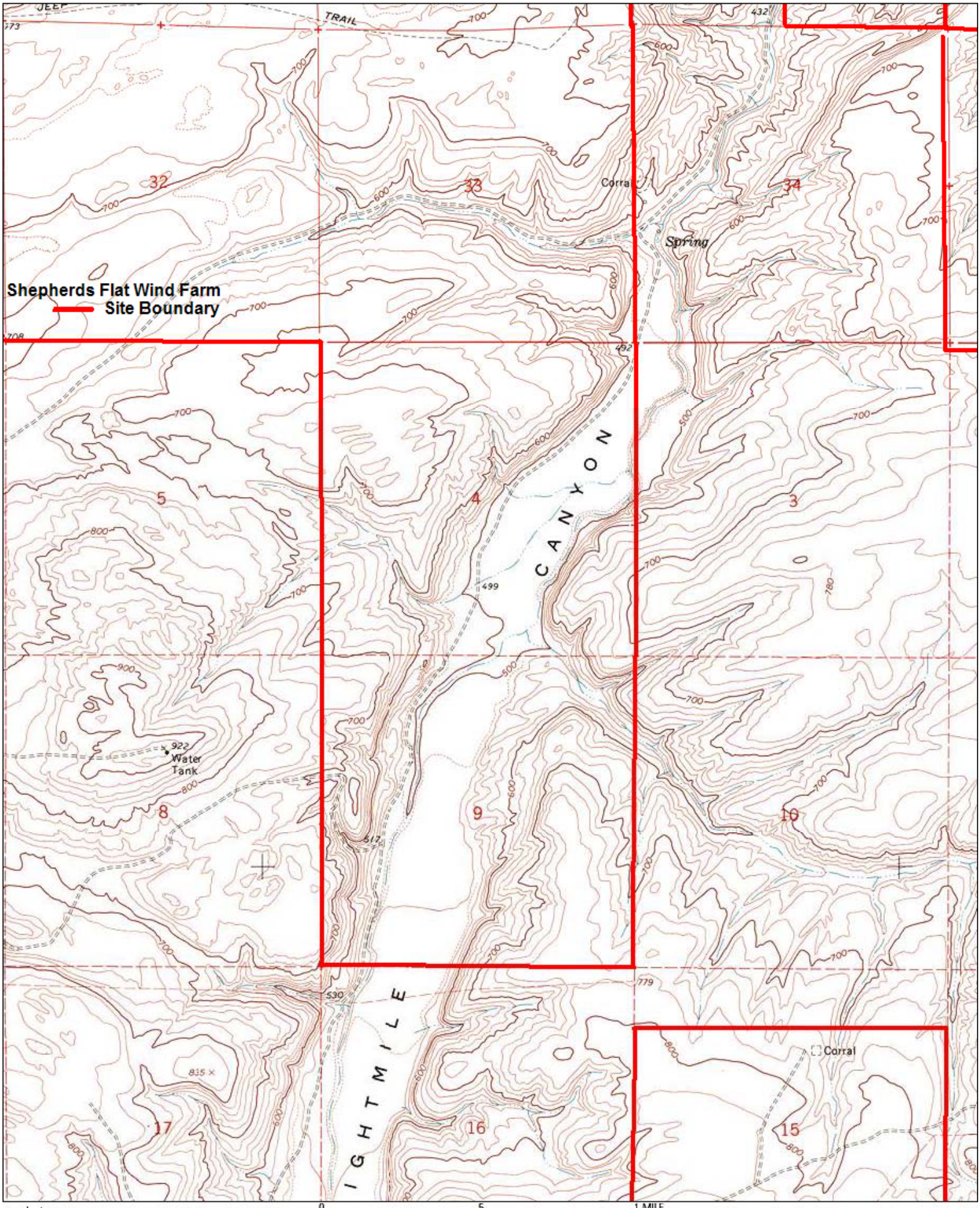

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Figure C-12

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Figure C-13

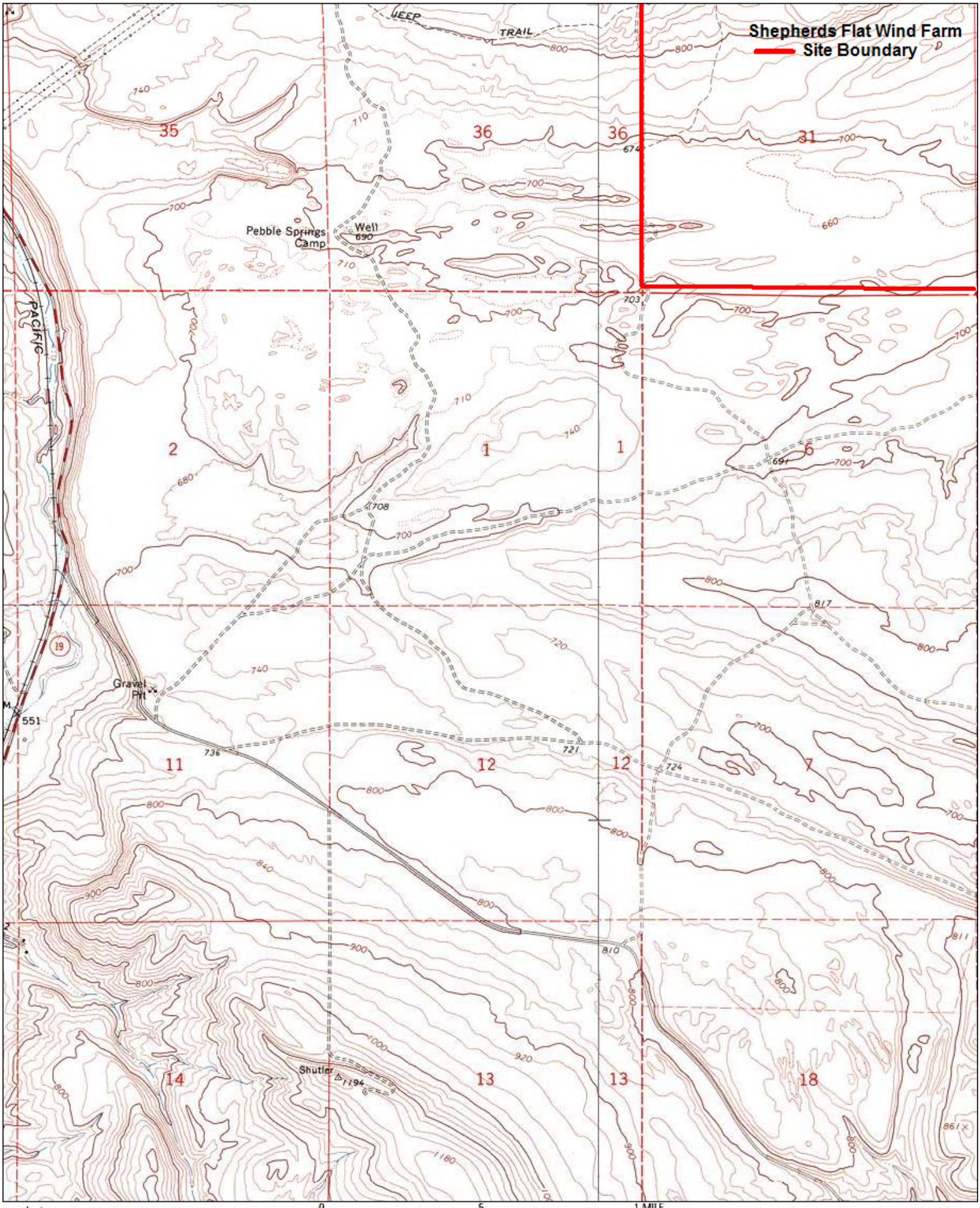

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Figure C-14

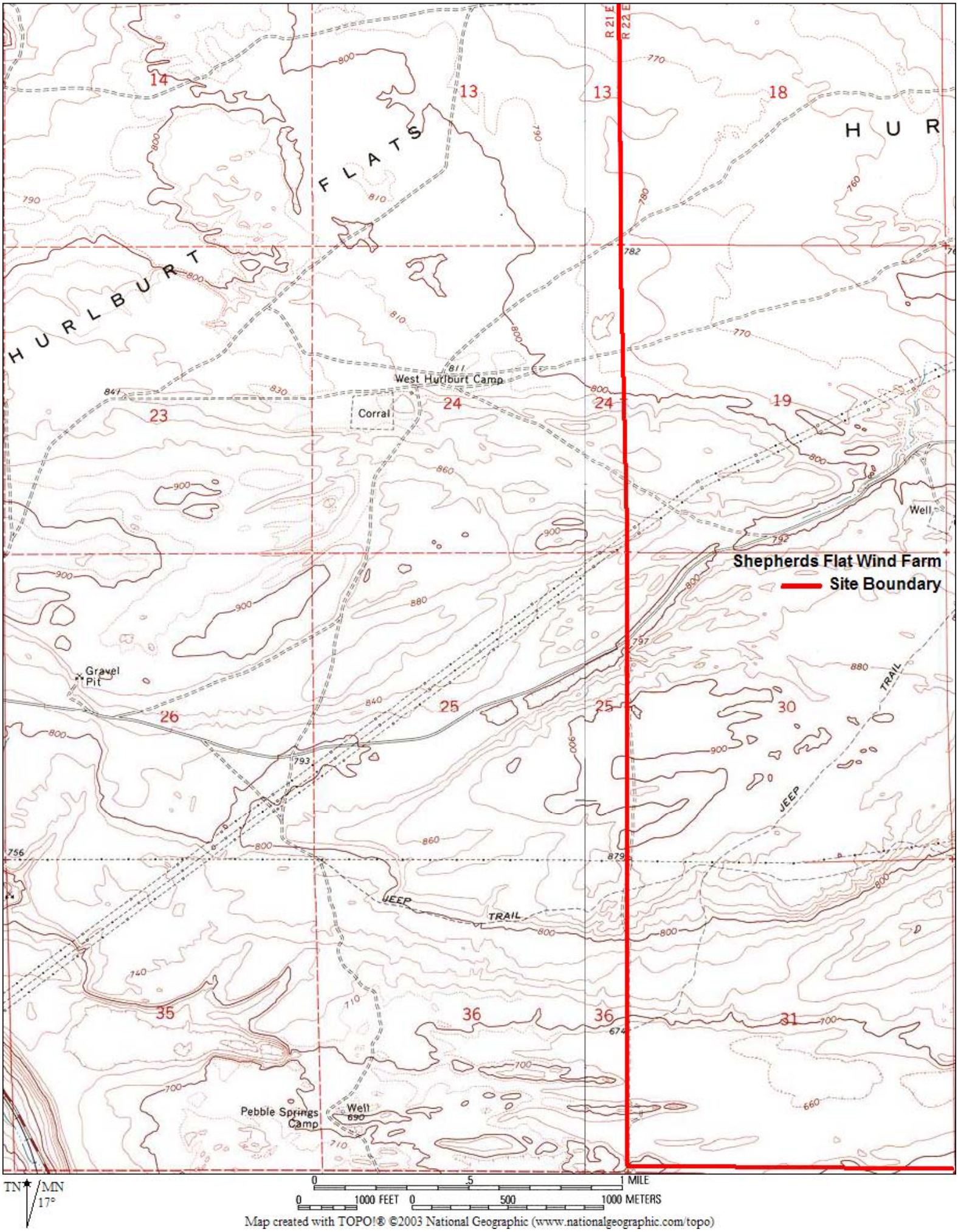

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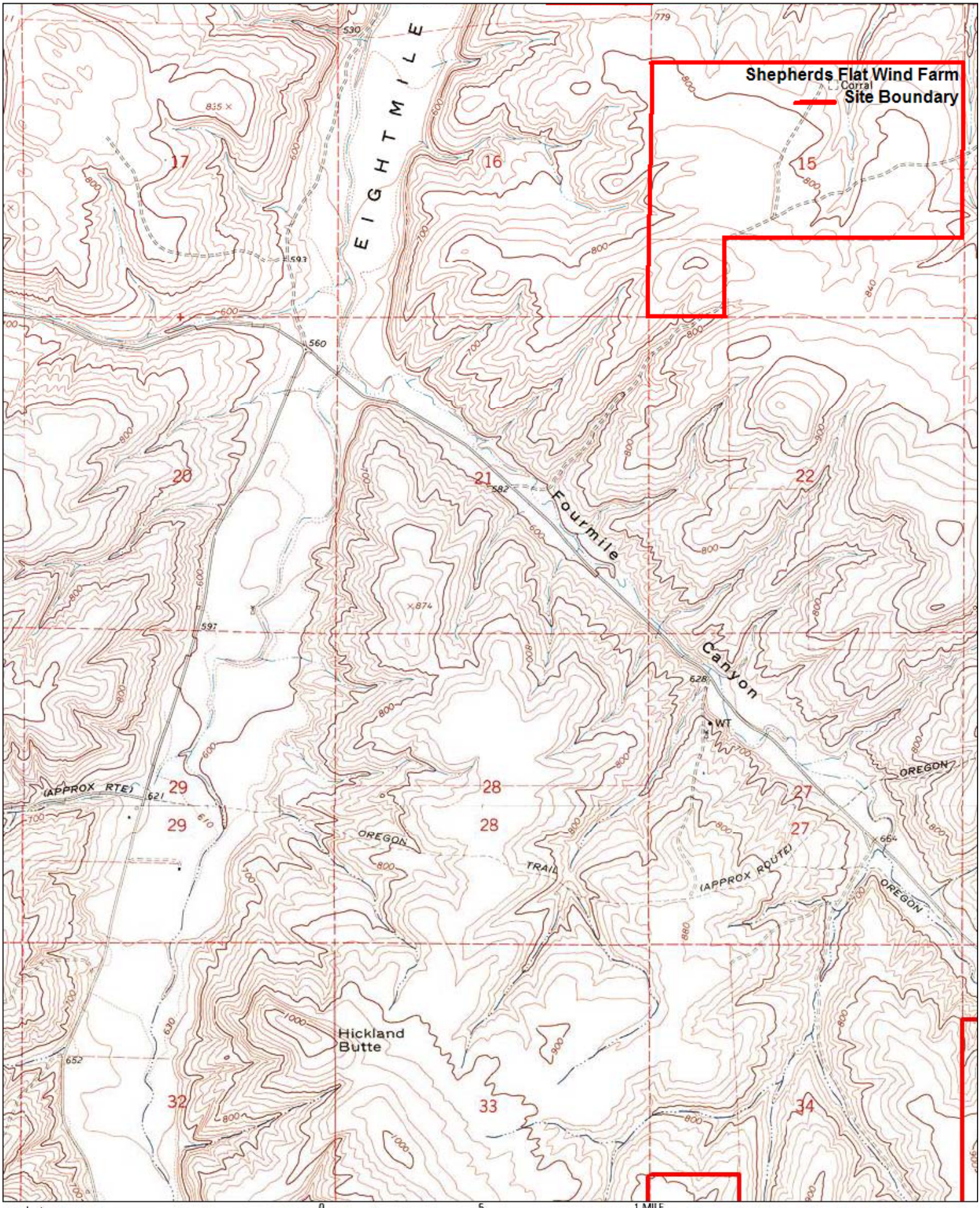
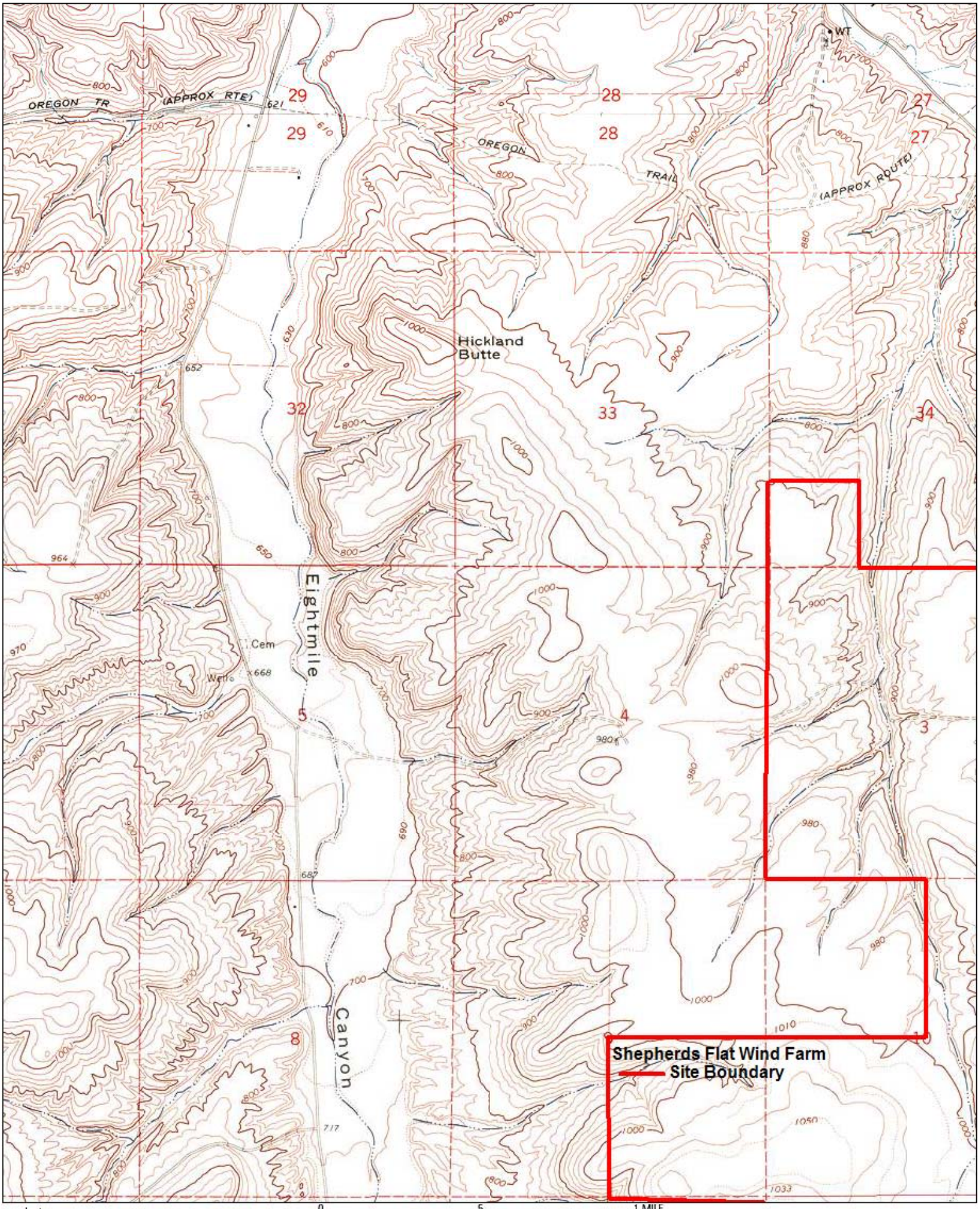
Figure C-15



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-16



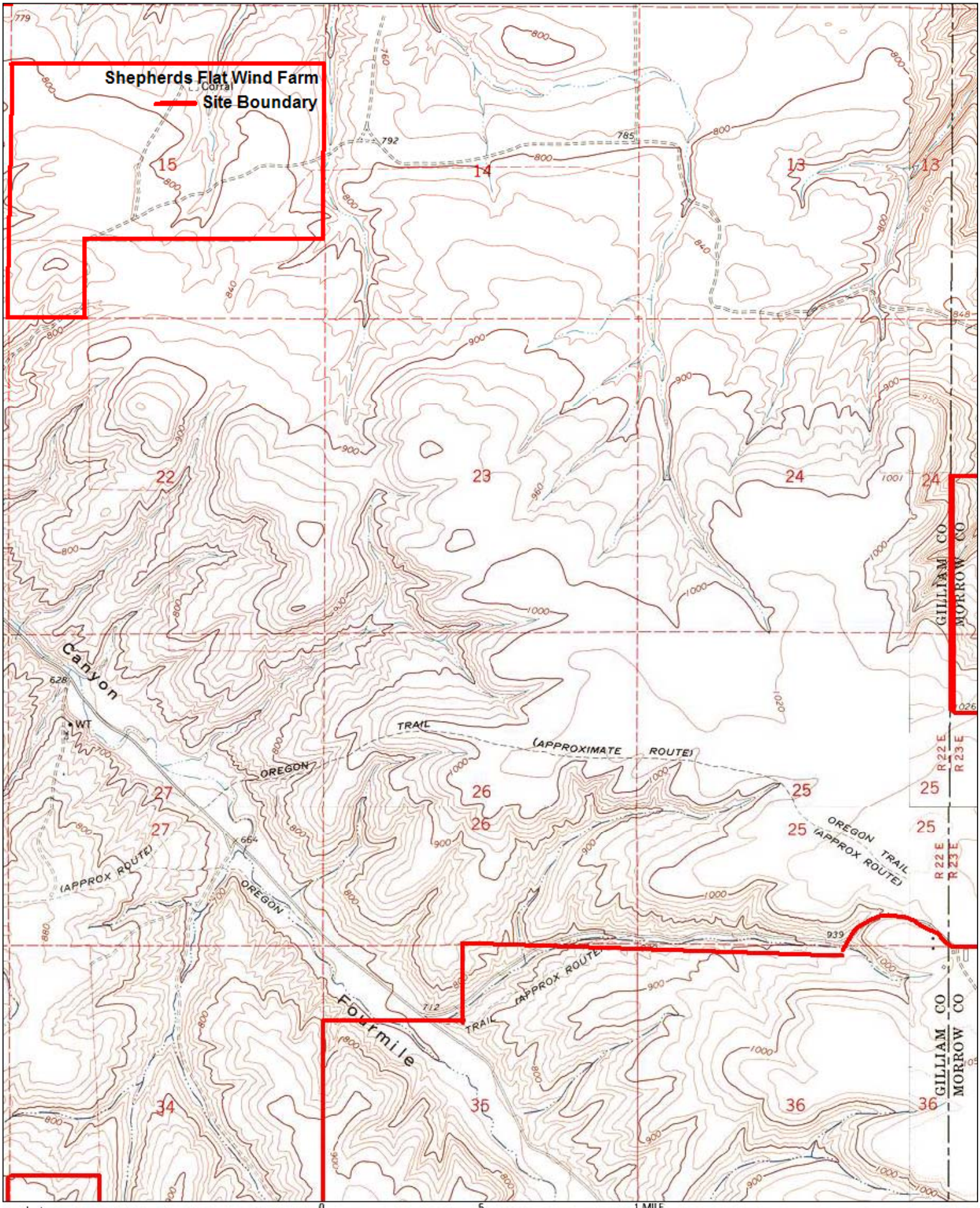
TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

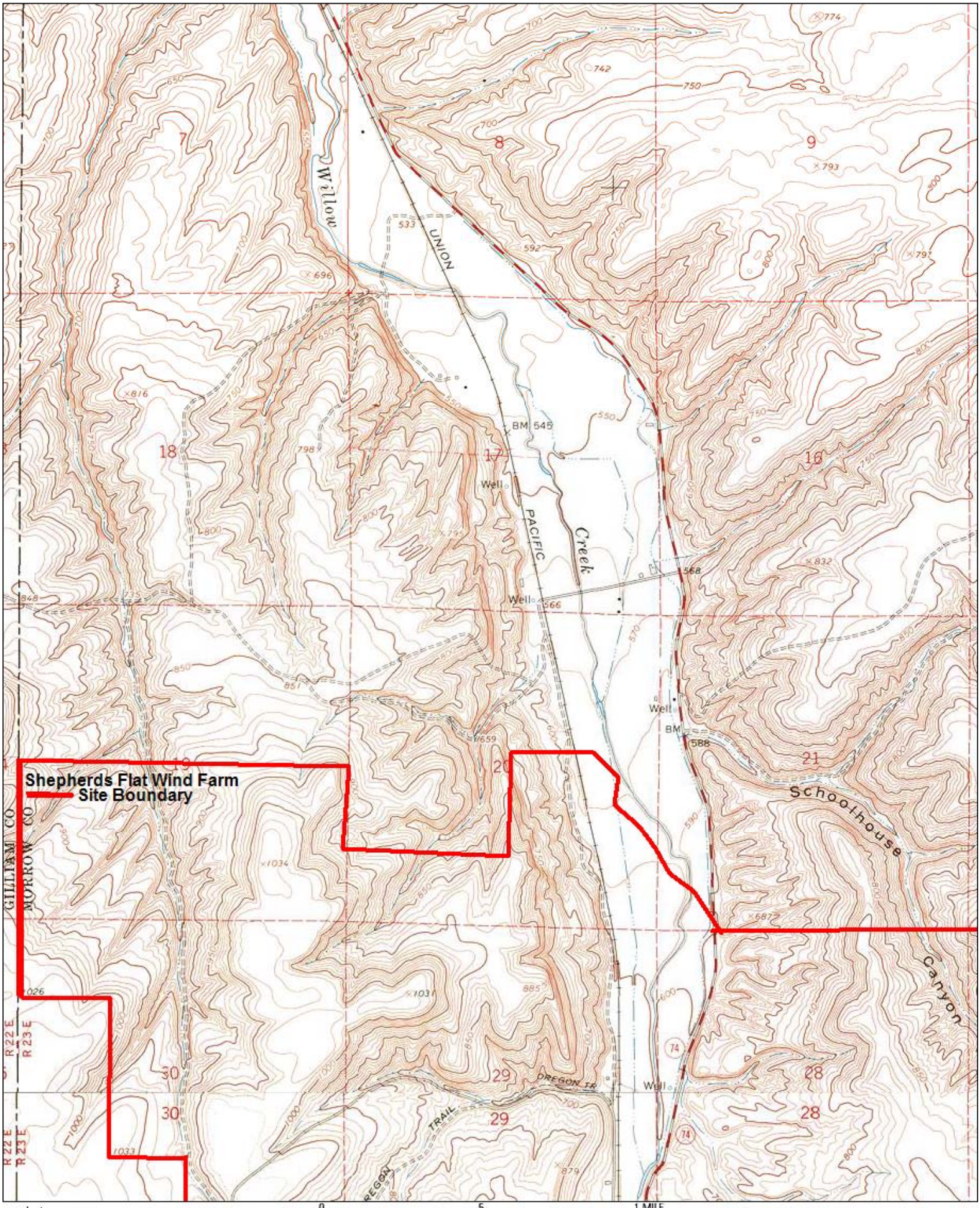
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-17



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-18



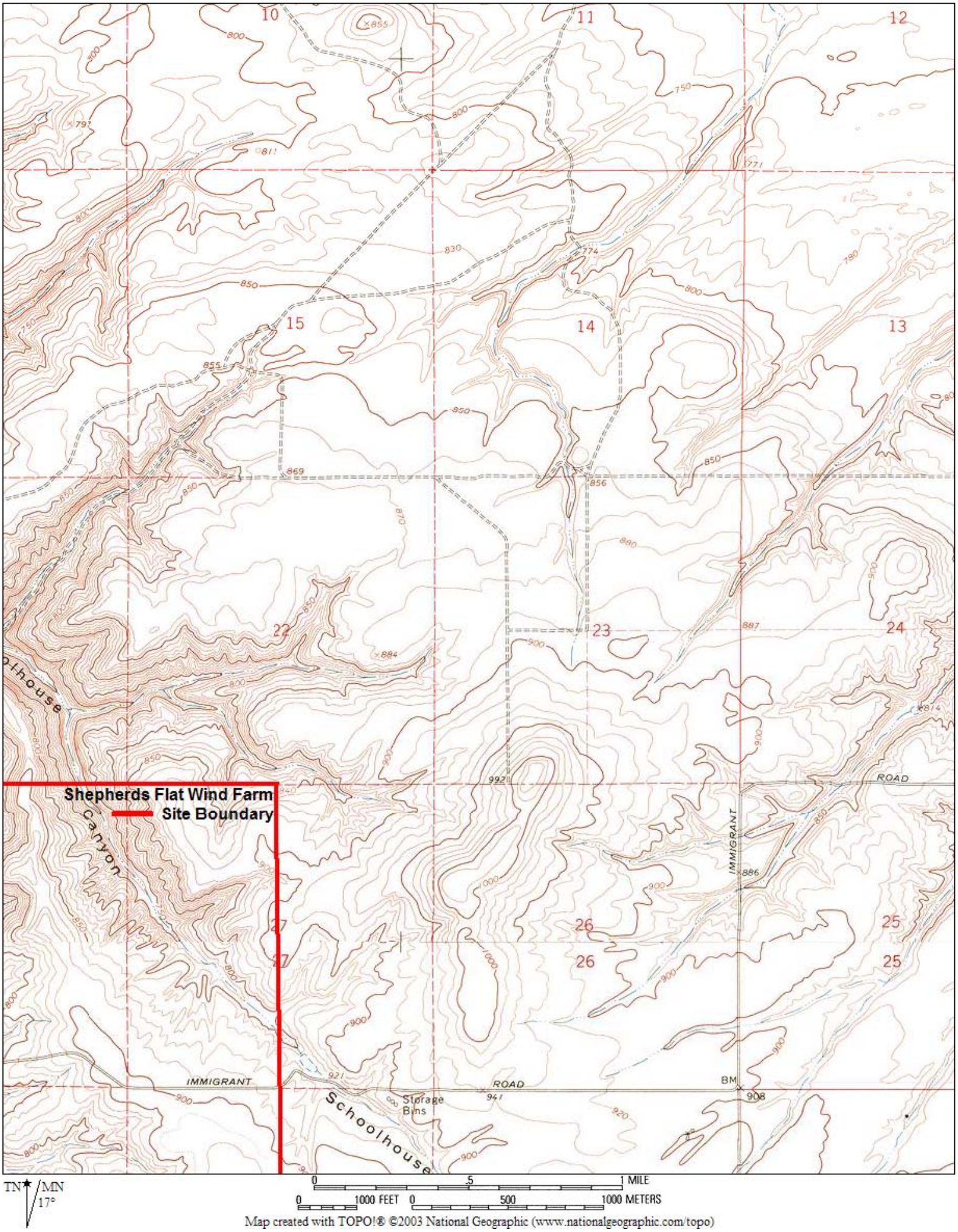
TN / MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

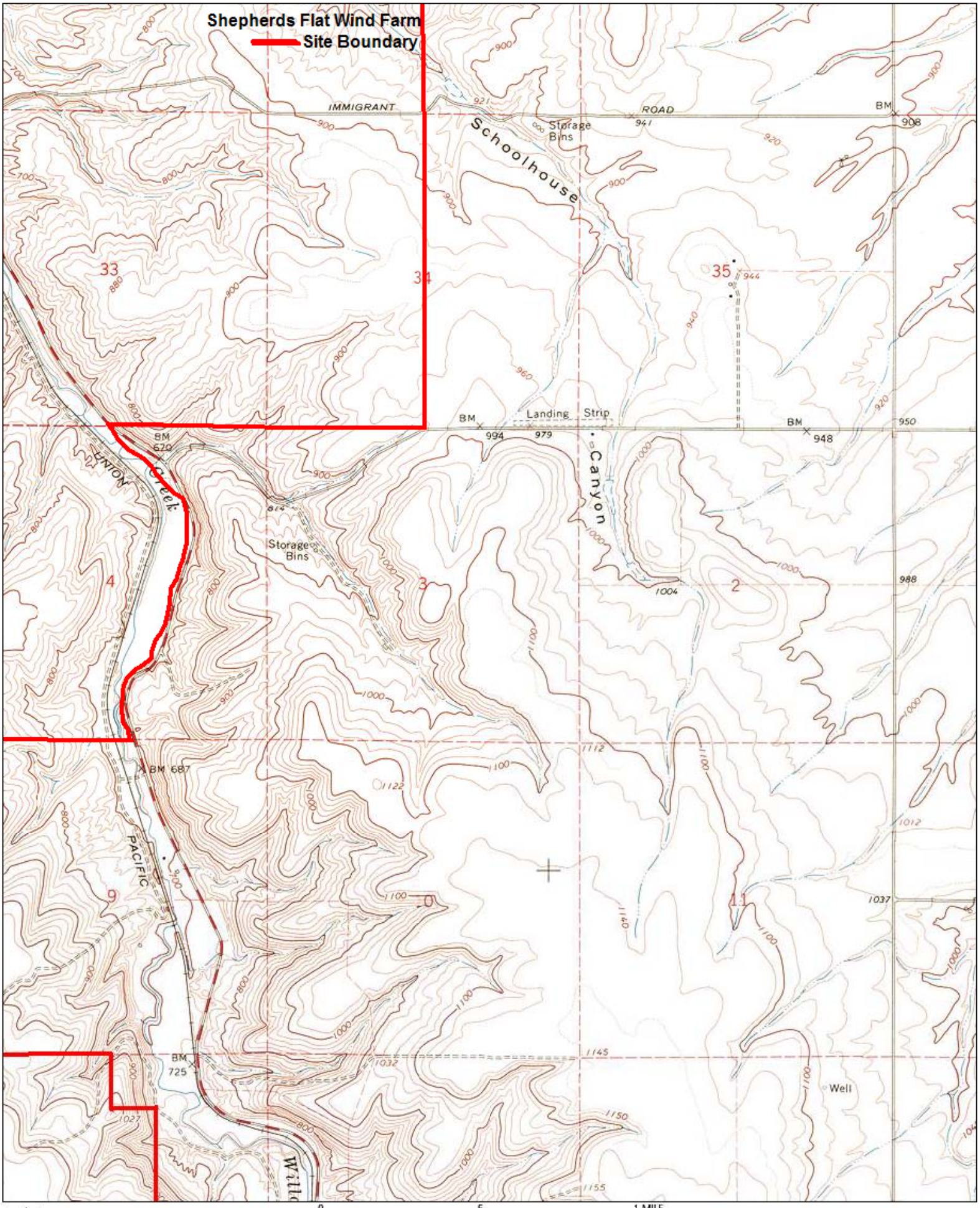
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-19



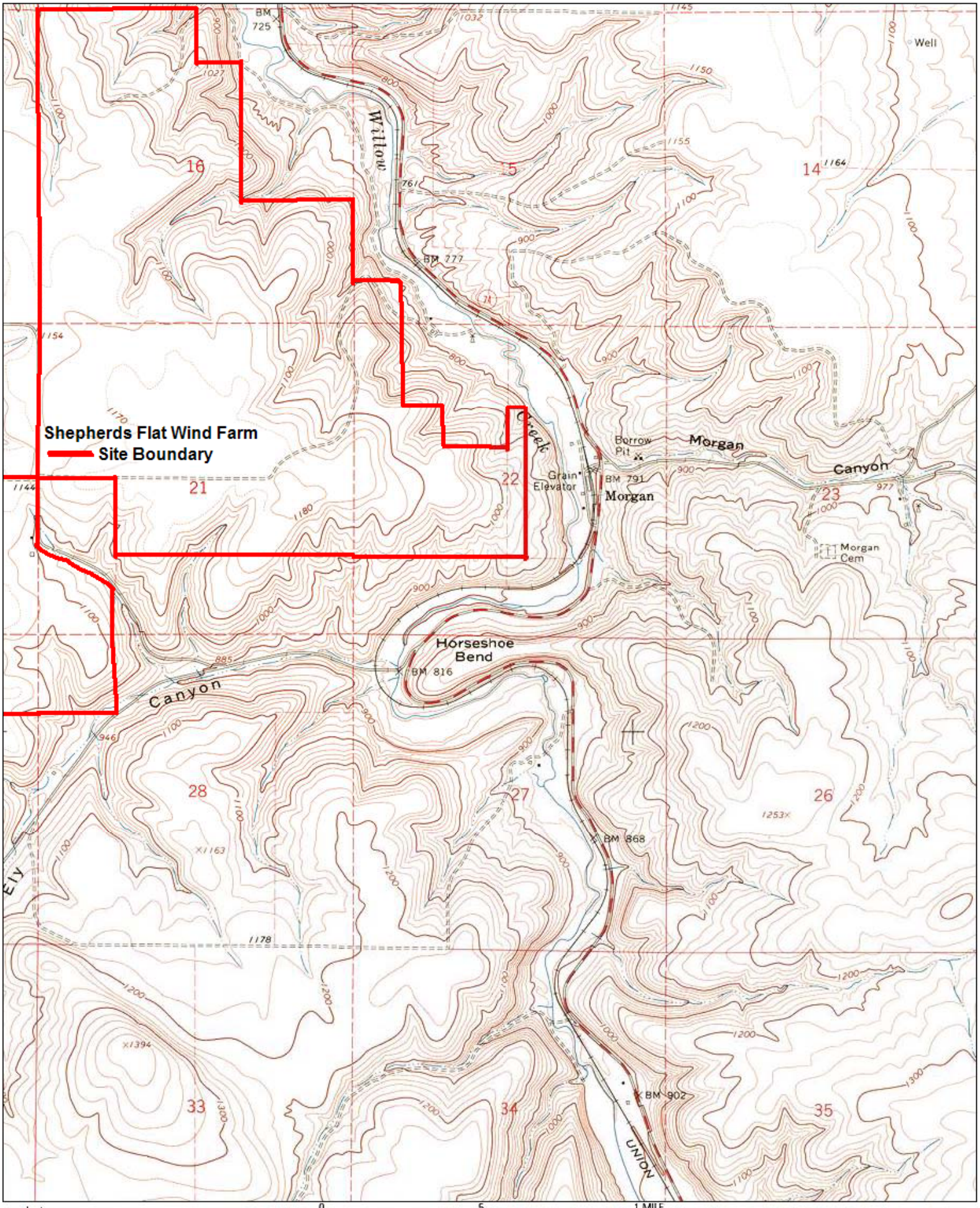
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-20



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-21



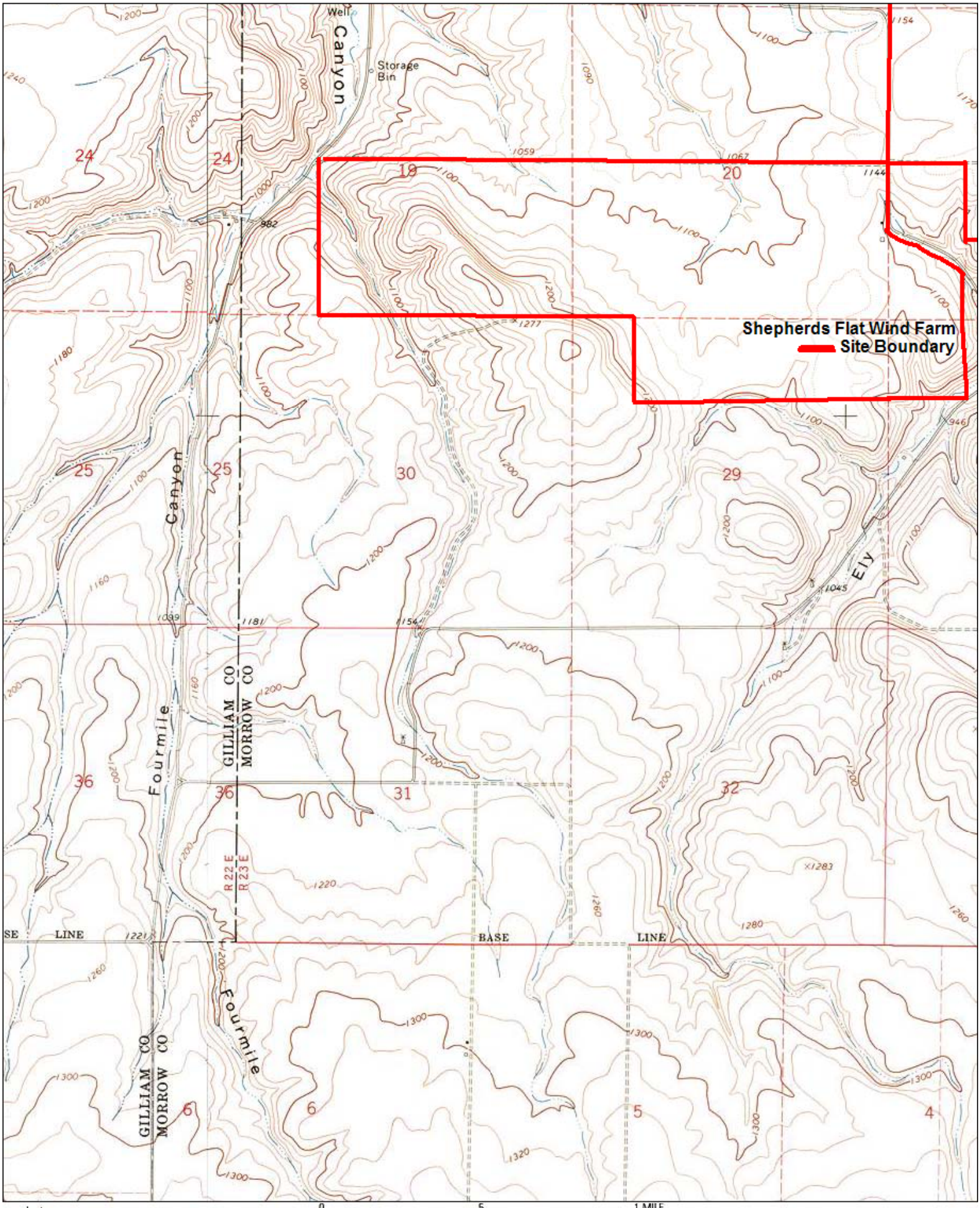
TN MN 17°

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

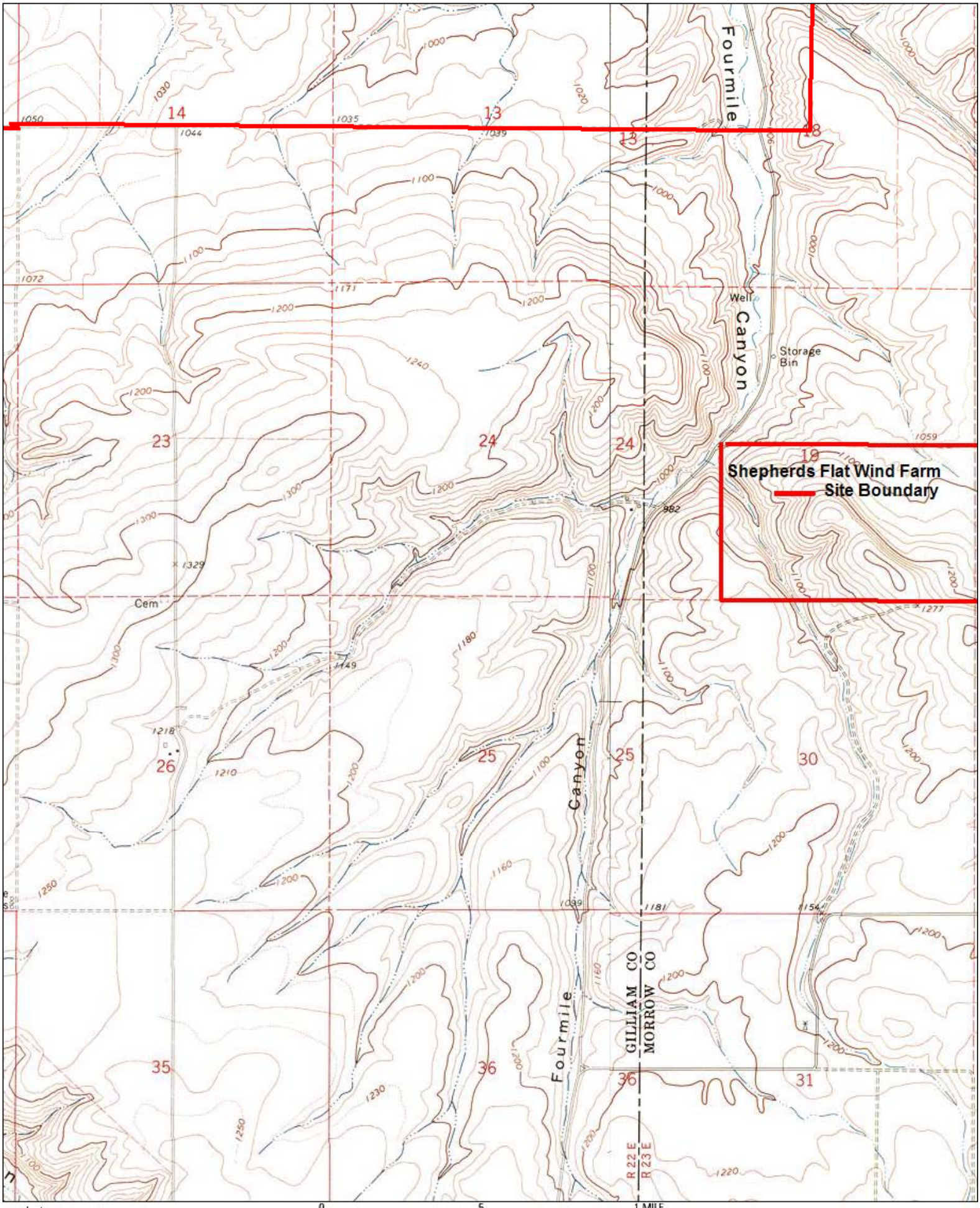
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-22



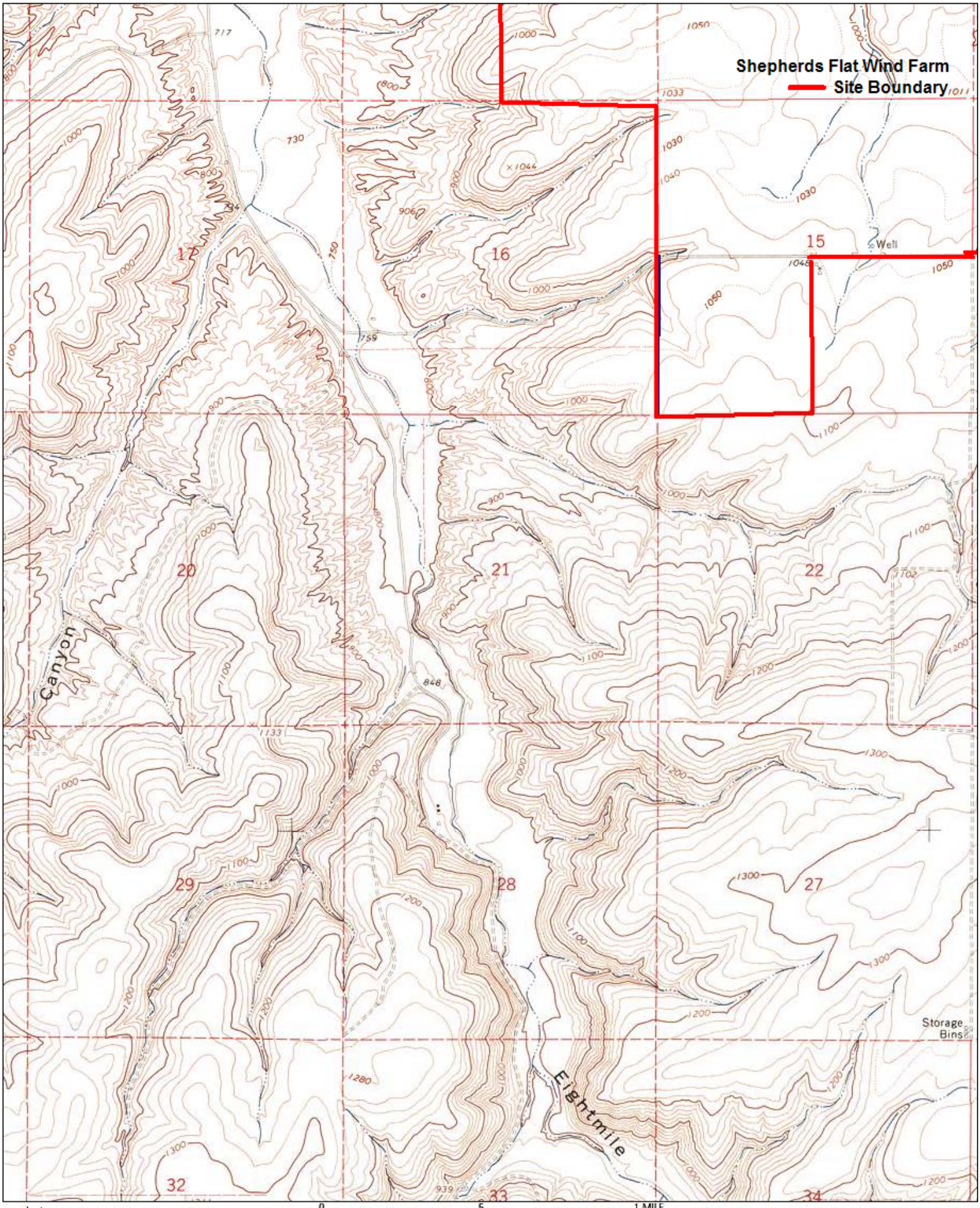
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-23



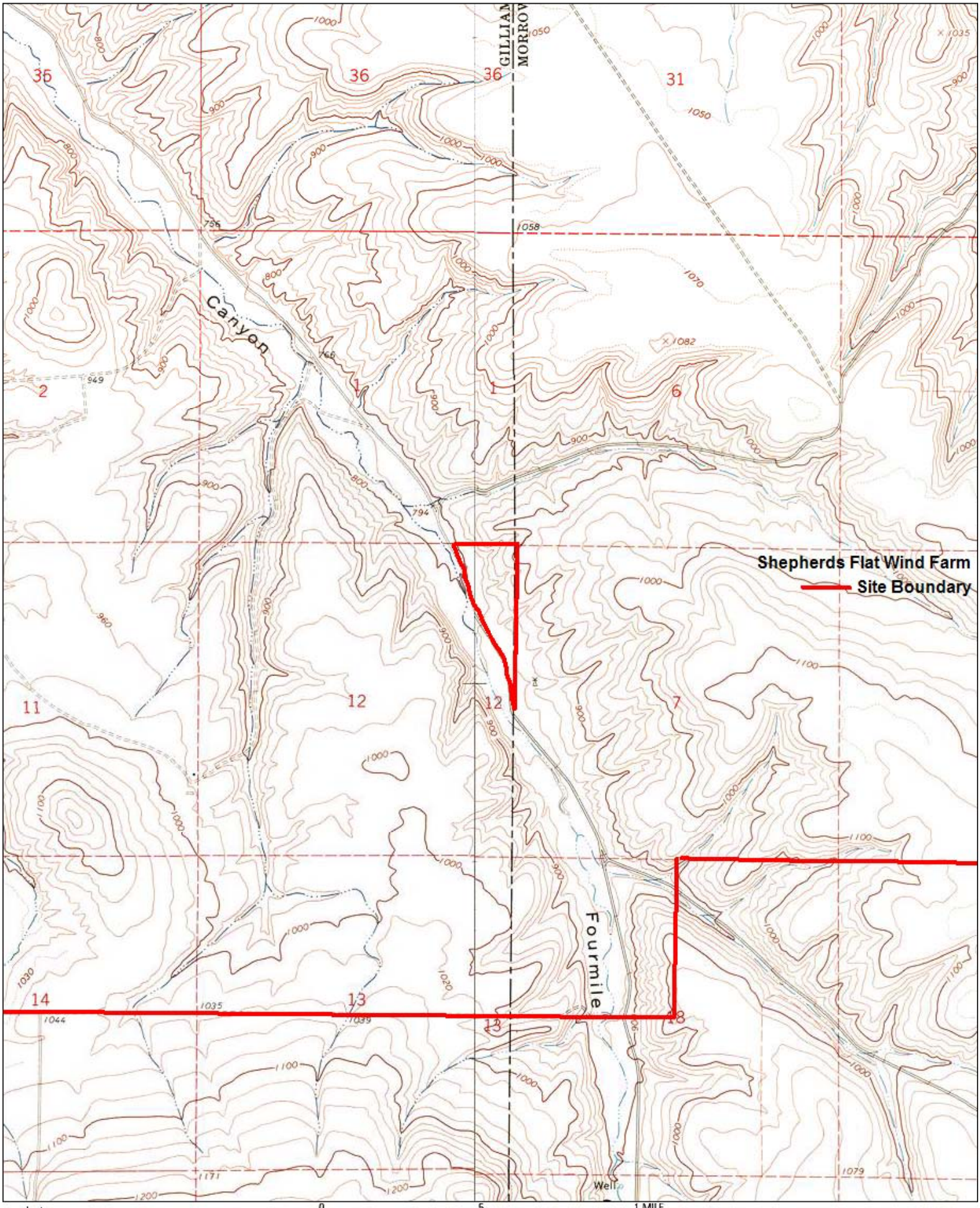
Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-24



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure C-25



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

EXHIBIT D

ORGANIZATIONAL EXPERTISE

Information about the organization expertise of the applicant to construct and operate the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0010, including:

(A) The applicant's previous experience, if any, in constructing and operating similar facilities;

(B) The qualifications of the applicant's personnel who will be responsible for constructing and operating the facility, to the extent that the identities of such personnel are known when the application is submitted;

(C) The qualifications of any architect, engineer, major component vendor, or prime contractor upon whom the applicant will rely in constructing and operating the facility, to the extent that the identities of such persons are known when the application is submitted;

(D) The past performance of the applicant, including but not limited to the number and severity of any regulatory citations in constructing or operating a facility, type of equipment, or process similar to the proposed facility;

(E) If the applicant has no previous experience in constructing or operating similar facilities and has not identified a prime contractor for construction or operation of the proposed facility, other evidence that the applicant can successfully construct and operate the proposed facility. The applicant may include, as evidence, a warranty that it will, through contracts, secure the necessary expertise; and

(F) If the applicant has an ISO 9000 or ISO 14000 certified program and proposes to design, construct and operate the facility according to that program, a description of the program;

(G) If the applicant relies on mitigation to demonstrate compliance with any standards of Division 22 or 24 of this chapter, evidence that the applicant can successfully complete such proposed mitigation, including past experience with other projects and the qualifications and experience of personnel upon whom the applicant will rely, to the extent that the identities of such persons are known at the date of submittal.

ORGANIZATIONAL EXPERTISE, CAITHNESS ENERGY, L.L.C.

Caithness Energy, L.L.C. ("Caithness"), the parent company of Caithness Shepherds Flat, LLC, is a privately owned company based in New York City specializing in power plant development, operations and asset management. Caithness' primary focus for more than 20 years has been to develop, finance, own, and operate power projects, which utilize natural gas, geothermal, wind, and solar energy. Caithness' efforts have resulted in a portfolio of some of the premier energy projects in the United States, making Caithness one of the largest privately held independent power producers.

Caithness and its affiliates have ownership in 32 power projects, including 1,439 MW of gas turbine projects, 60MW of diesel projects, 420 MW of geothermal projects, 375 MW of wind projects, 160 MW of solar projects and 27 MW of hydroelectric projects.

Caithness operates 14 of its projects and provides asset management services for all 32 projects. The operators and managers are experienced in all aspects of power production.

In addition to the current operating portfolio, Caithness has approximately 850 additional megawatts of production at varying stages of development, including a 350 MW facility located in Long Island, NY which is expected to begin construction this spring. Other development projects include Blythe II in California and the 118-mile Desert Southwest Transmission Line.

EXHIBIT E

CONSTRUCTION AND OPERATION PERMITS

Information about permits needed for construction and operation of the facility, including:

(A) Identification of all federal, state and local government permits needed before construction and operation of the proposed facility, legal citation of the statute, rule or ordinance governing each permit, and the name, address and telephone number of the agency or office responsible for each permit.

(B) A description of each permit and the reasons the permit is needed for construction or operation of the facility.

(C) For state or local government permits or approvals for which the Council must determine compliance with applicable standards, evidence to support findings by the Council that construction and operation of the proposed facility will comply with all statutes, rules and standards applicable to the permit. The applicant may show this evidence:

(i) In Exhibit J for permits related to wetlands;
(ii) In Exhibit O for permits related to water rights.

(D) For federally-delegated permit applications, evidence that the responsible agency has received a permit application and the estimated date when the responsible agency will complete its review and issue a permit decision.

(E) If the applicant will not itself obtain a state or local government permit or approval for which the Council would ordinarily determine compliance but instead relies on a permit issued to a third party, identification of any such third-party permit and for each:

(i) Evidence that the applicant has, or has a reasonable likelihood of entering into, a contract or other agreement with the third party for access to the resource or service to be secured by that permit;
(ii) Evidence that the third party has, or has a reasonable likelihood of obtaining, the necessary permit; and
(iii) An assessment of the impact of the proposed facility on any permits that a third party has obtained and on which the applicant relies to comply with any applicable Council standard.

(F) If the applicant relies on a federally-delegated permit issued to a third party, identification of any such third-party permit and for each:

(i) Evidence that the applicant has, or has a reasonable likelihood of entering into, a contract or other agreement with the third party for access to the resource or service to be secured by that permit;
(ii) Evidence that the responsible agency has received a permit application; and
(iii) The estimated the date when the responsible agency will complete its review and issue a permit decision.

(G) The applicant's proposed monitoring program, if any, for compliance with permit conditions;

PERMITS NEEDED

Federal Permits

Permit	Agency
Notice of Proposed Construction or Alteration 14 CFR Part 77	Federal Aviation Administration Northwest Mountain Region 1601 Lind Avenue, SW Suite 315 Renton, WA 98055

The Federal Aviation Administration requires the installation of aircraft hazard lighting on all structures more than 200 feet in height. Facility turbines will exceed this limit.

State Permits: Federally Delegated

Permit	**Agency**
National Pollutant Discharge Elimination System (NPDES) General Permit Clean Water Act, Section 402, 40 CFR Part 122; ORS Chapter 468B, OAR Chapter 340 Division 40	Oregon Department of Environmental Quality Water Quality 811 SW 6th Avenue Portland, OR 97204 (503) 229-5279

The U. S. Environmental Protection Agency has delegated authority to DEQ to issue NPDES Storm Water Discharge permits for construction and operation activities. The General Permit is required when there will be discharge into the waters of the United States. While the facility itself will not discharge any water, in the event of a severe rain storm, it is possible that there will be run-off from the project site. The Council may rely on the determinations of compliance and the conditions or the federally-delegated permit in making its determination about whether other standards and requirements under the Council's jurisdiction are met.

State Permits

Permit	Agency
Energy Facility Site Certificate OAR Chapter 345, Divisions 1,21,22,24,26 and 27.	Energy Facility Siting Council Oregon Office of Energy 625 Marion Street, NE—Suite 1 Salem, OR 97301 (503) 378-4040

Oregon requires an Energy Facility Site Certificate from the Energy Facility Siting Council for facilities when the average electric generating capacity is 35 megawatts or more if the power is produced from wind energy. The proposed facility exceeds that limit.

Archaeological Permit ORS 97.745, ORS 358.920, ORS 390.010 and -.235, OAR Chapter 736, Division 51.	Oregon Parks and Recreation Department

An archaeological permit may be required to conduct archaeological investigations of the site.

Water Pollution Control Facility (WPCF) Permit ORS Chapter 468B, OAR Chapter 340, Divisions 45 and 71.	Oregon Department of Environmental Quality Water Quality 811 SW 6th Avenue Portland, OR 97204 (503) 229-5279

If applicant intends to discharge sanitary wastes to an on-site septic system during operation, the facility may need a WPCF permit depending on the design capacity of the system. Applicant must first verify that the site is suitable for an on-site septic system by applying to DEQ or its designated agency for a site evaluation of groundwater and soil conditions. However, no on-site septic system is proposed.

Water Right ORS Chapters 536 through 540, OAR Chapter 690, Divisions 1 through 410.	Water Resources Department Water Rights Division

Under Oregon law, all water is publicly owned. The Applicant intends to purchase the water used during facility construction from commercial suppliers. No new water rights nor transfer of existing water rights is expected to be required.

Permit	Agency
Removal-Fill Permit ORS 196.800-.900, OAR Chapter 141, Division 85.	Oregon Department of State Lands

A removal-fill permit is required if 50 cubic yards or more of material is removed, filled or altered within a jurisdictional water of the State (OAR 141-085-0015). However, the Applicant does not intend to fill or alter material within the jurisdictional water of the State.

Oversize Load Movement Permit/Load Registration ORS 818.030; OAR ch 734 div 82	Oregon Department of Transportation Motor Carriers Transportation Division 550 Capitol Street, NE Salem, OR 97301 (503) 378-1289

Wind turbine nacelles, towers and rotors are large and heavy. Special transportation equipment required to move these facility components, and oversize load permits are required.

County Permits

Conditional Use Permit Applicable substantive criteria from county codes and comprehensive plan.	Gilliam County, Oregon

Applicant requests a Council determination regarding land use in accordance with ORS 469.504(1)(b).

Conditional Use Permit Applicable substantive criteria from county codes and comprehensive plan.	Morrow County, Oregon

Applicant requests a Council determination regarding land use in accordance with ORS 469.504(1)(b).

EXHIBIT F

PROPERTY OWNERS OF RECORD

A list of the names and mailing addresses of all owners of record, as shown on the most recent property tax assessment roll, of property located within or adjacent to the corridor(s) the applicant has selected for analysis as described in subsection (b) and property located within or adjacent to the site of the proposed facility. The applicant shall submit an updated list of property owners as requested by the Office of Energy before the Office issues notice of any public hearing on the application for a site certificate as described in OAR 345-015-0220. In addition to incorporating the list in the application for a site certificate, the applicant shall submit the list to the Office in electronic format suitable to the Office for the production of mailing labels. Property adjacent to the proposed site of the facility or corridor means property that is:

(A) Within 100 feet of the site or corridor, where the site or corridor is within an urban growth boundary;

(B) Within 250 feet of the site or corridor, where the site or corridor is outside an urban growth boundary and not within a farm or forest zone; and

(C) Within 500 feet of the site or corridor, where the site or corridor is within a farm or forest zone;

PROPERTY OWNERS

The site is within a farm zone. Property owners of record within the site or within 500 feet of the site are:

Owner Name	Mailing Address
State of Oregon C/O Parks and Recreation Dept.	1115 Commercial NE Salem, OR 97310
United States of America Bureau of Land Management	PO Box 550 Prineville, OR 97754
J. R. Krebs	PO Box 8 Arlington, OR 97812
BAIC, Inc. C/O Threemile Canyon Farms Attn: Mr. Martin Myers	75906 Threemile Road Boardman, OR 97818
Geo. G. & Lorene Griffith	68496 Hwy. 74 Ione, OR 97843

Owner Name	Mailing Address
Don W. & Patricia A. Phillips	PO Box 689 Beaver Creek, OR 97004
Brian L. & Lorence L. Sullivan	75181 Sullivan Road Ione, OR 97843
Richard, Joanne & Mark Goodhead	75398 Hwy. 74 Ione, OR 97843
Eugene S. Logan, Jr.	75396 Hwy. 74 Ione, OR 97843
Raymond & Nawarat Treveno	735 E. View Drive Hermiston, OR 97838
Pacific Power & Light Co.	825 N.E. Mulnomah Suite 1900 Portland, OR 97232
Jarrod & Alison Ogden	74475 Hwy. 74 Ione, OR 97843
Joseph V. & Cheryl L. Taylor	78559 Paul Smith Rd. Boardman, OR 97818
Portland General Electric Co.	121 S Salmon Street Portland, OR 97204
Clinton H. & Maureen C. Krebs Skye H. & Penny M. Krebs	69956 Hwy. 74 Ione, OR 97843
Oregon Department of Transportation	417 Transportation Bldg. Salem, OR 97310
State Highway Commission	135 Transportation Bldg. Salem, OR 97310
Harry P. & Linda M. Moffitt	PO Box 2303 Gresham, OR 97030
Willow Farms, LLC	415 E Mill Plain Blvd. Vancouver, WA 98660

Owner Name	Mailing Address
Vic Jansen Randy & Nancy Allred	406 W Broadway S Moses Lake, WA 98837
Crum Ranches, LLC Monty Crum Ranches, LLC	PO Box 121 Ione, OR 97843
Thomas F. Sumner Living Trust Phyllis A. Sumner Living Trust	PO Box 8 Arlington, OR 97812
Dana & Tonya Heideman Loren A. & Della Heideman	68809 Four Mile Canyon Rd. Ione, OR 97843
Eastern Z Farms, LLC	12423 River Rd. N Gervais, OR 97026
American Exchange Services, Inc.	320 Church Street Salem, OR 97308
Ronald W. Haguewood	PO Box 407 Ione, OR 97843
Morrow County	PO Box 788 Heppner, OR 97836
Barbara A. Nelson	72521 Tutuilla Creek Rd. Pendleton, OR 97801
George E. Miller Trust C/O Wells Fargo	PO Box 13519 Arlington, TX 76094
Justin C. & Stacie J. Miller	PO Box 374 Ione, OR 97843
Keven & Linda Haguewood et. al.	PO Box 195 Ione, OR 97843
Howard E. Crowell, Jr. Kathy Jo Crowell	68104 Hwy. 74 Ione, OR 97843
British-American Mortgage Co. C/O Fuhrman Dev. Co.	236 SE Spokane St. Portland, OR 97202

Owner Name	Mailing Address
Macwheat, Inc.	PO Box 28 Ione, OR 97843
Mary Knowles, Trustee	67207 Little Butter Creek Heppner, OR 97836
Pete & Laurel Cannon	PO Box 255 Ione, OR 97843
Four Mile Land Co.	68809 Four Mile Canyon Rd. Ione, OR 97843
Brad D. & Grace C. Clement	67505 Hwy. 74 Ione, OR 97843
J.P. Sullivan	PO Box 362 Ione, OR 97843
Gerald R. & Linda J. Miller	PO Box 321 Ione, OR 97843
Robert A. Barnes	66791 Hwy. 74 Ione, OR 97843
Christy L. Buscher C/O Robert Barnes	66791 Hwy. 74 Ione, OR 97843
Terri Schaber, Trustee Terri Schaber	PO Box 147 Ione, OR 97843
R. C. & Gayleen Miller	66066 Hwy. 74 Ione, OR 97843
Larry & Elvita Engelgau	01816 SW Palatine Hill Rd. Portland, OR 97819
State of Oregon	417 Transportation Bldg. Salem, OR 97310
Proudfoot Ranches, Inc.	PO Box 28 Ione, OR 97843

Owner Name	Mailing Address
Joe D. & Donna M. Reitmann	PO Box 302 Ione, OR 97843
Marvin & Beverly Boyle	PO Box 347 Ione, OR 97843

EXHIBIT G

MATERIALS ANALYSIS

A materials analysis including:

(A) An inventory of substantial quantities of industrial materials flowing into and out of the proposed facility during construction and operation;

(B) The applicant's plans to manage hazardous substances during construction and operation, including measures to prevent and contain spills; and

(C) The applicant's plans to manage non-hazardous waste materials during construction and operation;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit G as follows:

> [Applicant] must include in the application a list of all hazardous materials that might be stored or used at the facility site during construction and operation. [Applicant] must comply with DEQ regulations concerning the use, clean up and disposal of hazardous materials. The requirement is incorporated in the general standard of review, OAR 345-022-0000.

MATERIALS

Industrial Materials

Construction

Industrial materials flowing into the site during construction:

- Rock and gravel used for the construction of new project roads and the improvement of existing roads.
- Concrete used for turbine and transformer foundations.
- Diesel fuel for on-site equipment.

No industrial materials are expected to flow out of the site.

Operations

No substantial quantities of industrial materials will flow into or out of the site during facility operations.

Hazardous Substances

Construction and operations personnel follow all federal, state, and local governmental regulation and guidelines when using, storing, transporting, or disposing of any hazardous

material which may be used in conjunction with the construction and operation of the facility. The facility will not use, store, transport or dispose of extremely hazardous material (40 Code of Federal Regulation 335). All lubricants, oils, greases, antifreeze, cleansers and degreasers, and hydraulic fluids which may be used in the operation of the facility will be kept in approved containers.

All construction vehicles and equipment will be maintained and serviced in accordance with manufacturer recommendations to minimize leaks of motor oils, hydraulic fluids and fuels. The refueling and maintenance of vehicles that are authorized for highway travel will be performed off-site at an appropriate facility.

Wind turbines and transformers use lubricants, oils, greases, antifreeze, cleansers and degreasers, and hydraulic fluids. None of these products contains any compounds listed as extremely hazardous by the US Environmental Protection Agency. They are used in moderate quantities and are contained entirely within the spill trap and nacelle of the turbine so that the possibility of accidental leakage is minimal. Lubricants, hydraulic fluids, antifreeze and oils will be checked quarterly, filled as needed and changed every one to two years, as recommended by the manufacturer. Spent lubricants, hydraulic fluids, antifreeze, cleansers and degreasers, and oils will be recycled by a certified waste contractor.

Transformers contain cooling oil, which does not contain polychlorinated biphenyls (PCBs). Inspection of each transformer will be performed on a regular basis.

Towers and other project equipment will arrive at the site painted, and rarely need repainting during the life of the equipment. Should any repainting be necessary, it will be performed by licensed contractors in full compliance with applicable laws and regulations.

Herbicides, if used at all, will be used at landowner request to minimize the potential for introduction of any weed species into adjacent areas. Any application of herbicides will be done either by the landowner or, after consultation with the landowner, by a contract professional charged with observance of all regulations governing use and selection of herbicides. Herbicides will not be stored on-site nor any excess herbicides disposed of on the project site.

EXHIBIT H

GEOLOGICAL AND SOIL STABILITY

Information from reasonably available sources regarding the geological and soil stability of the site and vicinity, providing evidence to support findings by the Council as required by OAR 345-022-0020, including:

(A) A description of the geological features and topography of the site and vicinity;

(B) A description of site specific geological and geotechnical work performed or planned to be performed before construction. The applicant shall include:

(i) A proposed schedule for geotechnical work;
(ii) A description of the nature and extent of the work with a discussion of the methods used to assess the expected ground response, including amplification, at the site;
(iii) A list of the professional literature relied on in characterizing the site; and
(iv) The names of the personnel responsible for the work and a description of their relevant experience;

(C) For all transmission lines, a description of locations along the proposed route where the applicant proposes to perform site specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, dead ends, corners, and portions of the proposed route where geologic reconnaissance and other site specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction;

(D) For all pipelines that would carry explosive, flammable or hazardous materials, a description of locations along the proposed route where the applicant proposes to perform site specific geotechnical work, including but not limited to railroad crossings, major road crossings, river crossings, and portions of the proposed alignment where geologic reconnaissance and other site specific studies provide evidence of existing landslides or marginally stable slopes that could be made unstable by the planned construction;

(E) A map showing the location of existing and significant potential geological and soil stability hazards and problems, if any, on the site and in its vicinity that could adversely affect, or be aggravated by, the construction and operation of the proposed facility;

(F) An assessment of seismic hazards. For the purposes of this assessment, the maximum probable earthquake (MPE) is the maximum earthquake that could occur under the known tectonic framework with a 10 percent chance of being exceeded in a 50 year period. If seismic sources are not mapped sufficiently to identify the ground motions above, the applicant shall provide a probabilistic seismic hazard analysis to identify the peak ground accelerations expected at the site for a 500 year recurrence interval and a 5000 year recurrence interval. In the assessment, the applicant shall include:

(i) Identification of the Oregon Building Code Seismic Zone designation for the site;

(ii) Identification and characterization of all earthquake sources capable of generating median peak ground accelerations greater than 0.05g on rock at the site. For each earthquake source, the applicant shall assess the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE) and the MPE;

(iii) A description of any recorded earthquakes within 50 miles of the site and of recorded earthquakes greater than 50 miles from the site that caused ground shaking at the site more intense than the Modified Mercalli III intensity. The applicant shall include the date of occurrence and a description of the earthquake that includes its magnitude and highest intensity and its epicenter location or region of highest intensity;

(iv) Assessment of the median ground response spectrum from the MCE and the MPE and identification of the spectral accelerations greater than the design spectrum provided in the Oregon Building Code. The applicant shall include a description of the probable behavior of the subsurface materials and amplification by subsurface materials and any topographic or subsurface conditions that could result in expected ground motions greater than those characteristic of the Oregon Building Code Seismic Zone identified above; and

(v) An assessment of seismic hazards expected to result from reasonably probable seismic events. As used in this rule "seismic hazard" includes ground shaking, landslide, lateral spreading, liquefaction, tsunami inundation, fault displacement, and subsidence;

(G) An assessment of soil-related hazards such as landslides, flooding and erosion which could, in the absence of a seismic event, adversely affect or be aggravated by the construction or operation of the facility;

(H) An explanation of how the applicant will design, engineer and construct the facility to avoid dangers to human safety from the seismic hazards identified in paragraph (F). The applicant shall include proposed design and engineering features, applicable construction codes, and any monitoring for seismic hazards; and

(I) An explanation of how the applicant will design, engineer and construct the facility to adequately avoid dangers to human safety presented by the hazards identified in paragraph (G);

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit H as follows:

> All paragraphs apply, except that references to the "Oregon Building Code Seismic Zone" in paragraphs (F)(i) and (iv) are outdated. The applicant should instead discuss design standards or criteria from the 2004 Oregon Structural Specialty Code. [Applicant] should consult with the Oregon Department of Geology and Mineral Industries regarding information to include in the site certificate application.

Separately, the Oregon Department of Geology and Mineral Industries (DOGAMI) has commented on the need for adequate information about geologic hazards and geotechnical analysis. In its letter dated July 24, 2006, DOGAMI set forth its recommendations with respect to information to be included in the site certificate application as follows:

Specifically, the applicant should provide the acknowledgement of future studies of the project area including a detailed geologic hazards assessment (including seismic hazards) and a site-specific geotechnical evaluation. These assessments should include, but not be limited to seismic, slope stability, and erosion hazards at the proposed facility. The geotechnical and seismic evaluations should also include subsurface explorations and provide adequate supporting evidence to determine if the facility can be safely built and operated.

Based on the potential of these hazards, we suggest that the "analysis area" should extend well beyond the site boundaries so that any potential geologic hazards affecting the site are included in the study.

SEISMIC AND GEOTECHNICAL EVALUATIONS

Site-specific seismic and geotechnical evaluations of the project area will be completed before the commencement of construction. The evaluations will assess subsurface soil and geological conditions and provide information that will be used to identify geological or geotechnical hazards and facilitate the design of turbine foundations and other project structures.

A preliminary geotechnical engineering study of a portion of the facility site has been completed and may be found at Attachment H.

Figure H-1 shows know fault lines in the vicinity of the facility site.

Figure H-1

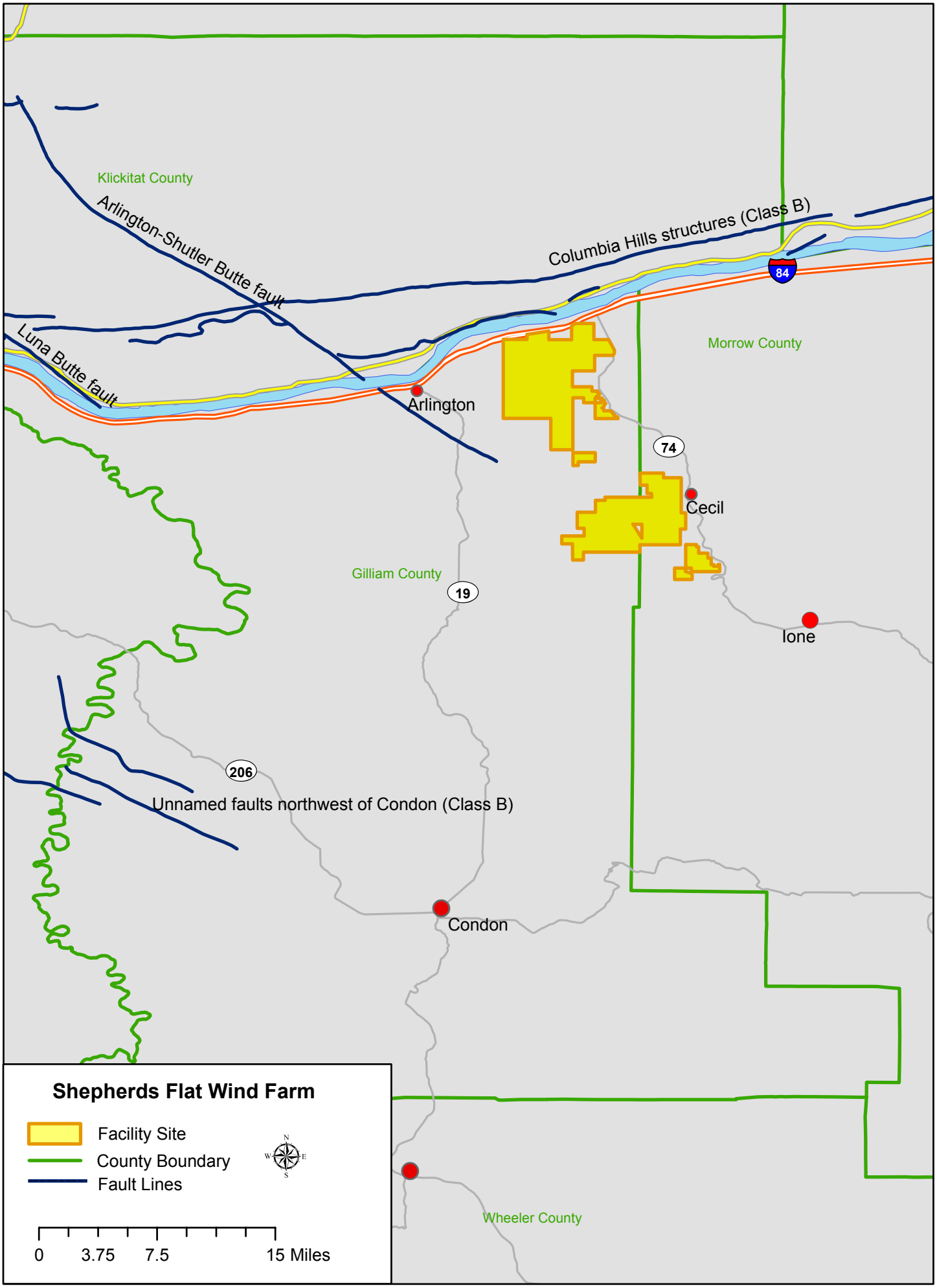

Klickitat County
Arlington-Shutler Butte fault
Columbia Hills structures (Class B)
84
Luna Butte fault
Morrow County
Arlington
74
Cecil
Gilliam County
19
Ione
206
Unnamed faults northwest of Condon (Class B)
Condon
Wheeler County
Shepherds Flat Wind Farm
Facility Site
County Boundary
Fault Lines
N
W
E
S
0
3.75
7.5
15 Miles

EXHIBIT I

SOIL CONDITIONS

Information from reasonably available sources regarding soil conditions and uses of the site and vicinity, providing evidence to support findings by the Council as required by OAR 345-022-0022, including:

(A) Identification and description of the major soil types at the site and its vicinity;

(B) Identification and description of any land uses on the proposed site and in its vicinity, such as growing crops, that require or depend on productive soils;

(C) Identification and assessment of significant potential adverse impact to soils from construction, operation and retirement of the facility, including, but not limited to, erosion and chemical factors such as salt deposition from cooling towers, land application of liquid effluent, and chemical spills;

(D) A description of any measures the applicant proposes to avoid or mitigate adverse impact to soils; and

(E) The applicant's proposed monitoring program, if any, for impact to soils;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit I as follows:

> All paragraphs apply. Include information describing the impact of construction and operation of the proposed facility on soil productivity in farm zones. Describe all measures proposed to maintain soil productivity during construction and operation. The applicant should consult with local farmers, landowners and soil conservation districts regarding mitigation of impacts to farmland.

SOILS

Northern Project Area

Soil types found in the northern portion of the project are listed below (data from the Natural Resources Conservation Service):

Township	Range	Section	#	Soil Unit Name(s)
3N	22E	3	29D	Quincy-Rock outcrop complex, 1 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	5	29D	Quincy-Rock outcrop complex, 1 to 20 percent slopes
			22F	Nansene silt loam, 35 to 70 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	7	22F	Nansene silt loam, 35 to 70 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	8	39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	9	38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	10	38A	Roloff silt loam, 0 to 2 percent slopes
			38B	Roloff silt loam, 2 to 7 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	11	15E	Lickskillet very stony loam, 7 to 40 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			38B	Roloff silt loam, 2 to 7 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
3N	22E	15	38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	16	14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	17	14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	18	38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
3N	22E	19	14B	Krebs silt loam, 2 to 5 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
3N	22E	21	4C	Blalock loam, 2 to 12 percent slopes
			14B	Krebs silt loam, 2 to 5 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
3N	22E	27	4C	Blalock loam, 2 to 12 percent slopes
			13	Kimberly fine sandy loam
			14D	Krebs silt loam, 5 to 20 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
3N	22E	28	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
3N	22E	29	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			38A	Roloff silt loam, 0 to 2 percent slopes
3N	22E	31	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			24D	Olex gravelly silt loam, 5 to 20 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			25D	Olex roloff complex, 5 to 20 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			56B	Willis silt loam, 2 to 5 percent slopes
3N	22E	32	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			23D	Olex silt loam, 12 to 20 percent slopes
			24D	Olex gravelly silt loam, 5 to 20 percent slopes
			38A	Roloff silt loam, 0 to 2 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
3N	22E	33	4C	Blalock loam, 2 to 12 percent slopes
			14D	Krebs silt loam, 5 to 20 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			23D	Olex silt loam, 12 to 20 percent slopes
			24D	Olex gravelly silt loam, 5 to 20 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
2N	22E	4	13	Kimberly fine sandy loam
			15E	Lickskillet very stony loam, 7 to 40 percent slopes
			23B	Olex silt loam, 0 to 5 percent slopes
			24E	Olex gravelly silt loam, 20 to 40 percent slopes
			39D	Roloff rock outcrop complex, 1 to 20 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
			41C	Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes
			58	Xeric torrifluvents, nearly level
2N	22E	9	13	Kimberly fine sandy loam
			15E	Lickskillet very stony loam, 7 to 40 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes
			40E	Sagehill fine sandy loam, 20 to 40 percent slopes
			41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
			41C	Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes
2N	22E	15	40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			40C	Sagehill fine sandy loam, 5 to 12 percent slopes
			40D	Sagehill fine sandy loam, 12 to 20 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes

A map showing these soils in the northern project area may be found at Figure I-1.

These northern soils are generally shallow and rocky and cannot be tilled. Livestock, primarily sheep, have been winter-grazed in the whole of the northern area since the early 1900s. The soil will not support summer grazing.

The area is crisscrossed with informal roads and four-wheel-drive "trails" which facilitate water delivery for stock and the movement of the sheep camps. The landowners believe that the introduction of formal project roads will improve soils and forage, as future traffic will be restricted to these routes, controlling soil compaction and vegetation destruction in the balance of the property. The site has frequent summer grass fires. New project roads will provide both fire breaks and remote site access. Both should help retain vegetation and improve soil stability.

Southern project area

Soil types found in the southern portion of the project are listed below (data from the Natural Resources Conservation Service):

Township	Range	Section	#	Soil Unit Name(s)
2N	23E	19	70B	Warden very fine sandy loam, 2 to 5 percent slopes
			70C	Warden very fine sandy loam 5 to 12 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71B	Warden silt loam, 2 to 5 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
			78	Xeric Torriorthents, nearly level
2N	23E	20	12	Esquatzel silt loam
			22	Kimberly fine sandy loam
			70B	Warden very fine sandy loam, 2 to 5 percent slopes
			70C	Warden very fine sandy loam 5 to 12 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	21	12	Esquatzel silt loam
			22	Kimberly fine sandy loam
			70B	Warden very fine sandy loam, 2 to 5 percent slopes
			70C	Warden very fine sandy loam 5 to 12 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	27	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	28	12	Esquatzel silt loam
			22	Kimberly fine sandy loam
			45D	Ritzville silt loam,12 to 20 percent slopes
			70B	Warden very fine sandy loam, 2 to 5 percent slopes
			70C	Warden very fine sandy loam, 5 to 12 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	29	12	Esquatzel silt loam
			18E	Hankins silt loam, 5 to 35 percent south slopes
			22	Kimberly fine sandy loam
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			70D	Warden very fine sandy loam, 12 to 20 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
			77F	Wrenthamrock outcrop complex, 35 to 70 percent slopes
2N	23E	30	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			47E	Ritzville silt loam, 20 to 40 percent south slopes
			70D	Ritzville silt loam, 12 to 20 percent slopes
			71B	Warden silt loam, 2 to 5 percent slopes
			71C	Warden silt loam, 5 to 12 percent slopes
			71E	Warden silt loam, 20 to 40 percent slopes
2N	23E	34	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
2N	23E	33	22	Kimberly fine sandy loam
			28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
2N	23E	32	13D	Gravden very gravelly loam, 5 to 20 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
1N	23E	4	12	Esquatzel silt loam
			22	Kimberly fine sandy loam
			28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
1N	23E	5	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam, 7 to 12 percent slopes
			45D	Ritzville silt loam, 12 to 20 percent slopes
			46E	Ritzville silt loam, 20 to 40 percent north slopes
2N	23E	31	13D	Gravden very gravelly loam, 5 to 20 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
1N	23E	6	13D	Gravden very gravelly loam, 5 to 20 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
1N	23E	7	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			71B	Warden silt loam, 2 to 5 percent slopes
			71D	Warden silt loam, 12 to 20 percent slopes
			75B	Willis silt loam, 2 to 5 percent slopes
1N	23E	8	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
1N	23E	18	45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			75B	Willis silt loam, 2 to 5 percent slopes
1N	23E	16	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
			47E	Ritzville silt loam, 20 to 40 percent south slopes
1N	23E	21	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			45D	Ritzville silt loam 12 to 20 percent slopes
			75D	Willis silt loam, 12 to 20 percent slopes
1N	23E	22	13E	Gravden very gravelly loam, 20 to 40 percent slopes
			28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			45D	Ritzville silt loam 12 to 20 percent slopes
			75D	Willis silt loam, 12 to 20 percent slopes
1N	23E	19	45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
			46E	Ritville silt loam, 20 to 40 percent north slopes
			47E	Ritzville silt loam, 20 to 40 percent south slopes
1N	23E	20	28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
1N	23E	28	28E	Lickskillet very stony loam, 7 to 40 percent slopes
			45B	Ritzville silt loam, 2 to 7 percent slopes
			45C	Ritzville silt loam 7 to 12 percent slopes
1N	23E	29	28E	Lickskillet very stony loam, 7 to 40 percent slopes
2N	22E	34	55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
2N	22E	35	13	Kimberly fine sandy loam
			24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
2N	22E	36	24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
1N	22E	3	55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	2	24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55D	Warden silt loam, 12 to 20 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	1	13	Kimberly fine sandy loam
			24D	Olex silt loam, 12 to 20 percent slopes
			32B	Ritzville silt loam, 2 to 7 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes

Township	Range	Section	#	Soil Unit Name(s)
			55D	Warden silt loam, 12 to 20 percent slopes
1N	22E	9	40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
1N	22E	10	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			40B	Sagehill fine sandy loam, 2 to 5 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
1N	22E	11	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			55B	Warden silt loam, 2 to 5 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	12	32B	Ritzville silt loam, 2 to 7 percent slopes
			34E	Ritzville silt loam, 20 to 40 percent south slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	13	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			32D	Ritzville silt loam, 12 to 20 percent slopes
			34E	Ritzville silt loam, 20 to 40 percent south slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	14	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes
			55C	Warden silt loam, 5 to 12 percent slopes
			55E	Warden silt loam, 20 to 40 percent slopes
1N	22E	15	32B	Ritzville silt loam, 2 to 7 percent slopes
			32C	Ritzville silt loam, 7 to 12 percent slopes

A map showing these soils in the southern project area may be found at Figure I-2.

The southern soils are deeper, but productivity is poor due to limited water resources: the project area is not irrigated, and fields are sometimes left unplanted in order to "bank" moisture. All land flat enough to plow is planted, when possible, in dry land wheat, and project facilities are located largely in these tilled fields.

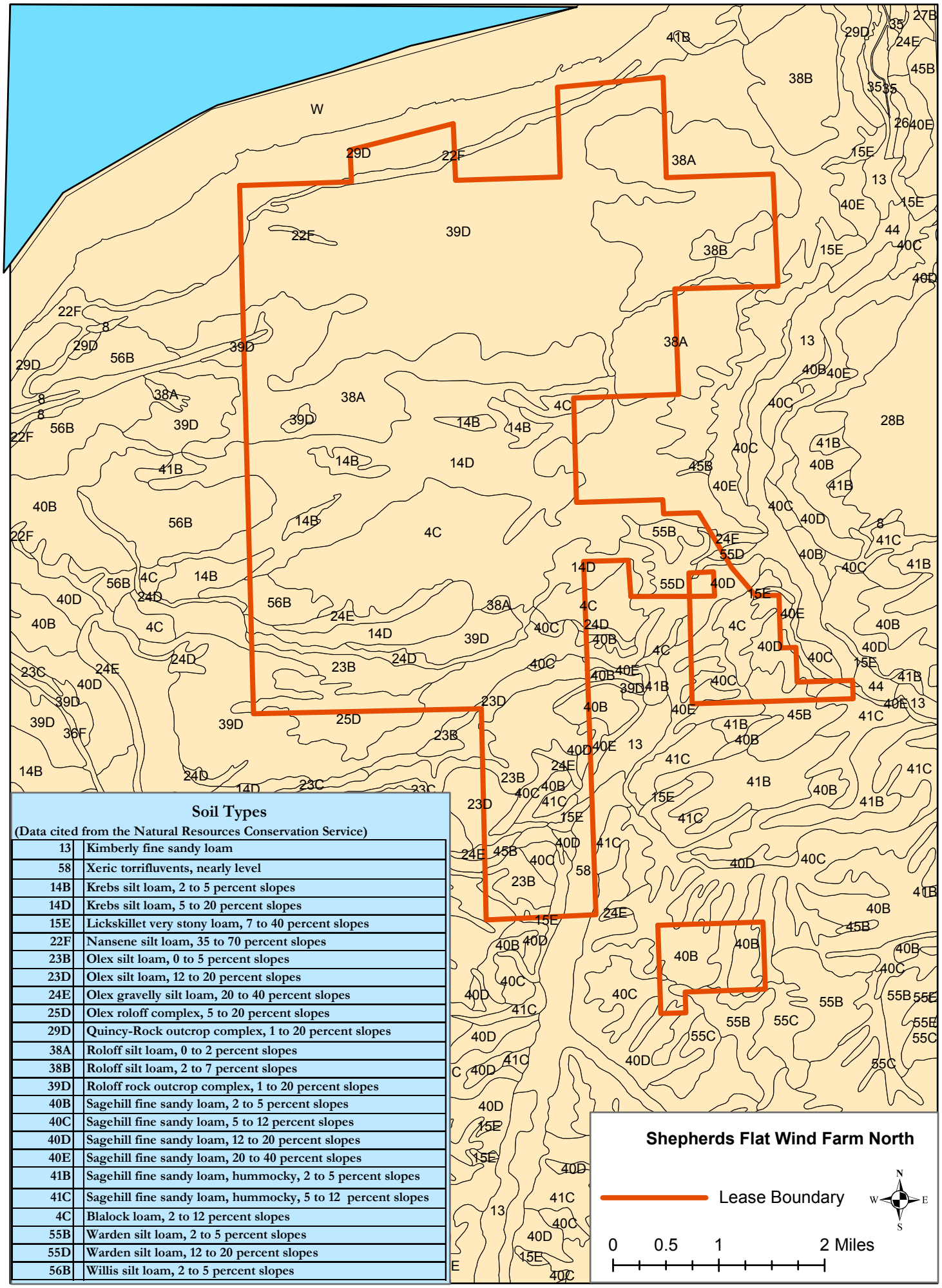
Facility construction will temporarily disrupt farming activities in fields that are cultivated but have not yet been harvested in the year of construction. Standard construction practices include enforcement of speed limits and water application as necessary in order to reduce wind-blown soil loss.

Project access roads interconnect with each other and are available for use by both project staff and the landowner, limiting soil damage caused by cross-field driving. During construction, the temporary disturbance width of project access roads may be up to 50 feet. The disturbance area

outside the finished width of twelve feet is not graveled, but rather formed from a compacted base of native soil. When the construction phase is complete, these areas will be plowed and planted by the landowner as appropriate.

Applicant's decision to purchase concrete from local sources rather than to install a concrete batch-plant within the project leased area was informed, in large measure, by efforts to reduce construction impacts on agricultural soils.

Figure I-1

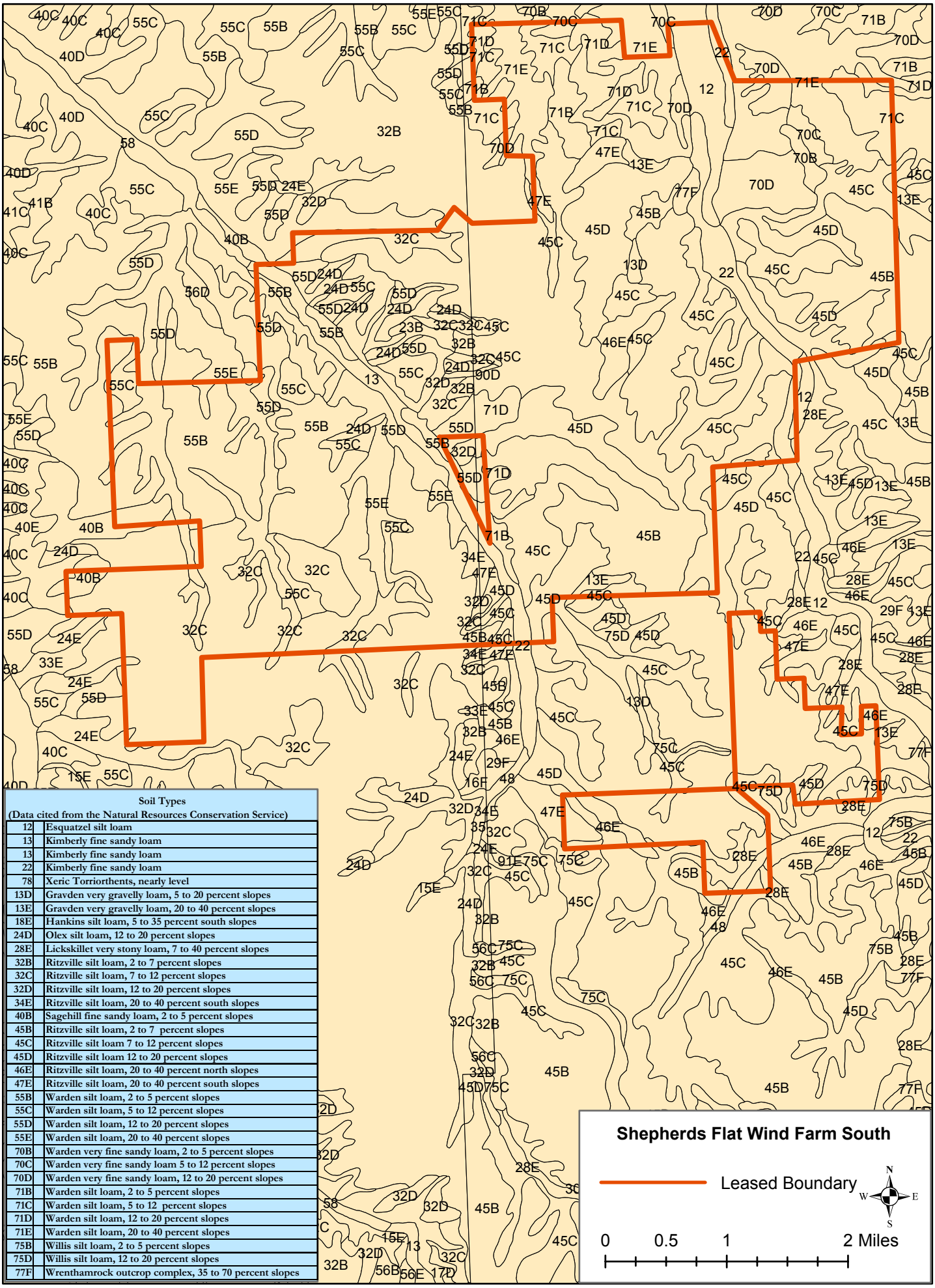


Soil Types

(Data cited from the Natural Resources Conservation Service)

13	Kimberly fine sandy loam
58	Xeric torrifluvents, nearly level
14B	Krebs silt loam, 2 to 5 percent slopes
14D	Krebs silt loam, 5 to 20 percent slopes
15E	Lickskillet very stony loam, 7 to 40 percent slopes
22F	Nansene silt loam, 35 to 70 percent slopes
23B	Olex silt loam, 0 to 5 percent slopes
23D	Olex silt loam, 12 to 20 percent slopes
24E	Olex gravelly silt loam, 20 to 40 percent slopes
25D	Olex roloff complex, 5 to 20 percent slopes
29D	Quincy-Rock outcrop complex, 1 to 20 percent slopes
38A	Roloff silt loam, 0 to 2 percent slopes
38B	Roloff silt loam, 2 to 7 percent slopes
39D	Roloff rock outcrop complex, 1 to 20 percent slopes
40B	Sagehill fine sandy loam, 2 to 5 percent slopes
40C	Sagehill fine sandy loam, 5 to 12 percent slopes
40D	Sagehill fine sandy loam, 12 to 20 percent slopes
40E	Sagehill fine sandy loam, 20 to 40 percent slopes
41B	Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes
41C	Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes
4C	Blalock loam, 2 to 12 percent slopes
55B	Warden silt loam, 2 to 5 percent slopes
55D	Warden silt loam, 12 to 20 percent slopes
56B	Willis silt loam, 2 to 5 percent slopes

Figure I-2



Soil Types (Data cited from the Natural Resources Conservation Service)	
12	Esquatzel silt loam
13	Kimberly fine sandy loam
13	Kimberly fine sandy loam
22	Kimberly fine sandy loam
78	Xeric Torriorthents, nearly level
13D	Gravden very gravelly loam, 5 to 20 percent slopes
13E	Gravden very gravelly loam, 20 to 40 percent slopes
18E	Hankins silt loam, 5 to 35 percent south slopes
24D	Olex silt loam, 12 to 20 percent slopes
28E	Lickskillet very stony loam, 7 to 40 percent slopes
32B	Ritzville silt loam, 2 to 7 percent slopes
32C	Ritzville silt loam, 7 to 12 percent slopes
32D	Ritzville silt loam, 12 to 20 percent slopes
34E	Ritzville silt loam, 20 to 40 percent south slopes
40B	Sagehill fine sandy loam, 2 to 5 percent slopes
45B	Ritzville silt loam, 2 to 7 percent slopes
45C	Ritzville silt loam 7 to 12 percent slopes
45D	Ritzville silt loam 12 to 20 percent slopes
46E	Ritzville silt loam, 20 to 40 percent north slopes
47E	Ritzville silt loam, 20 to 40 percent south slopes
55B	Warden silt loam, 2 to 5 percent slopes
55C	Warden silt loam, 5 to 12 percent slopes
55D	Warden silt loam, 12 to 20 percent slopes
55E	Warden silt loam, 20 to 40 percent slopes
70B	Warden very fine sandy loam, 2 to 5 percent slopes
70C	Warden very fine sandy loam 5 to 12 percent slopes
70D	Warden very fine sandy loam, 12 to 20 percent slopes
71B	Warden silt loam, 2 to 5 percent slopes
71C	Warden silt loam, 5 to 12 percent slopes
71D	Warden silt loam, 12 to 20 percent slopes
71E	Warden silt loam, 20 to 40 percent slopes
75B	Willis silt loam, 2 to 5 percent slopes
75D	Willis silt loam, 12 to 20 percent slopes
77F	Wrenthamrock outcrop complex, 35 to 70 percent slopes

EXHIBIT J

WETLANDS IMPACTS

Information based on literature and field study, as appropriate, about significant potential impacts of the proposed facility on wetlands that are within state jurisdiction under ORS Chapter 196, including:

(A) A determination, as defined in OAR 141-090-0020, of whether construction or operation of the proposed facility would affect any waters of the state, including wetlands, and, if so, a wetland delineation report, as defined in OAR 141-090-0020, describing how those waters would be affected;

(B) A wetland map, as defined in OAR 1141-090-0020, showing the location of any wetlands under state jurisdiction on or near the site and the source of the water for the wetlands, including any wetlands identified in the Statewide Wetland Inventory of the Division of State Lands;

(C) A description of each wetland identified in (A);

(D) A description of significant potential impact to each wetland, if any, including the nature and amount of material the applicant would remove from or place in each wetland and the specific locations where the applicant would remove or fill that material;

(E) Evidence that all required fill and removal permits of the Oregon Division of State Lands can be issued to the proposed facility in compliance with ORS 196.800 et seq., including:

(i) A discussion and evaluation of the factors listed in ORS 196.825 and OAR Chapter 141 Division 85; and

(ii) A description of the steps the applicant proposes to mitigate impacts to wetlands; and

(F) The applicant's proposed monitoring program, if any, for impacts to wetlands;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit J as follows:

> All paragraphs apply. This information should address all jurisdictional "waters of the state" and not just "wetlands" (OAR 141-085-0015).
>
> [Applicant] should include information in the application to support a finding whether a removal-fill permit is needed. [Applicant] should consult with the Department of State Lands and obtain its concurrence, which may require a formal delineation of wetlands and waters of the State within the site boundary. If a removal-fill permit is needed, the application must include an itemized demonstration of compliance with each applicable provision of ORS 196.825 and OAR 141-085-0029. If the permit is needed, the Council will make the issuing decision in consultation with the Department of State Lands.

WETLANDS AND WATERS OF THE STATE

The site of the Shepherds Flat Wind Farm has a low probability of containing wetlands or jurisdictional waters of the state. Figure J-1 shows those wetlands recorded in the US Fish & Wildlife, Branch of Habitat Assessment, National Wetland Inventory.

The Department of State Lands has requested a wetlands and waters survey, which, in consultation with the Department of State Lands, is underway but not yet completed. The survey, when completed, will inform the need for and scope of federal and state permits.

Figure J-1

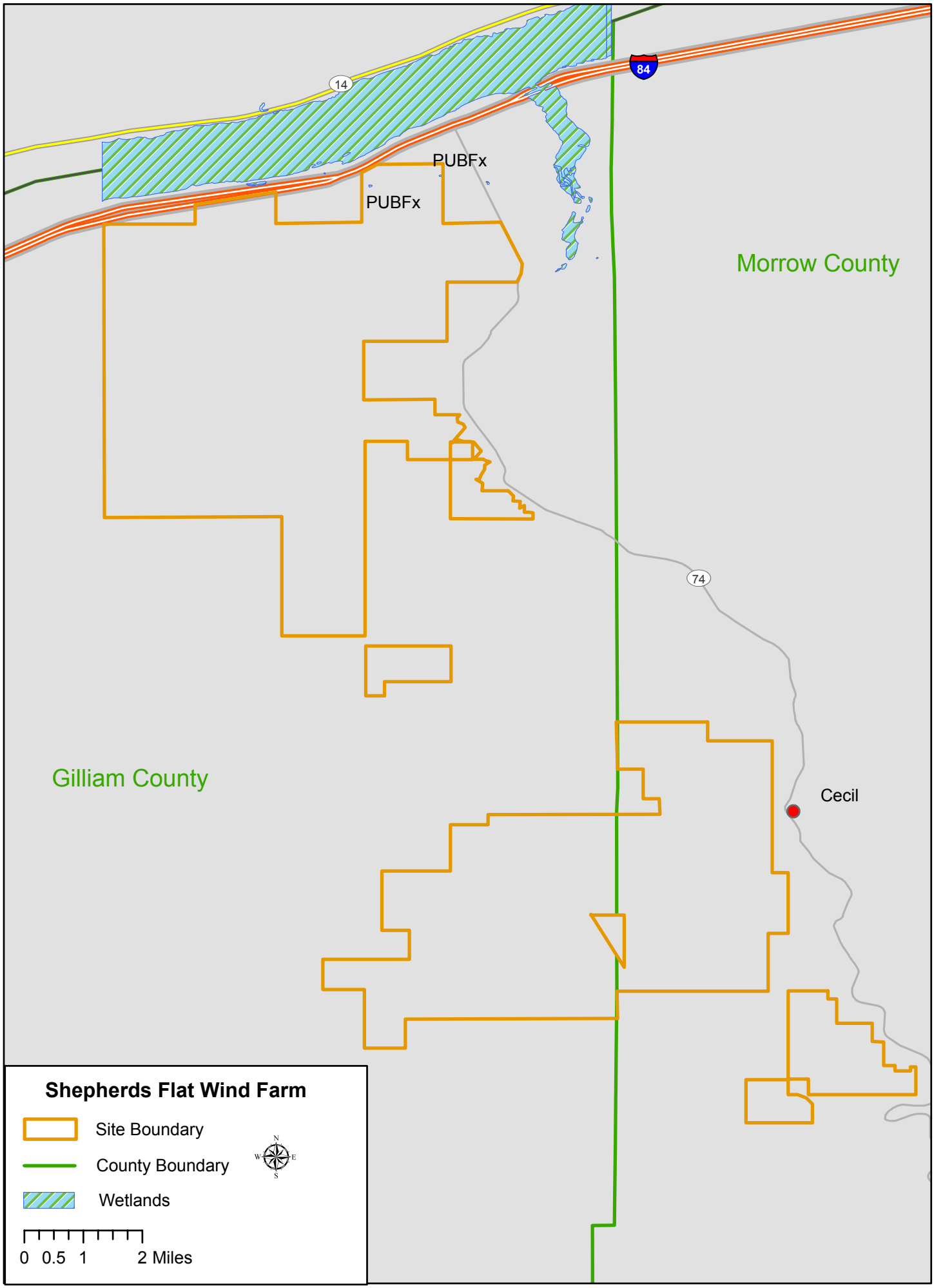

14
84
PUBFx
PUBFx
Morrow County
74
Gilliam County
Cecil
Shepherds Flat Wind Farm
Site Boundary
County Boundary
Wetlands
N
W
E
S
0 0.5 1 2 Miles

EXHIBIT K

LAND USE/STATEWIDE PLANNING GOALS

Information about the proposed facility's compliance with the statewide planning goals adopted by the Land Conservation and Development Commission, providing evidence to support a finding by the Council as required by OAR 345-022-0030. The applicant shall state whether the applicant elects to address the Council's land use standard by obtaining local land use approvals under ORS 469.504(1)(a) or by obtaining a Council determination under ORS 504(1)(b). An applicant may elect different processes for an energy facility and a related or supporting facility but may not otherwise combine the two processes. Notwithstanding OAR 345-021-0090(2), once the applicant has made an election, the applicant may not amend the application to make a different election. In this subsection, "affected local government" means a local government that has land use jurisdiction over any part of the proposed site of the facility. In the application, the applicant shall:

(A) Include a map showing the comprehensive plan designations and land use zones of the facility site, all areas that may be temporarily disturbed by any activity related to the design, construction and operation of the proposed facility and property adjacent to the site;

(B) If the applicant elects to obtain local land use approvals:

(i) Identify the affected local government(s) from which land use approvals will be sought;

(ii) Describe the land use approvals required in order to satisfy the Council's land use standard;

(iii) Describe the status of the applicant's application for each land use approval; and

(iv) Provide an estimate of time for issuance of local land use approvals;

(C) If the applicant elects to obtain a Council determination on land use:

(i) Identify the affected local government(s)

(ii) Identify the applicable substantive criteria from the affected local government's acknowledged comprehensive plan and land use regulations that are required by the statewide planning goals and that are in effect on the date the application is submitted and describe how the proposed facility complies with those criteria;

(iii) Identify all Land Conservation and Development Commission administrative rules, statewide planning goals and land use statutes directly applicable to the facility under ORS 197.646(3) and describe how the proposed facility complies with those rules, goals and statutes;

(iv) If the proposed facility might not comply with all applicable substantive criteria, identify the applicable statewide planning goals and describe how the proposed facility complies with those goals; and

(v) If the proposed facility might not comply with all applicable substantive criteria or applicable statewide planning goals, describe why an exception to any applicable statewide planning goal is justified, providing evidence to support all findings by the Council required under ORS 469.504(2); and

(D) If the proposed facility will be located on federal land:

(i) Identify the applicable land management plan adopted by the federal agency with jurisdiction over the federal land;

(ii) Explain any differences between state or local land use requirements and federal land management requirements;

(iii) Describe how the proposed facility complies with applicable federal land management plan;

(iv) Describe any federal land use approvals required for the proposed facility and the status of application for each required federal land use approval;

(v) Provide an estimate of time for issuance of federal land use approvals; and

(vi) If federal law or the land management plan conflicts with any applicable state or local land use requirements, explain the differences in the conflicting requirements, state whether the applicant requests Council waiver of the land use standard described under paragraph (B) or (C) of this subsection and explain the basis for a waiver;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit K as follows:

> Paragraphs A and C apply. Paragraph B does not apply. Paragraph D applies only if there is federal land within the site boundary as defined in OAR 345-001-0010(53). Include a discussion of whether the proposed facility would be compatible with farm use, would not seriously interfere with accepted farm practices and would not significantly increase the cost of accepted farm practices.
>
> [Applicant requests] a Council determination regarding land use in accordance with ORS 469.504(1)(b). Because parts of the proposed facility are located in Gilliam County and other parts are located in Morrow County, the Council must consider the applicable substantive criteria from both counties. Both counties have been appointed as Special Advisory Groups, as required under ORS 469.480. The applicable substantive criteria are those in effect on the date the application is submitted. ORS 460.504(1)(b)(A). In addition, the application must identify any Land Conservation and Development Commission administrative rules and goals and any land use statutes that are not implemented in the counties' comprehensive plans and are therefore directly applicable to the facility under ORS 197.646.
>
> [Applicant] should contact the Gilliam and Morrow County Planning Departments to discuss the requirements for conditional use permits. [Applicant] should include information necessary to demonstrate compliance with the substantive criteria from the Gilliam and Morrow County codes and comprehensive plans that are applicable to issuance of the permits. As provided in ORS 469.401(3), if the Council issues a site certificate, the Counties will be bound to issue the conditional use permits, subject only to the conditions set forth in the site certificate.

LAND USE AND STATEWIDE PLANNING GOALS

Caithness Shepherds Flat, LLC elects to address the Council's land use standard by securing a Council determination under ORS 504(1)(b).

All land within the site boundary is zoned Exclusive Farm Use (EFU). With the exception of Interstate 84 to the north of the project area, all land within the half-mile analysis area is zoned EFU. No federal lands are within the site boundary. See Figure K-1.

Affected local governments are Gilliam County and Morrow County.

Criteria applicable to the issuance of conditional use permits

Gilliam County		Morrow County	
Zoning Ordinance		*Zoning Ordinance*	
4.020 D 14	A power generation Facility not located on high-value farmland shall not preclude more than 20 acres from use as a commercial agricultural enterprise. A power generation Facility located on high-value farmland shall not preclude more than 12 acres from use as a commercial agricultural enterprise.	3.010 D 16	A power generation facility shall not preclude more than 12 acres of high value farmland or 20 acres of other land from commercial farm use unless an exception is approved pursuant to OAR 660 Division 4.
4.020 H 1	Will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use,	3.010 D 1	Will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use;
4.020 H 1	Will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.	3.010 D 2	Will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.
7.020 T 4d1	…no portion of the facility shall be within 3,520 feet of properties zoned residential use or designated on the Comprehensive Plan as residential.		
7.020 T 4d2	Reasonable efforts shall be made to blend the wind facility's towers with the natural surroundings in order to minimize impacts upon open space and the natural landscape.		

Gilliam County		Morrow County
Zoning Ordinance		*Zoning Ordinance*
7.020 T 4d3	Reasonable efforts shall be taken to protect and to preserve existing trees, vegetation, water resources, wildlife habitat or other significant natural resources.	
7.020 T 4d4	The turbine towers shall be designed and constructed to discourage bird nesting and wildlife attraction.	
7.020 T 4d5	The turbine towers shall be of a size and design to help reduce noise or other detrimental effects.	
7.020 T 4d6	Private access roads shall be gated to protect the facility and property owners from illegal or unwarranted trespass, and illegal dumping and hunting.	
7.020 T 4d7	Where practicable the electrical cable collector system shall be installed underground, at a minimum depth of 3 feet; elsewhere the cable collector system shall be installed to prevent adverse impacts on agriculture operations.	
7.020 T 4d8	Required permanent maintenance/ operations buildings shall be located of-site in one of Gilliam County's appropriately zoned areas, except that such a building may be constructed on-site if: (a) The building is designed and constructed generally consistent with the character of similar buildings used by commercial farmers or ranchers; and (b) The building will be removed or converted to farm use upon decommissioning of the Wind Power Generation Facility consistent with the provisions of this section.	
7.020 T 4d9	A Wind Power Generation Facility shall comply with the Specific Safety	

	Gilliam County	Morrow County
Zoning Ordinance	Standards for Wind Facilities delineated in OAR 345-024-0010.	*Zoning Ordinance*

This Application includes information assuring compliance with the Zoning Ordinances of both counties.

Exception pursuant to OAR 660 Division 4

OAR 660-033-0120(22) places a 20 acre limit on the use of non-high-value farmland without an exception to Statewide Planning Goal 3. The facility will preclude approximately 249 acres of non-high-value farmland (although some of this acreage will be made up for by the recovery of existing informal ranch roads), and therefore an exception is required.

The exception is permitted under OAR 345-022-0030(4)(c) when:

- Reasons justify why the state policy embodied in the applicable goal should not apply
- Significant consequences anticipated as a result of the proposed Facility have been identified and adverse impacts mitigated
- The proposed Facility is compatible with other adjacent uses

Goal 3 embodies the state policy to preserve and maintain agricultural lands. Applicant believes that facility development will serve to preserve the agricultural lands in the northern area of the facility. Due to poor soils and little water, agricultural productivity is marginal. The proposed facility will increase this land's *economic* productivity, decreasing pressure to convert it to other, non-ranching uses.

For both the northern and southern project areas, there are reasons why Goal 3 should not apply, including reasons cited by the Council with respect to other wind power facilities.

The state of Oregon's Renewable Energy Action Plan calls for significant additional development of renewable resources, including wind energy. Wind power facilities, by their nature, require open spaces. Because agricultural uses are compatible with wind power development, and relatively little land is taken out of production (0.8% for the Shepherds Flat Wind Farm), wind power development should be encouraged in agricultural areas rather than on other undeveloped land.

This Application sets forth the anticipated impacts of the proposed facility, and mitigates for the adverse impacts that have been identified.

Areas adjacent to the proposed facility are agricultural. Agricultural uses are compatible with wind power development.

Therefore, a Goal 3 exception is warranted.

Impact on accepted farm practices

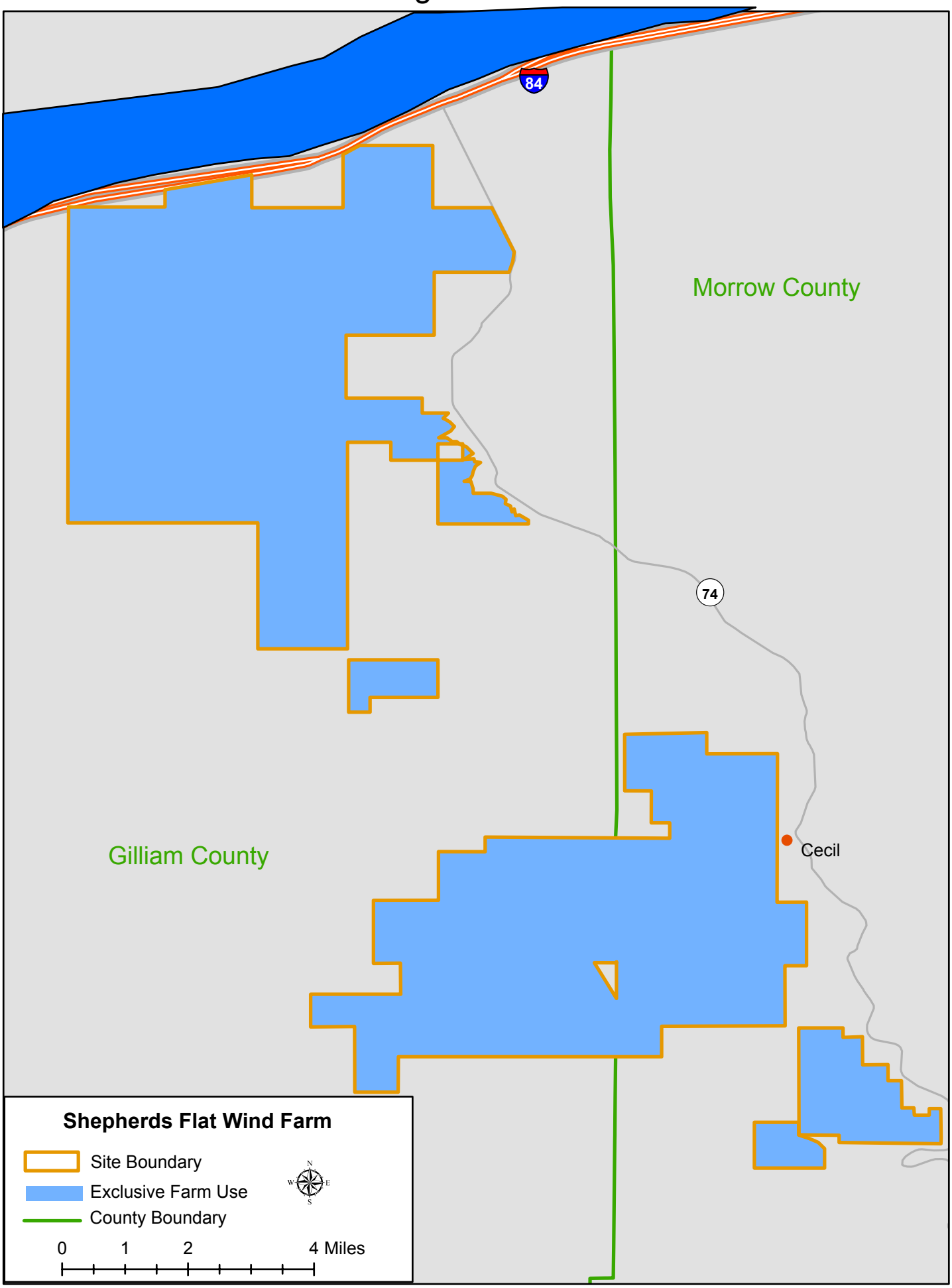
Northern facility area

The northern facility area is used exclusively for grazing and contains no high-value farmland. The addition of formal project roads is expected to have a positive impact on farm practices, providing safe access to remote sheep camps for herders and stock water trucks. It is expected that informal ranch roads and four wheel drive tracks will fall unto disuse, providing additional grazing ground. Wind power facilities are commonly sited on grazing land in the western U.S., and sheep and cattle have shown no aversion to the presence of wind power infrastructure.

Southern facility area

The only crop grown in the southern facility area is dry-land wheat. None of the fields is irrigated and the site contains no high-value farmland. The installation of wind turbines and project roads will not force a significant change in accepted farm practices, nor significantly increase the cost of accepted farm practices. Fields will be tilled in the usual manner to the edge project roads and turbine pads. Project roads will be available for agricultural uses.

Figure K-1


84
Morrow County
74
Cecil
Gilliam County
Shepherds Flat Wind Farm
Site Boundary
Exclusive Farm Use
County Boundary
N
W
E
S
0
1
2
4 Miles

IMPACTS ON PROTECTED AREAS

Information about the proposed facility's impact on protected areas, providing evidence to support a finding by the Council as required by OAR 345-022-0040, including:

(A) A map showing the location of the proposed facility in relation to the protected areas listed in OAR 345-022-040 located within the analysis area;

(B) A description of significant potential impacts of the proposed facility, if any, on the protected areas including, but not limited to, potential impacts such as:

(i) Noise resulting from facility construction or operation;
(ii) Increased traffic resulting from facility construction or operation;
(iii) Water use during facility construction or operation;
(iv) Wastewater disposal resulting from facility construction or operation;
(v) Visual impacts of facility structures, including cooling tower or other plumes, if any; and
(vi) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class 1 visual resources as described in OAR 340-204-0050;

IMPACTS ON PROTECTED AREAS

Please see Figure L-1 for a map showing the Shepherds Flat Wind Farm (SFWF) facility in relation to protected areas.

Protected areas within the twenty mile radius analysis, and their potential for impacts from the construction or operation of the Shepherds Flat Wind Farm, are shown in the following table:

	Potential for Impacts									
Protected Area	Construction Noise	Operating Noise	Construction Traffic	Operating Traffic	Construction Water	Operating Water	Construction Wastewater	Operating Wastewater	Visual Impact	Air emissions
1. John Day River & Wildlife Refuge	N	N	N	N	N	N	N	N	N	N
2. Willow Creek Wildlife Area	P	N	N	N	N	N	N	N	P	N
3. Umatilla National Wildlife Refuge	N	N	N	N	N	N	N	N	N	N
4. Umatilla Fish Hatchery	N	N	N	N	N	N	N	N	N	N
5. Horn Butte BLM ACEC	P	N	N	N	N	N	N	N	P	N

Protected Area	Potential for Impacts									
	Construction Noise	Operating Noise	Construction Traffic	Operating Traffic	Construction Water	Operating Water	Construction Wastewater	Operating Wastewater	Visual Impact	Air emissions
6. J.S. Burres State Park	N	N	N	N	N	N	N	N	N	N
7. John Day State Scenic Waterway	N	N	N	N	N	N	N	N	N	N
8. Irrigon Fish Hatchery	N	N	N	N	N	N	N	N	N	N
9. Oregon Trail Interpretive Center	P	N	N	N	N	N	N	N	P	N

N=None
P=Potential

Protected areas with a potential for impact are discussed below:

Willow Creek Wildlife Area

Potential impact to the Willow Creek Wildlife Area is limited to the potential for noise during construction and the visual impact of the completed facility. The potential for noise during construction is limited to any blasting that may be necessary for the excavation of turbine foundations in the northern project area. Exhibit P discusses the limits to be imposed on this activity. It is expected that some turbines will be visible from the Wildlife Area, as are existing tall high-voltage transmission towers. The potential visibility of these turbines is not expected to adversely impact resident or transient wildlife.

Horn Butte BLM ACEC

The Horn Butte Area of Critical Environmental Concern (ACEC) is adjacent to the Shepherds Flat Wind Farm. Potential impacts include construction noise and the visual impact of the completed facility.

The Horn Butte ACEC was established in 1989 as the Horn Butte Curlew Area of Critical Environmental Concern. The curlew, also found in the northern portion of the project site, is discussed in Exhibit P, which also proposes mitigation measures for any noise during construction.

The primary project access route, Rhea Road/Lane is located to the north of the ACEC. The visual impact of the SFWF is not expected to adversely effect the nesting curlews.

Oregon Trail Interpretive Center

A feature of Four Mile Canyon is its Oregon Trail Interpretive Center, a roadside kiosk offering views of unspoiled Oregon Trail wagon wheel ruts to the west. During construction, it is possible that the sounds of any blasting required for turbine foundations in the northern section of the project area may be heard. While such sounds may interrupt the contemplation of the hardships faced by Oregon's early settlers, these sounds will not be more obtrusive than the noise of agricultural equipment or passing traffic on Fourmile Canyon Road. Any construction noise due to any blasting in the northern project area will be of limited duration.

The SFWP turbines are not expected to be visible from the kiosk due to the area's topography. To the extent that they are, they may be considered no more obtrusive than the kiosk itself, or other man-made structures in the vicinity (silos, windmills for water pumping, cattle guards, etc.).

Figure L-1

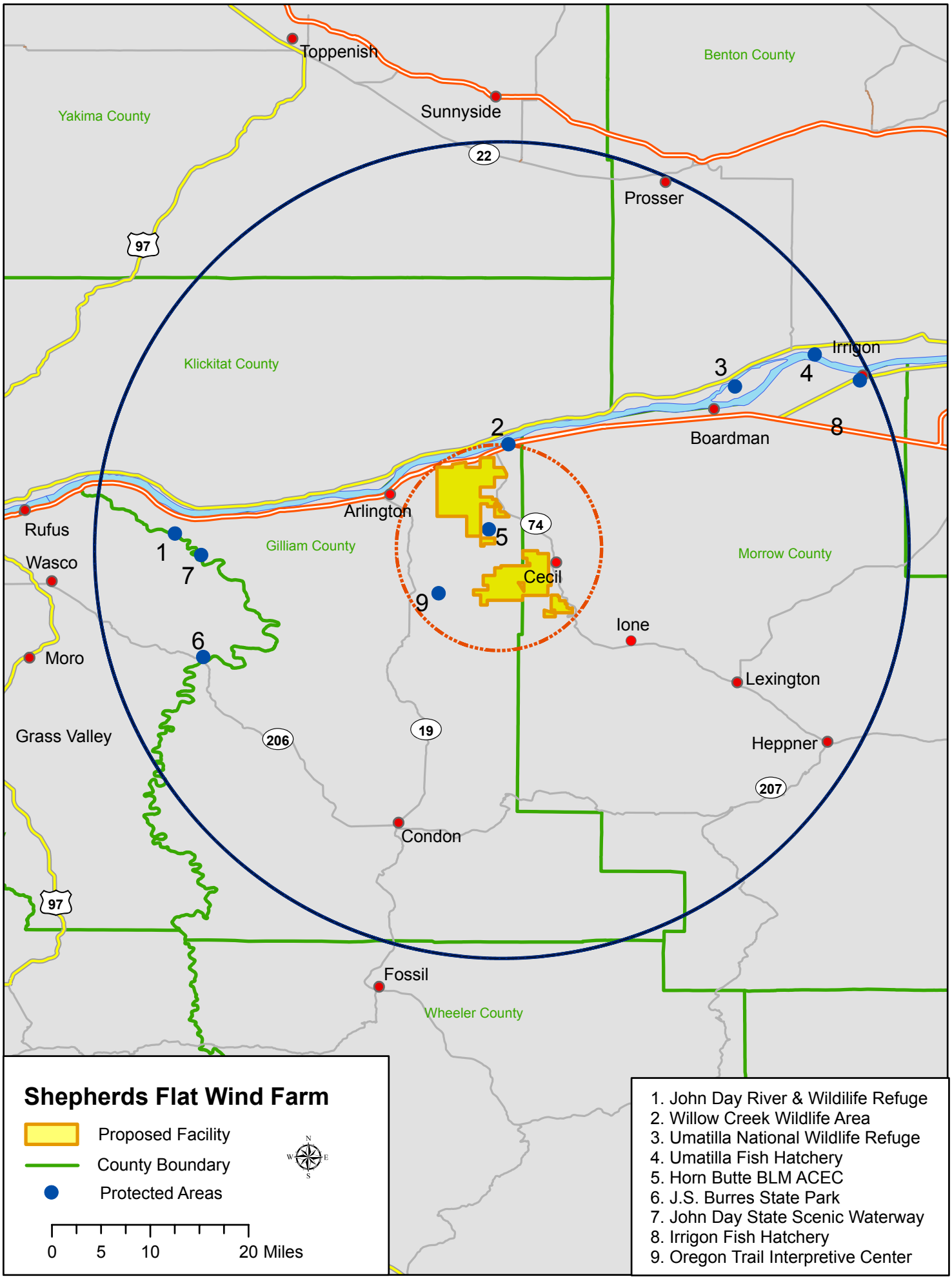

Toppenish
Benton County
Yakima County
Sunnyside
22
Prosser
97
Klickitat County
Irrigon
3
4
2
Boardman
8
Arlington
Rufus
74
5
Gilliam County
Morrow County
1
Wasco
7
Cecil
9
Ione
6
Moro
Lexington
Grass Valley
206
19
Heppner
207
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Proposed Facility
County Boundary
Protected Areas
N
W
E
S
0
5
10
20 Miles
1. John Day River & Wildilife Refuge
2. Willow Creek Wildlife Area
3. Umatilla National Wildlife Refuge
4. Umatilla Fish Hatchery
5. Horn Butte BLM ACEC
6. J.S. Burres State Park
7. John Day State Scenic Waterway
8. Irrigon Fish Hatchery
9. Oregon Trail Interpretive Center

EXHIBIT M

FINANCIAL CAPABILITY

Information about the applicant's financial capability, providing evidence to support a finding by the Council as required by OAR 345-022-050(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:

(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;

(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

(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;

FINANCIAL CAPABILITY

Counsel's opinion may be found on the following page.

Caithness Shepherds Flat, LLC's parent company's and affiliates' financial capability is demonstrated by credit ratings on the following debt:

- Caithness Coso Funding Corp. (240MW) $375,000,000 Senior Note
- Caithness Coso Funding Corp. (240MW) $90,000,000 Subordinate Note

Moody's credit rating increased from Baa3 to Baa2 on the Senior Note, and from Ba2 to Ba1 on the Subordinate Note on January 26, 2007. Fitch's current rating is BBB- on the Senior Note, and BB- on the Subordinate Note, both of which are on ratings watch positive for a potential upgrade.

- FPL Caithness Funding Corp. (160MW) $150,000,000

S&P rates the credit BBB, and the rating outlook is stable.

Caithness Shepherds Flat, LLC

c/o Caithness Corporation
565 Fifth Avenue, 29th floor
New York, New York 10017
Phone: (212) 921-9099
Fax: (212) 921-9239

January 29, 2007

Oregon Energy Facility Siting Council
625 Marion Street, N.E.
Salem, Oregon 97310

Re: Application of Caithness Shepherds Flat, LLC for Site Certificate

Dear Ladies and Gentleman:

I am an in house attorney for Caithness Shepherds Flat, LLC, a Delaware limited liability company (the "Applicant"), and have also acted as counsel to the Applicant.

In that connection, I have examined: (i) the Limited Liability Company Agreement of Applicant; (ii) the Delaware Certificate of Formation of Applicant; (iii) the Oregon Certificate of Registration of Applicant as a Foreign Limited Liability Company; and (iv) bond indenture provisions, if any (collectively, the "Constituent Documents").

In rendering this opinion expressed below, I have assumed (i) the authenticity of all documents submitted to me as originals and (ii) the conformity to original documents of all documents submitted to me as copies. As to factual matters, I have relied to the extent deemed proper, upon statements and certifications of officers and manager of the Applicant.

Based upon the foregoing, to the best of my knowledge, as of the date above I am of the opinion that, subject to the Applicant's 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 up to 750 megawatt (MW) name-plate capacity wind-powered electric generating project known as the Shepherds Flat Wind Farm located in Gilliam and Morrow Counties, Oregon (the "Project") that the Applicant proposes in its Application for Site Certificate to be filed with the Oregon Energy Facility Siting Council and in connection with which this opinion is rendered, without violating the Constituent Documents or similar agreements.

I am a member of the bar of the state of New York and New Jersey and do not hold myself out as an expert in, and do not express any opinion with respect to, the law of any jurisdiction other than the law of the states of New York and New Jersey.

The foregoing opinion is limited solely to whether the Applicant would place itself in violation of the Constituent Documents in undertaking construction and operation of the Project. I express no opinion as to the applicability of any federal, state or local laws (including all rules and regulations promulgated thereunder) to the construction and operation of the Project or as to the effects of the foregoing laws on such construction and operation or as to the Applicant's compliance or non-compliance with such laws. The foregoing opinion is intended to be relied upon solely by the Oregon Energy Facility Siting Council and the Oregon Department of Energy in their evaluation of the Application for Site Certificate for the Project and no third party is entitled to rely on this opinion.

Please contact me if you have any additional questions regarding this matter.

Very truly yours,

CAITHNESS SHEPHERDS FLAT, LLC

Michael Kowal
Legal Counsel

New York
William L. Hess
Managing Director
Corporate Finance Group
Moody's Investors Service
JOURNALISTS: 212-553-0376
SUBSCRIBERS: 212-553-1653

New York
A.J. Sabatelle
VP - Senior Credit Officer
Corporate Finance Group
Moody's Investors Service
JOURNALISTS: 212-553-0376
SUBSCRIBERS: 212-553-1653

Moody's upgrades Caithness Coso

Approximately $399 Million (Originally $465 Million) of Debt Securities Affected

New York, January 26, 2007 -- Moody's Investors Service upgraded Caithness Coso Funding Corp.'s (Caithness Coso). 5.489% senior secured bonds due 2019 to Baa2 from Baa3 and 6.263% subordinated secured notes due 2014 to Ba1 from Ba2. Caithness Coso's rating outlook remains stable.

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The upgrade reflects the project's relatively consistent operating and financial performance; strong debt service coverage ratios which are expected to be in excess of 2.0x for senior debt in each year and 1.50x for total debt in each year over the foreseeable future; the benefits to Caithness Coso's cash flows of receiving a higher fixed energy rate of 6.15 cents/kWh (escalated 1% per annum) beginning on May 1, 2007; the continued improvement in off-taker credit quality along with the more reliable regulatory environment that is evolving in California; and the announcement by Southern California Edison Company (SCE:A3 senior unsecured) that it had signed new 20 year contracts with the Coso partnerships. Upon the effectiveness of these new contracts, which still require state regulatory approval, the Coso partnerships' exposure to energy price risk will be largely mitigated.

Caithness Coso's ratings reflect the predictable cash flows generated from energy and capacity payments received under three power purchase agreements that currently expire at varying times though 2019 with SCE. The ratings incorporate the strong operating history of these plants, the experience of the operator, Coso Operating Company (COC), which has operated the plants since their inception in the 1980's and the

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experience of Caithness Energy, COC's parent, which obtained a controlling interest in these plants in 1999 and owns other geothermal plants.

The ratings further consider the importance of these geothermal assets to the California electric market, given the state's focus on renewable resources as a core component of their energy policy. The ratings further recognize the plants' very competitive operating cost profile relative to other generating resources within the region, as the Coso partnerships' variable costs of around 1.4 cents/kWh are below all fossil-fuel options in the western US, including base load coal.

The rating outlook is stable and incorporates an expectation of continued strong operating and financial performance due to COC's history of being able to effectively manage this geothermal resource, the existence of a predictable contracted cash flow over the intermediate term, and the prospects for the continuation of contracted cash flow over the life of the securities given the long-term contracts recently signed with SCE.

Upgrades:

..Issuer: Caithness Coso Funding Corp.

....Subordinate Regular Bond/Debenture, Upgraded to Ba1 from Ba2

....Senior Secured Regular Bond/Debenture, Upgraded to Baa2 from Baa3

Caithness Coso is a special purpose corporation owned entirely by the three Coso partnerships -- Coso Finance Partners (Navy I Partnership), Coso Energy Developers (BLM Partnership), and Coso Power Developers (Navy II Partnership) (Collectively "the Coso partnerships"). Each of the Coso partnerships guarantee, jointly and severally, on a senior secured basis, repayment of the senior secured bonds, and guarantee, jointly and severally, on a subordinated secured basis, repayment of the subordinated secured notes.

The Coso projects consist of three 80 megawatt (MW) geothermal power plants as well as their transmission lines, wells, gathering system and related facilities. The Coso projects are located near one another in the Mojave Desert approximately 150 miles northeast of Los Angeles, California, and have been generating electricity since the late 1980s.

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Caithness Energy L.L.C., through its affiliates, owns about 70% of the Coso partnerships. Caithness Energy is privately held and majority owned by Caithness Equities, which is headquartered in New York City.

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appropriateness of the opinion having regard to your own objectives, financial situation and needs.

end

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EXHIBIT N

NON-GENERATING FACILITY

If the proposed facility is a non-generating facility for which the applicant must demonstrate need under OAR 345-023-0005, information about the need for the facility, providing evidence to support a finding by the Council as required by OAR 345-023-0005, including:

(A) Identification of the rule in Division 23 of this chapter under which the applicant chooses to demonstrate need;

(B) If the applicant chooses to demonstrate need for the proposed facility under OAR 345-023-0020(1), the least-cost plan rule:

(i) Identification of the energy resource plan or combination of plans on which the applicant relies to demonstrate need;

(ii) The name, address, and telephone number of the person responsible for preparing each energy resource plan identified in subparagraph (i);

(iii) For each plan reviewed by a regulatory agency, the agency's findings and final decision, including:

(I) For a plan reviewed by the Oregon Public Utility Commission, the acknowledgement order; or

(II) For a plan reviewed by any other regulatory agency, a summary of the public process including evidence to support a finding by the Council that the agency's decision process included a full, fair and open public participation and comment process as required by OAR 345-023-0020(1)(L), and the location of and means by which the Office of Energy can obtain a complete copy of the public record;

(iv) Identification of the sections(s) of the short-term action plan(s) that call(s) for the acquisition of the proposed facility or a facility substantially similar to the proposed facility; and

(v) The attributes of the proposed facility that qualify it as one called for in the short-term action plan of the energy resource plan or combination of plans identified in subparagraph (i) or a demonstration that a facility substantially similar to the proposed facility is called for in the plan(s);

(C) In addition to the information described in paragraph (B), if the applicant chooses to demonstrate need for the proposed facility under OAR 345-023-0020(1), the least-cost plan rule, and relies on an energy resource plan not acknowledged by the Public Utility Commission of Oregon:

(i) The names, addresses and telephone numbers of members of any public advisory groups that participated in the preparation and review of each plan identified in paragraph (B);

(ii) A discussion of how the plan or combination of plans conforms to the standards in OAR 345-023-0020(1)(a) through (L) including citations to relevant portions of the plan documents or other supporting evidence; and

(iii) The expected annual emissions in tons of nitrogen oxides, PM-10 particulate, sulfur dioxide, carbon dioxide and mercury and a discussion of other environmental impacts, as compared to resources in the applicable energy resources plan;

(D) In addition to the information described in paragraphs (B) and (C), if the applicant chooses to demonstrate need for a proposed natural gas pipeline or storage facility for liquefied natural gas under OAR 345-023-0020(1), the least-cost plan rule, and relies on an energy resource plan not acknowledged by the Public Utility Commission of Oregon, the applicant shall include the information described in paragraph (G) of this subsection if the energy resource plan or combination of plans does not contain that information, If the energy resource plan or combination of plans contains the information described in paragraph (G), the applicant shall provide a list of citations to the sections of the energy resource plan(s) that contain the information;

(E) In addition to the information described in paragraphs (B) and (C), if the applicant chooses to demonstrate need for a proposed electric transmission line under OAR 345-023-0020(1), the least-cost plan rule and relies on an energy resource plan not acknowledged by the Public Utility Commission of Oregon, the applicant shall include the information described in paragraph (F) of this subsection if the energy resource plan or combination of plans does not contain that information. If the energy resource plan or combination of plans contains the information described in paragraph (F), the applicant shall provide a list of citations to the sections of the energy resource plan(s) that contain the information;

(F) If the applicant chooses to demonstrate need for a proposed electric transmission line under OAR 345-023-0030, the system reliability rule:

(i) Load-resource balance tables for the area to be served by the proposed facility. In the tables, the applicant shall include firm capacity demands and existing and committed firm resources for each of the years from the date of submission of the application to at least five years after the expected in-service date of the facility.

(ii) Within the tables described in subparagraph (i), a forecast of firm capacity demands for electricity and firm annual electricity sales for the area to be served by the proposed facility. The applicant shall separate firm capacity demands and firm annual electricity sales into loads of retail customers, system losses, reserve margins and each wholesale contract for firm sale. In the forecast, applicant shall include a discussion of how the forecast incorporates reductions in firm capacity demand and firm annual electricity sales resulting from:

(I) Existing federal, state, or local building codes, and equipment standards and conservation programs required by law for the area to be served by the proposed facility;

(II) Conservation programs provided by the energy supplier;

(III) Conservation that results from responses to price; and

(IV) Retail customer fuel choice;

(iii) Within the tables described in subparagraph (i), a forecast of existing and committed firm resources used to meet the demands described in subparagraph (ii). The applicant shall included, as existing and committed firm resources, existing generation and transmission

facilities, firm contract resources and committed new resources minus expected resource retirements or displacement. In the forecast, the applicant shall list each resource separately;

(iv) A discussion of the reasons each resource is being retired or displaced if the forecast described in subparagraph (iii) includes expected retirements or displacements;

(v) A discussion of the annual capacity factors assumed for any generating facilities listed in the forecast described in subparagraph (iii);

(vi) A discussion of the reliability criteria the applicant uses to demonstrate the proposed facility is needed, considering the load carrying capability of existing transmission system facilities supporting the area to be served by the proposed facility; and

(vii) A discussion of reasons why the proposed facility is economically reasonable compared to the alternatives described below. In the discussion, the applicant shall include a table showing the amounts of firm capacity and firm annual electricity available from the proposed facility and each alternative and the estimated direct cost of the proposed facility and each alternative. The applicant shall include documentation of assumptions and calculations supporting the table. The applicant shall evaluate alternatives to construction and operation of the proposed facility that include, but are not limited to:

(I) Implementation of cost-effective conservation, peak load management, and voluntary customer interruption as a substitute for the proposed facility;

(II) Construction and operation of electric generating facilities as a substitute for the proposed facility;

(III) Direct use of natural gas, solar or geothermal resources at retail loads as a substitute for use of electricity transmitted by the proposed facility; and

(IV) Adding standard sized smaller or larger transmission line capacity;

(vii) The earliest and latest expected in-service dates of the facility and a discussion of the circumstances of the energy supplier that determine these dates; and

(G) If the applicant chooses to demonstrate need for a proposed natural gas pipeline or a proposed facility for storing liquefied natural gas under OAR 345-023-0040, the economically reasonable rule:

(i) Load-resource balance tables for the area to be served by the proposed facility. In the tables, the applicant shall include firm demands and resource availability for each of the years from the date of submission of the application to at least five years after the expected in-service date of the proposed facility. In the tables, the applicant shall list flowing supply and storage supply separately;

(ii) Within the tables described in subparagraph (i), a forecast of firm capacity demands for the area to be served by the proposed facility. The applicant shall separate firm capacity demands into firm demands of retail customers, system losses and each wholesale contract for firm sale. The applicant shall accompany the tables with load duration curves of firm capacity and interruptible demands for the most recent historical year, the year the facility is expected to be placed in service and the fifth year after the expected in-service date. In the forecast of firm capacity demands, the applicant shall include a discussion of how the forecast incorporates reductions in firm capacity demand resulting from:

(I) Existing federal, state, or local building codes and equipment standards and conservation programs required by law for the area to be served by the proposed facility;

(II) Conservation programs provided by the energy supplier;

(III) Conservation that results from responses to price; and

(IV) Retail customer fuel choice;

(iii) Within the tables described in subparagraph (i), a forecast of existing and committed firm resources used to meet the demands described in subparagraph (ii). The applicant shall include, as existing and committed firm capacity resources, existing pipelines, storage facilities, and scheduled and budgeted new facilities minus expected resource retirements or displacement. In the forecast, the applicant shall list each committed resource separately;

(iv) A discussion of the reasons each resource is being retired or displaced if the forecast described in subparagraph (iii) includes expected retirements or displacements;

(v) A discussion of the capacity factors assumed for any storage facilities listed in the forecast described in subparagraph (iii);

(vi) A discussion of the reliability criteria the applicant uses to demonstrate the proposed facility is needed, considering the capacity of existing gas system facilities supporting the area to be served by the proposed facility;

(vii) A discussion of reasons why the proposed facility is economically reasonable compared to the alternatives described in subparagraphs (viii) or (ix). In the discussion, the applicant shall include a table showing the amounts of firm capacity available from the proposed facility and each alternative and the estimated direct cost of the proposed facility and each alternative. The applicant shall include documentation of assumptions and calculations supporting the table;

(viii) In an application for a proposed natural gas pipeline, an evaluation of alternatives to construction and operation of the proposed facility including, but not limited to:

(I) Implementation of cost-effective conservation, peak load management, and voluntary customer interruption as a substitute for the proposed facility;

(II) Installation of propane storage systems, facilities to store liquefied natural gas and underground gas storage reservoirs as a substitute for the proposed facility;

(III) Direct use of electricity, solar or geothermal resources at retail loads as a substitute for use of natural gas supplied by the proposed facility; and

(IV) Adding standard sized smaller or larger pipeline capacity.

(ix) In an application for a proposed liquefied natural gas storage facility, an evaluation of alternatives to construction and operation of the proposed facility including, but not limited to:

(I) Implementation of cost-effective conservation, peak load management, and voluntary customer interruption as a substitute for the proposed facility;

(II) Installation of propane storage systems, natural gas pipelines and underground gas storage facilities as a substitute for the proposed facility;

(III) Direct use of electricity, solar or geothermal resources at retail loads as a substitute for use of natural gas supplied by the proposed facility; and

(IV) Adding smaller or larger liquefied natural gas storage capacity; and

(x) The earliest and latest expected in-service date of the facility and a discussion of the circumstances of the energy supplier that determine these dates;

NON-GENERATING FACILITY

Does not apply.

EXHIBIT O

WATER REQUIREMENTS

Information about the water requirements the applicant anticipates for construction and operation of the proposed facility. If the applicant has submitted any permit applications to the Office, as described in OAR 345-021-0000(4), that contain this information, the applicant may copy relevant sections of those documents into this exhibit or include in this exhibit cross-references to the relevant sections of those documents. The applicant shall include:

(A) A description of each source of water and the applicant's estimate of the amount of water the facility will need from each source under annual average and worst-case conditions;

(B) If a new water right is required, the approximate location of the points of diversion with the estimated quantity of water to be taken at each point;

(C) A description of how the water is to be used;

(D) A description of each avenue of water loss or output from the facility site, 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, including storm water;

(E) For operation, a water balance diagram, including the source of cooling water and the estimated consumptive use of cooling water, based on annual average conditions;

(F) If the facility does not require a groundwater permit, a surface water permit, or a water rights transfer, an explanation why no such permit or transfer is required for the construction and operation of the proposed facility;

(G)) Evidence to support Council findings that the Water Resources Department should issue a groundwater or a surface water permit under ORS Chapter 537 or should approve a transfer of a water use under ORS Chapter 540, including a discussion and evaluation of all relevant factors, including those listed in ORS 537.153(2) and (3), ORS 537.170(8) and OAR Chapter 690, Divisions 15 and 310;

(H) A discussion of any steps proposed by the applicant to reduce consumptive water use; and

(I) A discussion of any mitigation steps proposed by the applicant to address the impact of the applicant's water use on affected resources;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit O as follows:

> All paragraphs apply except (E) and, if no groundwater or surface water permit or transfer of a water use is needed, (G).

> [Applicant] should include information in the application to support a finding on whether a water right is or is not required. The application must identify the sources of water to be used by the facility, the water right under which the water would be provided, the quantity of water needed and the means of disposal of all water discharges from the facility. If a water right is required, the application must include information to support a finding for issuance of a groundwater or surface water permit under ORS Chapter 537 or transfer of a water use under ORS Chapter 540, including a discussion and evaluation of all relevant factors, including those factors listed in ORS 537.153(2) and (3), ORS 537.170(8) and OAR Chapter 690, Divisions 15 and 310. If a permit or transfer is needed, the Council will make the issuing decision in consultation with the Water Resources Department.

WATER REQUIREMENTS

Facility water requirements will be limited to the construction period; no on-site operations and maintenance facility is proposed.

During construction, water will be used to control dust and to maintain compaction of project roads. No on-site concrete batch plant is proposed.

Water usage for dust control and the maintenance of project roads is highly dependent upon weather conditions; and Applicant anticipates that water requirements will be greater in the southern project area than the northern project area due to its deeper soils.

Applicant estimates that an average of 100,000 gallons of water per day will be required during the construction period. Water will be purchased from commercial sources and delivered to the site by tanker.

Because the Applicant proposes to purchase all facility water from commercial sources, no new water right nor the transfer is an existing water right is required.

EXHIBIT P

FISH AND WILDLIFE HABITATS AND SPECIES

Information about the fish and wildlife habitats and the fish and wildlife species, other than the species addressed in subsection (q) that may be affected by the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0060. The applicant shall include:

(A) Identification and description of all habitat within the analysis area, classified by the habitat categories as set forth in OAR 635-415-0030;

(B) 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;

(C) A map showing the locations of the habitat identified in (A);

(D) A description of the nature, extent and duration of significant potential impacts on the habitat identified in (A) that may result from construction, operation and retirement of the proposed facility;

(E) A description of any measures the applicant proposes to avoid, reduce or mitigate potential adverse impacts;

(F) Evidence that the proposed facility, including any proposed mitigation, complies with the fish and wildlife habitat mitigation goals and standards in OAR 635-415-0030; and

(G) The applicant's proposed monitoring program, if any, for impacts to such fish and wildlife species and their habitats;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit P as follows:

> All paragraphs apply. The references in (A) and (G) are incorrect; the correct reference is OAR 635-415-0025. Identify all areas that may be Category 1 habitat due to the use of the area by Washington ground squirrels. [Applicant] should consult with ODFW on the proper classification of these areas as Category 1 or 2.
>
> The Oregon Department of Fish and Wildlife (ODFW) provides technical review and recommendations on compliance with Council standards. ODFW will base its review and recommendations on state wildlife policy (ORS 496.012).
>
> OAR Chapter 635, Division 415, classifies habitat into six categories and establishes a mitigation goal for each category. [Applicant] must identify the appropriate habitat category for all areas affected by the proposed facility and provide the basis for each category designation. [Applicant] must show how it would comply with the habitat mitigation goals and standards by appropriate monitoring and mitigation.

Public Concerns

The Oregon Department of Energy received several public comment letters raising concerns about the potential impacts of the facility on wildlife, particularly avian species. The comments addressed:

- the need for baseline surveys of wildlife use of the area within the site boundary
- consideration of regional cumulative impacts of wind facilities
- micrositing of turbine placement to reduce avian impacts
- reducing the impact on higher value wildlife habitat
- the need for monitoring of bird and bat fatalities during facility operation
- mitigation of electrocution risks
- the need for a plan to reduce fire risk and respond to fires that occur

Agency Concerns

The Oregon Department of Energy received a comment letter from the U. S. Fish and Wildlife Service recommending:

- a cumulative analysis of impacts to birds and bats
- inclusion of a monitoring program addressing long-term fatalities to birds and bats
- inclusion of an agreement to ensure that proposed mitigation measures are complied with, monitored, and effective
- bat surveys to develop a regional perspective on risk to bats, migratory patterns, their movement through the area, and their response to turbines
- marking of guy wires
- co-location of buried transmission, electric and communication lines with roads
- down-shielding of security lighting
- construction activity occur outside of migratory bird breeding seasons
- siting of turbines close to existing roads
- reduction of risk to raptors from electrocution hazards
- monitoring of the condition and proper installation of power line bird protection devices
- monitoring of raptor electrocutions and wire strikes
- the use of comparable fatality monitoring metrics
- documentation of the project decommissioning process
- establishment of a fire plan, and addressing fire control, abatement and effects

The Oregon Department of Energy received a comment letter from the Oregon Department of Fish and Wildlife (ODFW) recommending:

- inclusion of maps that show vegetation classifications and habitat categories, active and inactive raptor nests and sensitive species sightings
- assistance of ODFW in turbine micrositing
- pre-construction studies of avian and wildlife use of the project area

- surveys for Washington ground squirrel habitat within 1,000 feet of ground-disturbing activities
- raptor nest surveys within a 2-mile radius of the project area
- construction activity limitations within 0.5 miles of active raptor nests during nesting season
- ODFW and Oregon Department of Energy review of and comment on the draft mitigation and monitoring plans
- permission for ODFW to conduct wildlife surveys in the project area
- consideration of habitat mitigation through easements on or acquisition of property containing habitats similar to those altered or degraded by the project, and inclusion of provisions for success monitoring, land management activities, habitat improvement, wildlife surveys or research activities

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HABITAT AND HABITAT CLASSIFICATION

The facility site contains two areas with very different characteristics and use, primarily a consequence of soil depth. The north area of the site is situated south of the Columbia River, and some sections within the site boundary contain portions of the bluffs along the river. The upland area is characterized by shallow soils, and used primarily for grazing of sheep. Sheep are typically present on the site from November until they are transported to lambing pens in mid January, and they are returned to the site two months later. Low rainfall levels in the area result in limitations in forage by late spring, and sheep are transported to off-site pastures in May for continued grazing. The area is crossed by a large number of unimproved roads and off-road vehicle tracks as well as several electrical transmission line corridors. Some portions are highly disturbed from congregation of sheep around watering and transport sites. Areas of bare sand, exposed rock, and soil left bare due to wildfires are also frequently encountered. Cheatgrass (*bromus tectorum*, an alien species) is found throughout the area and is usually the predominant grass species, but the native species Sandberg's bluegrass (*poa secunda*), needle and thread grass (*hesperostipa comata*), bluebunch wheatgrass (*pseudoroegneria spicata*) and six-weeks fescue (*vulpia octoflora*) also occur in many locations. Within or near the site boundary in the north area also lie portions of Willow Creek Valley and Eightmile Canyon (Figure P-1). In most years, Willow Creek contains water year-round, and the valley contains some riparian vegetation as well as flat land in irrigated agriculture. Eightmile Canyon has an ephemeral stream, is cultivated in some areas, and in others contains a diverse blend of native riparian and dryland plant species as well as the ubiquitous cheatgrass. No residences are within the site boundary in the north area, although a few outbuildings, structures and facilities are present that are related to the tending of sheep, sheepdogs and sheepherders.

Land in the south area of the proposed facility contains deeper soils and is largely devoted to the cultivation of dryland wheat. Portions of the south property are in the Conservation Reserves Program (CRP), and some slopes that are too steep to cultivate contain small stands of big sagebrush (*artemisia tridentata*) in good condition. Fourmile Canyon passes through the south area, and Willow Creek Valley lies to the east. Fourmile Canyon (an offshoot of Eightmile Canyon) also has an ephemeral stream, and a diversity of plant species is present. Residences, shops and farm equipment storage areas are present within the site boundary in the south area.

Habitat Category 1

According to OAR 635-415-0025, this is irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population or unique assemblage. Habit within the site boundary the Applicant considers Category 1:

- **AR** Aquatic Resources: vernal pools, wetlands and riparian habitat types, regardless of their current use by wildlife or plant species.
- **RN** Raptor Nesting: structures in use for nesting, such as cliffs, trees, barns and power poles.
- **WGS** Washington Ground Squirrel: areas with burrowing activity.

Habitat Category 2

According to OAR 635-415-0025, this is essential habitat for a fish or wildlife species, population, or unique assemblage of species and is limited on either a physiographic province or site-specific basis, depending on the individual species, population or unique assemblage. Habit within the site boundary the Applicant considers Category 2:

- **RN** Raptor Nesting: natural structures suitable for raptor nesting but unoccupied, including the bluffs above the Columbia River.
- **WGS** Washington Ground Squirrel: a buffer of 1000 feet from active burrows.
- **CF** Canyon Floors: the portion of the floors of Eightmile and Fourmile Canyons outside of the streambed that are not cultivated or occupied by structures.
- **SS** Shrub Steppe: substantial shrub stands (primarily big sage), most containing native grass species in their understory.
- **GL** Grasslands: areas containing mostly native grass species, no livestock grazing and no evidence of cultivation

Habitat Category 3

According to OAR 635-415-0025, this is essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited on either a physiographic province or site-specific basis, depending on the individual species or population. Habit within the site boundary the Applicant considers Category 3:

- **CUR** Long-Billed Curlew: a band of grassland at the north end of the site characterized by high levels of curlew use. Sandberg's bluegrass, rather than cheatgrass, is often predominant; the area also contains some needle and thread grass and six-weeks fescue.
- **SS** Shrub Steppe: moderate shrub stands with some native grass species in the understory.
- **GL** Grasslands: curlew use is low or absent, and areas show moderate grazing pressure with some native grass species.

Habitat Category 4

According to OAR 635-415-0025, this is important habitat for fish and wildlife species. Habit within the site boundary the Applicant considers Category 4:

- **SS** Shrub Steppe: few shrubs or shrubs in highly fragmented patches with a weedy understory.
- **GL** Grasslands: weedy, and some contain scattered rabbitbrush, bitterbrush, sage, juniper, or an occasional tree. These show higher grazing pressure or more recent cultivation.
- **RS** Rock and Sand: exposed rock and bare sand.

Habitat Category 5

According to OAR 635-415-0025, this is habitat for fish and wildlife having a high potential to become either essential or important habitat. Habit within the site boundary the Applicant considers Category 5:

- **PC** Previously Cultivated: fallow agricultural land.
- **DW** Dryland Wheat.
- **IA** Irrigated Agriculture: irrigated fields or pastures.

Habitat Category 6

According to OAR 635-415-0025, this habitat has a low potential to become essential or important habitat for fish and wildlife. Habit within the site boundary Applicant considers to be Category 6:

- **RP** Roads and Parking: roadways and parking areas for equipment and vehicles.
- **ST** Structures: farmyards, residences and outbuildings, along with their associated areas of disturbance, excluding structures used for raptor nesting.
- **QR** Quarries.
- **AF** Animal Facilities: feeding or watering stations, feedlots and animal holding pens, excluding those close to or containing Washington ground squirrel activity.

BIOLOGICAL AND BOTANICAL SURVEYS

Special Status Species Review

Correspondence from the U.S. Fish and Wildlife Service (USF&WS) (Attachment Q), and databases and reports from the USF&WS Threatened and Endangered Species System,[1] the USF&WS Oregon Fish and Wildlife Office,[2] the Oregon Department of Fish and Wildlife (ODFW),[3] the Oregon Department of Agriculture Plant Division,[4] and the Oregon Natural Heritage Information Center[5] were surveyed to determine the species listed or considered as special status species within the site boundary. These determinations were updated for the proposed facility in January 2007. The criteria for species selection were: species listed as threatened or endangered at the federal or state level and species proposed for or candidates for listing as threatened or endangered at the federal or state level, and those listed as species of

[1] http://ecos.fws.gov/tess_public/StartTESS.do
[2] http://www.fws.gov/oregonfwo/Species/EndSpeciesMainPage.asp
[3] http://www.dfw.state.or.us/wildlife/diversity/index.asp
[4] http://www.oregon.gov/ODA/PLANT/CONSERVATION/statelist.shtml
[5] http://oregonstate.edu/ornhic/data.html

concern at the federal or state level; and species with historical or current records as having occurred in either Morrow or Gilliam County within the Columbia Basin ecoregion.[6, 7, 8] Where the species is a listed, proposed or candidate species or a species of concern in an ecoregion other than the Columbia Basin, it was not included. Anadromous fish, traveling the Columbia River to the north of the site, were not considered in this exhibit as they do not occur within the site boundary; they are addressed in Exhibit Q.

Wildlife Surveys

Avian and mammalian surveys within and near the site boundary commenced September 2002 and ended in October 2004. The initial surveys, from September 2002 to mid-November 2002, were performed by Northwest Wildlife Consultants, Inc., Pendleton, Oregon. The remaining surveys were performed by two wildlife biologists, Rick Welch and Lana Schleder, from Energy Northwest Environmental Services, Richland, Washington. Their qualifications for the work include participation in evaluation of botanical, avian, mammalian and aquatic resources during siting of the uncompleted nuclear power plant at Satsop, Washington, and the three nuclear plants proposed to be built north of Richland, Washington. One of these, the Columbia Generating Station, was completed, and the two still perform assessments of environmental impacts from operation of the facility.

Avian surveys included: point counts for avian use, with fixed-point circular plots, a survey duration of 20 minutes, and a viewing radius of approximately 800 meters; examination of suitable habitat and structures for raptor nests; and a breeding bird survey primarily of passerine species. Point count survey plots were located throughout the site and in nearby areas. All but one plot was located in upland areas; the remaining plot was located in Willow Creek Valley. These plots provided an assessment of avian use adjacent to as well as within the site boundary (Figure P-2). Twenty-seven point count plots were surveyed for a full year, and 7 were surveyed only during the fall of 2004. Analysis of avian use studies indicates that surveys of one season's duration, particularly during the spring or fall, are sufficient to assess year-round avian use in areas where substantial seasonal use data are available, as is the case for the proposed facility.[9] While traveling to and from the site from Richland, and while in transit between survey locations, any observations of special status bird species were recorded. The facility site and a buffer of approximately 2 miles beyond the boundary were searched for raptor nests or nesting activity in spring of 2003 and 2004. In May and June 2003, surveys for breeding birds were performed in Eightmile Canyon, an area with significantly higher habitat resources than the upland portion of the facility site. Eightmile Canyon includes riparian vegetation as well as sagebrush and juniper tree stands larger than are seen on the balance of the area within and adjacent to the site.

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[6] Oregon Natural Heritage Program (2001). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon.

[7] Oregon Natural Heritage Program (2004). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon.

[8] NatureServe (2006). NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia: http://www.natureserve.org/explorer

[9] Erickson W., G. Johnson, D. Young, D. Strickland, R. Good, M. Bourassa, K. Bay and K. Sernka (2002). Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wild Developments. WEST, Inc., Cheyenne, Wyoming.

Any sightings of special status mammals at avian point count plots were also recorded, as were incidental mammal observations while in transit to and from the site and between survey plots. On March – June 2003 and March – May 2004, suitable habitat within the site boundary was surveyed for Washington ground squirrel or western burrowing owl activity.

Observations from all surveys and survey locations were use to compose a list of individual bird species observed on and around the facility site. Point count data from all survey plots except for the one in Willow Creek Valley were used to determine the number of observations of each species per survey, mean use (mean number of the species observed per survey), the number of surveys in which a member of each species was observed, and the percent of surveys in which a member of the species was observed. These were tabulated for the entire proposed facility and separately for the north and south portions of the site. Summaries for each bird group (passerines, raptors, waterbirds, waterfowl, upland gamebirds and doves) were prepared showing mean use, composition (the mean use of the group divided by the total mean use of all groups) and the percent of surveys in which a member of a group was observed. These summaries were prepared for the total site, and separately for the north and south portions. These summaries included results by season and by all seasons combined (Attachments P-1 – P-3).

The Willow Creek plot was not included in the analysis of avian use of the facility site. A riparian area with considerably different habitat characteristics, avian use of the Willow Creek plot is not representative of the facility site. Willow Creek Valley is outside of the site boundary, and birds remaining within the valley are unlikely to be at risk from facility activities. Upland point count sites were capable of detecting birds from Willow Creek Valley using the facility site.

Botanical Surveys

In November and December 2002, Dr. Steven Link of Environmental Solutions, Richland, Washington, and a team from Energy Northwest Environmental Services performed an assessment of the vegetative characteristics of the north area of the facility site. Dr. Link is an acknowledged expert in inland Pacific Northwest native and invasive plant species, and is a faculty member of Washington State University. Nine survey locations were selected (Figure P-3), representative of the general area in which they occurred.

Within a 100-meter radius of each survey location, all plants present within an area of 0.1 meter^2 were identified to the species level at 21 sites. A species inventory was also developed around each survey location in a circular area with a radius of approximately 200 meters. Plant cover was estimated by identifying the tallest entity appearing at 1 meter intervals along a 100-meter transect from the survey location.

All native and alien plant species observed were tabulated. For each survey location, the presence or absence of each species, the species richness (total number of different species present), percent of species present that were native, and the average observation frequency of native and alien plants were determined. Species cover of each location was calculated for native and alien species, and the proportion of each site that could be considered to represent good or poor condition determined (Attachment P-4).

Determination of Habitat Categories

Habitat categories within the site boundary were assessed by reviewing the results of the vegetative characteristics study and the site's soil types, in conjunction with review of satellite imagery and aerial photographs of the facility site. In 2003, color photographs were taken with a 6 inch focal length, 9 inch format mapping camera. There were a total of 6 flight lines, resulting in 38 exposures at a scale of 1 inch = 1,650 feet. These photographs were used to determine the extent and boundaries of habitat types. Aerial photographs were reviewed and habitat categories evaluated in consultation with the Energy Northwest Environmental Services biologists who performed the wildlife surveys and participated in the vegetation surveys. They became intimately familiar with the area during two years of surveys on and around the site. The location and frequency of observation of sensitive and listed species were also reviewed. The Umatilla and Willow Creek Assessment[10] was consulted to evaluate habitat occurring on the facility site that was considered critical or essential to selected species. Where habitat category selection within the ODFW standards (OAR 635-415-0025) was uncertain, the highest category reasonably expected to apply was assigned. Habitat boundaries were digitized from aerial photographs and images, and habitat subcategories mapped into ArcGIS for calculation of habitat extent and areas of permanent or temporary impacts.

RESULTS OF SURVEYS

Special Status Species

Listed, Candidate and Proposed Species

Of the 13 federal or state listed, candidate or proposed species historically occurring in the Columbia Basin ecoregion of Gilliam and Morrow Counties (Table P-1), only the American peregrine falcon, bald eagle, golden eagle and Washington ground squirrel are likely to be observed within the site boundary. During surveys of the area, only the bald eagle was observed, and only one individual.

The nearest known occurrences of sessile mousetail are within five miles, to the west of the facility site near the regional landfill. The southernmost edge of the greater sage-grouse range in Washington State lies approximately five miles from the northern site boundary, across the Columbia River in Klickitat County. The nearest known occurrences of Laurence's milkvetch are approximately 20 miles to the southeast of the facility site, near the town of Heppner. The closest sightings of the Canada lynx are in the Blue Mountains, further to the southeast. The remaining plant species have no known current occurrences in either Gilliam or Morrow County, and the remaining mammals are not currently known to occur in Oregon. Use of the facility site by these species was considered in habitat evaluations, and they are addressed individually in Exhibit Q.

Table P-1: Listed, Candidate and Proposed Species Occurring in the Area

[10] Kagan J.S., R. Morgan and K. Blakeley (September 2000). Umatilla and Willow Creek Basin Assessment for Shrub Steppe, Grasslands, and Riparian Wildlife Habitats. EPA Regional Geographic Initiative.

Scientific Name	Common Name	Federal Status[1]	State Status
Plants			
Camissonia pygmaea	Dwarf evening-primrose	SoC	Candidate
Mimulus evanescens	Disappearing monkeyflower	SoC	Candidate
Mimulus jungermannioides	Hepatic monkeyflower	None	Candidate
Myosurus sessilis	Sessile mousetail	SoC	Candidate
Astragalus collinus var. *laurentii*	Laurence's milk-vetch	SoC	Threatened
Birds			
Falco peregrinus anatum	American peregrine falcon	None	Endangered
Haliaeetus leucocephalus	Bald eagle	Threatened	Threatened
Centrocercus urophasianus	Greater sage-grouse	Candidate	SV
Mammals			
Canis lupus	Gray wolf	Threatened	Endangered
Spermophilus washingtoni	Washington ground squirrel	Candidate	Endangered
Lynx Canadensis	Canada lynx	Threatened	None
Ursus arctos horribilis	Grizzly bear	Threatened	None

1. **SoC:** Species of Concern
   SV: Species of Concern, Vulnerable

Protected Species and Species of Concern

For federal or state protected species or species of concern, there are two invertebrate species, two vascular plant species, three amphibian species, four reptile species, twenty bird species and nine mammal species historically or currently known in the Columbia Basin ecoregion of Gilliam or Morrow County, or whose distribution in Oregon is unknown (Table P-2). Surveys were not performed to evaluate the occurrence of invertebrate, amphibian or reptile species on the facility site.

Neither invertebrate species of concern is expected to be present within site boundary, as they require aquatic resources not present. Neither plant species of concern was observed during the survey of the site's vegetative characteristics; one grows near the Columbia River and the other requires alkaline vernal pools. Aquatic resources needed by the amphibious species and by one of the reptiles are also absent within the site boundary. Two reptile species probably occur on or near the facility site although they were not observed.

Table P-2: Species of Concern Occurring in the Area, or whose Distribution is Unknown

Scientific Name	Common Name	Species of Concern		Oregon Category[1]
		Federal	State	
Invertebrates				
Gomphus lynnae	Lynn's clubtail dragonfly	X		
Lepidostoma goedeni	Goedon's lepidostoman caddisfly	X		
Vascular plants				
Allium robinsonii	Robinson's onion	X		
Myosurus minimus apus	Little mousetail	X		
Amphibians				
Rana pipiens	Northern leopard frog		X	Critical
Bufo woodhousii	Woodhouse's toad		X	Peripheral
Bufo boreas	Western toad		X	Vulnerable
Reptiles				
Chrysemys picta	Painted turtle		X	Critical
Crotalus viridis	Western rattlesnake		X	Vulnerable
Sceloporus graciosus	Sagebrush lizard		X	Vulnerable
Sceloporus graciosus graciosus	Northern sagebrush lizard	X		
Birds				
Riparia riparia	Bank swallow		X	Unknown
Bucephala islandica	Barrow's goldeneye		X	Unknown
Amphispiza bilineata	Black-throated sparrow		X	Peripheral
Bucephala albeola	Bufflehead		X	Unknown
Speotyto cunicularia	Burrowing owl		X	Critical
Tympanuchus phasianellus columbianus	Columbian sharp-tailed grouse	X		
Buteo regalis	Ferruginous hawk	X	X	Critical
Ammodramus savannarum	Grasshopper sparrow		X	Vulnerable
Aquila chrysaetos	Golden eagle	Protected		
Melanerpes lewis	Lewis' woodpecker	X	X	Critical

Scientific Name	Common Name	Species of Concern		Oregon Category[1]
		Federal	State	
Lanius ludovicianus	Loggerhead shrike		X	Vulnerable
Numenius americanus	Long-billed curlew		X	Vulnerable
Oreortyx pictus	Mountain quail	X		
Accipiter gentiles	Northern goshawk	X	X	Critical
Dryocopus pileatus	Pileated woodpecker		X	Vulnerable
Amphispiza belli	Sage sparrow		X	Critical
Centrocercus urophasianus	Sage-grouse		X	Vulnerable
Buteo swainsoni	Swainson's hawk		X	Vulnerable
Athene cunicularia hypugaea	Western burrowing owl	X		
Empidonax traillii adastus	Willow flycatcher		X	Unknown
Icteria virens	Yellow-breasted chat	X		
Mammals				
Antrozous pallidus	Pallid bat	X		
Corynorhinus townsendii pallescens	Pale western big-eared bat	X		
Euderma maculatum	Spotted bat	X		
Lepus townsendii	White-tailed jackrabbit		X	Unknown
Myotis ciliolabrum	Western small-footed myotis	X	X	Unknown
Myotis evotis	Long-eared myotis	X	X	Unknown
Myotis yumanensis	Yuma myotis	X		
Ovis Canadensis California	California bighorn sheep	X		
Ovis Canadensis nelsoni	Desert bighorn sheep	X		

1. **Critical:** Listing pending or appropriate
   Vulnerable: Listing not imminent
   Peripheral or Naturally Rare: Oregon populations are on the edge of their range
   Undetermined: Status is unclear
   Protected: Protected by the federal Bald and Golden Eagle Protection Act

Of the 20 avian protected species or species of concern, 10 were observed on or near the facility site during wildlife studies; three others were not observed but may be rare visitors to the site. Only one mammal species of concern was observed, the white-tailed jackrabbit. Six of the remaining mammals are bat species, all of which may occur on or near the facility site. It is unlikely the conducted wildlife surveys would have detected bat species. The remaining mammals are two bighorn sheep species not observed on or near the facility site; they are not inconspicuous, and it is doubtful they would have been missed during the surveys.

Invertebrates

Lynn's clubtail dragonfly	Known current distribution is well to the south of the site, with sightings along the John Day and Owyhee Rivers south and east of Gilliam and Morrow Counties.[11] Unlikely to occur within the site boundary due to the absence of aquatic resources needed by the species, but may appear in Willow Creek Valley.
Goedon's lepidostoman caddisfly	Distribution unknown. Unlikely to occur within the site boundary due to the absence of aquatic resources needed by the species. Oregon Natural Heritage Information Center rejected consideration of the species for taxonomic reasons.[12]

Plants

Robinson's onion	Not observed, and unlikely to occur within the site boundary. Uses sand and gravel deposits along the Columbia River.
Little mousetail	Not observed on the facility site. May occur if alkaline vernal pools are present. Often accompanies sessile mousetail; the nearest known location of sessile mousetail is to the west, within five miles of the site boundary.

Amphibians

Northern leopard frog	Not observed, and unlikely to occur within the site boundary. May be present in Willow Creek. Habitat is marshes, wet meadows, ponds and reservoirs with quiet water.
Woodhouse's toad	Not observed, and unlikely to occur within the boundary as the current Oregon distribution does not include Gilliam or Morrow County. Only partly terrestrial and requiring permanent aquatic resources for breeding, Willow Creek may provide suitable habitat.
Western toad	Not observed on the site, although potentially occurs within the boundary. Although can use arid landscapes, seasonal

[11] Pacific Biodiversity Institute Endangered Species Information Network: http://www.pacificbio.org/ESIN/OtherInvertebrates/LynnsClubtail/LynnsClubtail_pg.html
[12] Oregon Natural Heritage Program (2001), op. cit.

	water is required for breeding, and the site is generally too distant from these. The species probably occurs around Willow Creek, and possibly occurs in Eightmile or Fourmile Canyons.
<u>Reptiles</u>	
Painted turtle	Not observed on the site, and is unlikely to occur within the boundary. Uses sites with still or slow-moving water with abundant aquatic vegetation. Willow Creek may be suitable.
Western rattlesnake	Not observed, but probably occurs on or near the facility site. Uses desert scrub, grassland and open pine.
Northern sagebrush lizard	Not observed, but probably occurs on or near the facility site. Uses sage steppe and open stands of pine or juniper.
<u>Birds[13]</u>	
Bank swallow	Isolated individuals and flocks observed on and near the site during all portions of the wildlife survey. Most observations were made outside of the site boundary in Willow Creek Valley. Uses grassland, pasture or agricultural areas near surface water; uses vertical dirt embankments for nest burrows.
Barrow's goldeneye	Not observed, but potentially an extremely rare visitor within the site boundary. Uses lakes in forested areas, and a few may appear on inland waters in the winter.
Black-throated sparrow	Not observed, but potentially a rare visitor to the area. Uses arid shrublands.
Bufflehead	Not observed, and unlikely to occur within the site boundary. Uses mountain and low elevation lakes in forested areas, absent from the site.
Columbian sharp-tailed grouse	Not observed, and unlikely to occur within the site boundary. No longer present in Oregon, although the facility site is within the historic range.[14] Uses prairie, shrub and grassland.
Ferruginous hawk	Observed on and near the site during all portions of the wildlife study other than point count surveys in Willow Creek Valley. One active nest found near the site outside the boundary. Uses open juniper woodlands, sagebrush flats or grasslands.

[13] Peterson Field Guides (1989). A Field Guide to Western Birds. Houghton Mifflin Company, Boston, Massachusetts and New York, New York.

[14] Ramsey R.D., T.A. Black, E. Edgley and N. Yorgason (1999). Use of GIS and Remote Sending to Map Potential Columbian Sharp-Tailed Grouse Habitat in Southeastern Idaho. Utah State University Landscape Ecology: Modeling and Analysis Center, Logan, Utah.

Grasshopper sparrow	One observed on the facility site while in transit between wildlife survey locations. Uses grasslands, hayfields and prairies.
Golden eagle	Observed on and near the site during all portions of the wildlife study. One active golden eagle nest was found outside the site boundary. Uses open habitat in mountains, foothills and plains.
Lewis' woodpecker	Three observations outside of the site boundary during the wildlife study. Uses logged or burned forests, wooded watersides.
Loggerhead shrike	Observed on and near the facility site in small numbers during all portions of the wildlife study. Uses sagebrush and juniper steppe.
Long-billed curlew	Observed on and near the facility site during all portions of the wildlife study. The vast majority of observations were in the north area, and all were during spring and summer. Spring and summer habitat includes plains and rangeland.
Mountain quail	Not observed, and unlikely to occur within the site boundary. Uses open ponderosa pine forest.
Northern goshawk	Not observed, and unlikely to occur within the site boundary. Uses mature forested areas.
Pileated woodpecker	Not observed, and unlikely to occur within the site boundary. Uses mature fir or mixed conifer forested areas.
Sage sparrow	One observed within the site boundary during avian point counts in the north area. Uses arid brush, sage or chaparral areas.
Swainson's hawk	Observed on and near the facility site during all portions of the wildlife survey. No active nests found on or near the site. Uses open juniper woodlands, sagebrush flats or grasslands.
Western burrowing owl	Rarely occurs within the site boundary. One observed within the site boundary in the north area during avian point count surveys; two additional observations during other wildlife study activities. None was present during breeding season, and no active nesting burrows were found. Uses sagebrush, grasslands or pastures. The lack of suitable soil depths for burrowing in uncultivated areas is probably the primary limitation to their use of the site.
Willow flycatcher	One observed outside of site boundary during wildlife study activities. May be a rare visitor within the boundary. Uses willow or other tall shrubs at the edges of streams, springs, seeps, marshes or meadows.
Yellow-breasted chat	Not observed. May occur in Willow Creek Valley, but expected to occur extremely rarely, if at all, within the Site boundary. Uses stream thickets.

Mammals

Pallid bat	Not observed during wildlife studies, which were not likely to detect bats. Uses areas of open pine, juniper or sagebrush, and roosts in crevices, caves, mines or buildings.
Pale western big-eared bat	Not observed during wildlife studies, which were not likely to detect bats. Uses any type of vegetation, and roosts in crevices, bridges, mines or buildings.
Spotted bat	Not observed during wildlife studies, which were not likely to detect bats. Uses pines or desert vegetation, and roosts in crevices in cliffs or canyon walls.
White-tailed jackrabbit	One observation outside of the site boundary. Uses open grassland, pastures and fields.
Western small-footed myotis	Not observed during wildlife studies, which were not likely to detect bats. Not known to currently occur as residents of either Gilliam or Morrow County,[15] it could occur during migration. Uses coniferous forests or arid shrubland, and roosts in crevices, caves and mines.
Long-eared myotis	Not observed during wildlife studies, which were not likely to detect bats. Uses deciduous or coniferous forests or arid shrubland, and roosts in crevices, caves, mines, bridges, hollow trees or loose bark.
Yuma myotis	Not observed during wildlife studies, which were not likely to detect bats. Uses pine and fir forests and arid grasslands with nearby open water, and roosts in caves, tunnels and buildings.
California bighorn sheep	Not observed, and unlikely to currently occur within the site boundary. Uses open areas or sparsely populated woodlands, preferably near precipitous slopes, and does use sagebrush-bitterbrush-bunchgrass scrub.[16] Currently occur in Oregon primarily in the southeast part of the state.
Desert bighorn sheep	The site area may lie within the historic range. Not observed, and unlikely to currently occur within the site boundary as this subspecies does not currently occur in Oregon.[17]

[15] Deschutes & Ochoco National Forests, Crooked River National Grassland. Bats: http://www.fs.fed.us/r6/centraloregon/wildlife/species/mammals/bats.shtml

[16] US Fish and Wildlife Service (2003). Draft Recovery for the Sierra Nevada Bighorn Sheep (*Ovis canadensis californiana*). Region 1, US Fish and Wildlife Service, Portland, Oregon.

[17] US Department of the Interior (1995). Our Living Resources: A report to the nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems. National Biological Service, Washington, District of Columbia.

Results of Avian Surveys

Eighty different species of birds were observed on or near the facility site (Table P-3). Of these, twelve were special status species (Figure P-4). Eighteen species were observed only during breeding bird surveys, at the Willow Creek site, or while performing other activities. These included the grasshopper sparrow and willow flycatcher, special status species. No numbers for mean use of the facility site or other quantitative comparisons were calculated for these species.

Table P-3: Individual Bird Species Observed During Wildlife Surveys

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
Passerine						
Horned lark	*Eremophila alpestris*	X	X	X	X	X
Western meadowlark	*Sturnella neglecta*	X	X	X	X	X
Loggerhead shrike	*Lanius ludovicianus*	X	X	X	X	X
Black-billed magpie	*Pica pica*	X	X	X	X	X
Brewer's blackbird	*Euphagus cyanocephalus*	X	X	X	X	X
Red-winged blackbird	*Agelaius phoeniceus*	X	X	X	X	X
Common raven	*Corvus corax*	X	X	X	X	X
Barn swallow	*Hirundo rustica*	X	X	X	X	X
Bank swallow	*Riparia riparia*	X	X	X	X	X
Cliff swallow	*Hirundo pyrrhonota*	X	X	X	X	X
White-crowned sparrow	*Zonotrichia leucophrys*	X	X	X		X
Lark sparrow	*Chondestes grammacus*	X	X	X	X	X
Golden-crowned sparrow	*Zonotrichia atricapilla*		X			
Savannah sparrow	*Passerculus sandwichensis*	X	X			X
House sparrow	*Passer domesticus*	X		X		X
Sage sparrow	*Amphispiza belli*	X				X
Song sparrow	*Melospiza melodia*	X		X	X	X
Western kingbird	*Tyrannus verticalis*	X	X	X	X	X
Say's phoebe	*Sayornis saya*	X	X		X	X
American robin	*Turdus migratorius*	X	X	X	X	X
American goldfinch	*Carduelis tristis*	X	X	X		X
House finch	*Carpodacus mexicanus*	X	X	X		X
Sage thrasher	*Oreoscoptes montanus*		X			
Eurasian starling	*Sturnus vulgaris*	X	X	X	X	X
Northern flicker	*Colaptes auratus*	X	X			X
Rock wren	*Salpinctes obsoletus*	X			X	X
American pipit	*Anthus spinoletta*	X				
Lark bunting	*Calamospiza melanocorys*	X				
Common nighthawk	*Chordeiles minor*	X			X	X
Townsend's solitaire	*Myadestes townsendii*	X				
Mountain bluebird	*Sialia corrucoides*	X				X
Lewis' woodpecker	*Melanerpes lewis*		X			X
Bullock's oriole	*Icterus bullockii*		X		X	
Golden-crowned kinglet	*Regulus satrapa*			X		

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
Yellow rumped warbler	*Dendroica coronata*			X	X	X
Wilson's warbler	*Wilsonia pusilla*			X		
Winter wren	*Troglodytes troglodytes*					X
Grasshopper sparrow	*Ammodramus savannarum*					X
Calliope hummingbird	*Stellula calliope*				X	X
Willow flycatcher	*Empidonax traillii*					X
Brown-headed cowbird	*Molothrus ater*				X	X
Northern rough-winged swallow	*Stelgidopteryx serripennis*				X	X
Chipping sparrow	*Spizella passerina*				X	
Western tanager	*Piranga ludoviciana*				X	
American crow	*Corvus brachyrhynchos*					X
Raptor						
Sharp-shinned hawk	*Accipter striatus*	X				
Ferruginous hawk	*Buteo regalis*	X	X		X	X
Swainson's hawk	*Buteo swainsoni*	X	X	X	X	X
Red-tailed hawk	*Buteo jamaicensis*	X	X	X	X	X
Rough-legged hawk	*Buteo lagopus*	X	X	X		X
Bald eagle	*Haliaeetus leucocephalus*	X				X
Golden eagle	*Aquila chrysaetos*	X	X	X	X	X
American kestrel	*Falco sparverius*	X	X	X	X	X
Northern harrier	*Circus cyaneus*	X	X	X	X	X
Prairie falcon	*Falco mexicanus*	X	X			X
Turkey vulture	*Cathartes aura*	X	X			X
Merlin	*Falco columbarius*		X			X
Great horned owl	*Bubo virginianus*	X				X
Burrowing owl	*Speotyto cunicularia*	X				X
Long-eared owl	*Asio otus*					X
Osprey	*Pandion haliaetus*					X
Waterbird						
Great blue heron	*Ardea herodias*	X		X		X
Long-billed curlew	*Numenius americanus*	X	X		X	X
Sandhill crane	*Grus canadensis*	X	X	X		X
Ring-billed gull	*Larus delawarensis*	X		X		X
California gull	*Larus californicus*	X				X
Killdeer	*Charadrius vociferus*	X		X	X	X
Belted kingfisher	*Ceryle alcyon*	X				
Great egret	*Ardea alba*				X	X
Virginia rail	*Rallus limicola*				X	
Western gull	*Larus occidentalis*			X		X
Waterfowl						
Redhead	*Aythya americana*			X		X
Mallard	*Anas platyrhynchos*		X	X	X	X
Canada goose	*Branta canadensis*	X	X			X

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
Upland Gamebird						
California quail	*Callipepla californica*	X	X	X	X	X
Ringnecked pheasant	*Phasianus colchicus*	X		X	X	X
Chukar	*Alectoris chukar*	X	X		X	X
Gray partridge	*Perdix perdix*		X			X
Dove						
Morning dove	*Zenaida macroura*	X	X	X	X	X
Rock dove	*Columba livia*		X	X		X
Total		**54**	**43**	**39**	**40**	**67**

1. **NP** – Observed at point count sites in the northern portion of the site
   SP – Observed at point count sites in the southern portion of the site
   P5 – Observed at the point count site in Willow Creek Valley
   BB – Observed during breeding bird surveys
   Other – Observed incidentally, while in transit, during raptor nest surveys, or during surveys for ground squirrels and burrowing owls

The total number of individuals of a species observed, the mean number of individuals of the species observed per survey, and the percent of surveys in which an individual of the species was observed were tabulated by season for the entire site, and separately for the north and south areas (Table P-4).

Ten special status species were observed during point count surveys. The burrowing owl, bald eagle and sage sparrow were represented by one individual each, and consequently have very low site use and observation frequencies. All were observed at point count sites only in the north area of the site. The Swainson's hawk with 104 individuals, and the long-billed curlew with 254 individuals, had the highest counts of special status species. In comparison, there were 4014 individual horned larks observed during the course of the point counts. For some species, observations varied highly by season: the long-billed curlew was only observed during spring and summer surveys, while the loggerhead shrike, ferruginous hawk and Swainson's hawk were absent from the site during winter surveys. The golden eagle was the only special status species observed in each season, although summer was represented by only one individual. The golden eagle was also the most numerous of special status species sightings in winter, with the bald eagle the only other special status species observed.

There was also some variability in the locations in which some special status species were observed. Long-billed curlews were infrequently seen in the south area of the site, with 84% of sightings in the north area, and most of these were sighted on Hurlburt Flats. The Swainson's hawk was observed most frequently in the south area of the site, with 84% of observations located there. The substantial majority Swainson's hawk observations were in the fall. Prey abundance, and ease of prey location in wheat stubble or in newly cultivated or seeded fields, probably account for this difference in use. The ferruginous hawk and golden eagle had approximately a 1:2 preference for the north area of the site.

Table P-4: Special Status Species Observed During Point Count Surveys

Species	Fall # Obs[1]	Fall Use	Fall Freq	Winter # Obs	Winter Use	Winter Freq	Spring # Obs	Spring Use	Spring Freq	Summer # Obs	Summer Use	Summer Freq
Entire site												
Loggerhead shrike	4	0.012	0.9%				5	0.022	2.2%	3	0.015	1.0%
Bank swallow	1	0.003	0.3%				2	0.009	0.4%	27	0.13	6.9%
Sage sparrow										1	0.005	0.5%
Lewis' woodpecker							2	0.009	0.4%			
Ferruginous hawk	1	0.003	0.3%				10	0.043	3.4%	9	0.044	3.0%
Swainson's hawk	60	0.18	5.3%				23	0.099	7.3%	21	0.10	6.4%
Bald eagle				1	0.004	0.4%						
Golden eagle	13	0.038	3.5%	11	0.042	4.2%	11	0.047	4.7%	1	0.005	0.5%
Burrowing owl										1	0.005	0.5%
Long-billed curlew							179	0.77	40.5%	75	0.37	12%
North Area												
Loggerhead shrike	2	0.011	1.1%				2	0.013	1.3%	3	0.021	1.4%
Bank swallow							2	0.013	0.6%	20	0.14	5.7%
Sage sparrow										1	0.007	0.7%
Ferruginous hawk	1	0.005	0.5%				7	0.044	3.1%	7	0.050	2.9%
Swainson's hawk	1	0.005	0.5%				9	0.056	4.4%	7	0.050	4.3%
Bald eagle				1	0.006	0.6%						
Golden eagle	11	0.060	5.5%	10	0.059	5.9%	7	0.044	4.4%			
Burrowing owl										1	0.007	0.7%
Long-billed curlew							170	1.1	54%	66	0.47	14%
South Area												
Loggerhead shrike	2	0.013	0.6%				3	0.042	4.2%			
Bank swallow	1	0.006	0.6%							7	0.11	9.5%
Lewis' woodpecker							2	0.028	1.4%			
Ferruginous hawk							3	0.042	4.2%	2	0.032	3.2%
Swainson's hawk	59	0.37	11%				14	0.19	14%	14	0.22	11%
Golden eagle	2	0.013	1.3%	1	0.011	1.1%	4	0.056	5.6%	1	0.016	1.6%
Long-billed curlew							9	0.12	9.7%	9	0.143	6.3%

1. **# Obs:** number of individual birds observed
   Use: mean number of birds observed per survey
   Freq: percent of surveys in which a member of the species was observed

Table P-5: Species Groups Observed During Point Count Surveys

	Fall			Winter			Spring			Summer			All Seasons		
	Use[1]	**Comp**	**Freq**	**Use**	**Comp**	**Freq**	**Use**	**Comp**	**Freq**	**Use**	**Comp**	**Freq**	**Use**	**Comp**	**Freq**
Entire site															
Passerines	8.0	84%	84%	8.7	58%	79%	3.9	68%	95%	3.4	77%	80%	6.4	70%	84%
Raptor	0.55	5.8%	30%	0.32	2.1%	25%	0.44	7.8%	34%	0.49	11%	32%	0.46	5.0%	30%
Waterbird	0.73	7.7%	2.6%	1.9	13%	1.1%	1.2	21%	43%	0.48	11%	15%	1.1	12%	14%
Waterfowl	0.15	1.5%	0.6%	3.9	26%	7.6%	0.043	0.8%	1.7%	0.010	0.2%	0.5%	1.0	12%	2.6%
Upland Gamebird	0.044	0.5%	2.6%	0.095	0.6%	1.5%	0.065	1.1%	1.7%				0.053	0.6%	1.6%
Dove	0.085	0.9%	2.6%	0.034	0.2%	1.1%	0.039	0.7%	2.6%	0.049	1.1%	3.4%	0.055	0.6%	2.4%
All bird groups	**9.5**			**15**			**5.7**			**4.4**			**9.1**		
North area															
Passerines	7.8	79%	80%	5.1	54%	76%	4.1	72%	98%	3.8	79%	79%	5.3	70%	83%
Raptor	0.34	3.4%	25%	0.21	2.2%	18%	0.31	5.5%	27%	0.39	7.9%	27%	0.31	4.0%	24%
Waterbird	1.4	14%	4.9%	3.0	32%	1.8%	1.2	22%	56%	0.62	13%	18%	1.6	21%	19%
Waterfowl	0.28	2.8%	1.1%	1.1	12%	5.9%	0.013	0.2%	0.6%				0.36	4.7%	2.0%
Upland Gamebird	0.071	0.7%	4.4%	0.012	0.1%	0.6%	0.006	0.1%	0.6%				0.025	0.3%	1.5%
Dove	0.033	0.3%	2.2%	0.006	0.1%	0.6%	0.013	0.2%	1.3%	0.021	0.4%	2.1%	0.018	0.2%	1.5%
All bird groups	**9.9**			**9.3**			**5.7**			**4.9**			**7.6**		
South area															
Passerines	8.1	80%	88%	15	60%	84%	3.4	61%	88%	2.5	71%	82%	8.1	70%	86%
Raptor	0.80	8.8%	35%	0.53	2.1%	38%	0.74	13%	49%	0.71	20%	43%	0.71	6.2%	40%
Waterbird							1.1	19%	14%	0.16	4.5%	7.9%	0.23	2.0%	3.9%
Waterfowl				9.3	36%	11%	0.11	2.0%	4.2%	0.032	0.9%	1.6%	2.2	20%	3.6%
Upland Gamebird	0.013	0.1%	0.6%	0.25	1.0%	3.3%	0.19	3.4%	2.8%				0.10	0.9%	1.6%
Dove	0.14	1.6%	3.1%	0.087	0.3%	2.2%	0.097	1.7%	5.6%	0.11	3.2%	6.3%	0.12	1.0%	3.9%
All bird groups	**9.1**			**26**			**5.6**			**3.5**			**11**		

1. **Use:** mean number of group members observed per survey
   Comp: Mean use of the group divided by the total mean use of all groups
   Freq: percent of surveys in which a member of the group was observed

Ten active raptor nests were located within the site boundary and a 2-mile area around it (Figure P-5). Six red-tailed hawk nests were distributed fairly evenly throughout the surveyed area, three outside of the site boundary. One golden eagle nest, one ferruginous hawk nest and two great horned owl nests were located, all outside of the site boundary.

A summary of species group use of the total site and the north and south areas includes all avian species (Table P-5). In all seasons and in both site areas, passerine species had the highest number of individuals and highest percent of surveys in which a species member was observed, and accounted for the majority of mean species use (70% overall). This is largely due to the number of passerine species observed relative to the number of different species within other the groups, and to extremely high numbers of horned lark observations. The order of group mean use, following passerines, varied considerably among seasons and between locations. The mean number of different species observed during each survey, a measure of avian diversity on and near the facility site, ranged from 2.6 species per survey in the spring to 1.5 species per survey in the winter. There was no substantial difference between avian diversity in the north and south areas of the site.

Mammal observations

One observation of a special status species occurred, of a white-tailed jackrabbit outside of the site boundary in the north area. Other mammals observed on or near the site but not tabulated were black-tailed jackrabbits, antelope, mule deer, coyote, yellow-bellied marmot, badger and agricultural pests such as pocket gophers.

Vegetative Characteristics

Thirty-six different plant species were identified in vegetative surveys of the north area, eleven of which were alien species (Attachment P-4). The number of different species found at each survey location, a measure of the location's vegetative diversity, ranged from 11 to 23, and includes alien species. The percent of separate species identified at each survey location that were native ranged from 55 – 83%, while the frequency of individual native plants among the total number of plants present at each survey location was only 7 – 16%. Although there may be many native plant species on the site, they are substantially outnumbered by aliens that are fewer in number of species but higher in number of plants. One measure of this is the percent of cover provided by alien or native species, an indication of the condition of the plant community. Good condition encompasses native plant cover, bare soil and soil cryptogram. Poor condition includes alien plants and litter. The proportion of cover indicating good condition ranged from 12 – 66%. The predominant cover is provided by the alien species cheatgrass (*bromus tectorum*), covering 8 to 68% of the surveyed areas. Following in coverage are four native grasses – Sandberg's bluegrass (*poa secunda*), needle and thread grass (*hesperostipa comata*), bluebunch wheatgrass (*pseudoroegneria spicata*) and six-week fescue (*vulpia* cf *octoflora*).

Although the survey of vegetative characteristics of the north area of the site took place in 2002, much of the property subsequently experienced wildfires, particularly during the summer of 2004. Due to these fires, plant diversity and native species richness on the site is expected to have declined in the intervening years.

Habitat Categories

Final habitat mapping, and determination of the acreage within the site boundary in which each habitat category occurs, await the results of the wetlands determination of the facility site. In preliminary mapping (Figures P-7 and P-8), the codes assigned mapped habitats are: AR aquatic resources; RN raptor nesting structures; WGS Washington ground squirrel; CF canyon floor; SS shrub steppe; GL grassland; CUR long-billed curlew; RS rock and sand; PC previously cultivated; DW dryland wheat; IA irrigated agriculture; RP roads and parking; ST structures; QR quarries; and AF animal facilities.

POTENTIAL IMPACTS TO IDENTIFIED HABITATS

Temporary and Permanent Habitat Loss

Habit loss includes destruction of plants, displacement of mobile wildlife, and destruction of burrowing wildlife. Habitat would be temporarily lost in laydown areas, from the widening of roads during construction, and through similar ground disturbing construction-related activity. Habitat would also be permanently lost, from the footprint of new roads, turbine towers and transformers. Although the facility may eventually be decommissioned, in relation to the lifetimes of most of the plant and animal species affected, the loss would essentially be permanent. Secondary impacts to wildlife include reduction of foraging, courting and breeding habitat and the population of prey species.

Disturbance from Facility Activities

Noise during construction or decommissioning may be the predominant source of disturbance to wildlife. Additionally, the presence of facility staff and vehicular activity, the presence of structures such as the turbines, and the motion and noise of the turbine blades or nacelles could be sources of wildlife disturbance. Disturbance could cause displacement of wildlife from nesting, burrowing, breeding or foraging sites, and redistribution of prey species but would not impact plants. Secondary impacts include the loss of eggs or young if nests, burrows or similar sites were abandoned while young or eggs are present, and the added risk to reproductive success if mating wildlife or pregnant mammals were displaced to other locations. Disturbance caused by decommissioning of the facility are anticipated to be equivalent to construction disturbance.

Collision with or Electrocution by Overhead Power Lines or Guy Wires

Collisions and electrocutions, potentially causing injury or the death of the individual involved, could occur for birds and bats. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Collision with Turbines or Towers

Turbine and tower collisions, potentially causing injury or the death of the individual involved, could occur for insects, birds and bats. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Collision with Vehicles

Vehicular collisions could affect all wildlife species present within the site boundary, and could cause impacts to plants as well during off-road travel. These collisions have the potential to cause injury or the death of the individual involved. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Dust

Dust, from vehicular traffic or wind movement of soil in disturbed areas could impact water quality and affect aquatic wildlife, reduce photosynthesis or transpiration in plant species, and reduce air quality for all wildlife species. Secondary effects may include dust production as a cause of disturbance to and subsequent displacement of wildlife.

Runoff Water Quality

Impairment of water quality, from particulate material or other contaminants from facility construction and operation, could impact aquatic plants and wildlife in the receiving waters. Impacts could include wildlife displacement or wildlife and plant injury or death. Secondary effects could be loss of or disadvantage to the young of wildlife species, if one or both parents were displaced, impaired or killed while the young were still dependants.

Wildfires

Potentially caused by facility construction and operation vehicles or by other facility-related activities, wildfires could impact plant and wildlife species throughout the facility site and in its vicinity. Impacts could include impairment or death of individual plants and animals, reduction of habitat quality in terrestrial and aquatic habitats even in areas that are not burnt, increased soil loss through wind or water erosion where plant cover was destroyed, and displacement of wildlife from the burned areas due to loss of food resources, appropriate habitat types or cover. Secondary effects include loss of or disadvantage to the young of wildlife species, if one or both parents were displaced, impaired or killed while the young were still dependants.

PROPOSED MITIGATION MEASURES

Specific measures for mitigation of impacts to federal or state listed, proposed or candidate species are addressed in Exhibit Q. Specific mitigation measures are proposed for only one special status species, the long-billed curlew. Mitigation measures proposed for raptors in general also provide mitigation of impacts to the burrowing owl, golden eagle, ferruginous hawk and Swainson's hawk.

Habitat Loss

Most of the habitat within the site boundary is category 3 – 5. Although difficult to quantify, some facility components are expected to improve habitat quantity and quality within the site boundary, such as the presence of graveled facility access roads and the steps taken to prevent

facility-related soil erosion and contamination of stormwater runoff; these can also be regarded as mitigation.

The Applicant proposes to mitigate for habitat loss through facility layout, facility design, construction practices, habitat restoration and habitat replacement. Also as mitigation of habitat loss the Applicant has removed from within the site boundary, as compared to the boundary proposed in the Notice of Intent, the portion of the leased area containing Willow Creek, the floor of the Willow Creek Valley, and all leased property east of Willow Creek (Figure P-6). This preserves the only perennial stream within the boundary of the leased land, the riparian habitat present in the valley, and the only large tract of big sage habitat in good condition. Although the area in which the proposed facility is located historically contained substantial stands of big sagebrush over much of the site,[18] it has been largely replaced by cultivated fields and grazed grasslands. Big sage exists in isolated pockets throughout the remainder of the facility site, although condition, size and lack of contiguity reduce their habitat value.

In the current facility layout (Exhibit C), the Applicant has avoided all identified wetlands and aquatic resources, the faces of bluffs or rock outcroppings, and trees or other structures with active raptor nests. For those without active raptor nests, every attempt will be made in micrositing and construction to avoid loss of any of the few trees present within the site boundary. Locations of habitat to be avoided during construction will be flagged for the duration of construction activities in the area, and the construction contractor instructed of their locations and the need for avoidance.

Active raptor nests, riparian and other aquatic resources and active Washington ground squirrel burrows are all considered to be Category 1 habitat, and the Applicant proposes that no loss of Category 1 habitat occur. Minimal loss of Category 2 habitat is anticipated, and the facility goal is to reduce this loss as far as possible. Removal from within the site boundary of Willow Creek, the floor of the valley, and the leased property east of the creek eliminated much of the identified Category 2 habitat from that area proposed for the facility site in the Notice of Intent.

Temporary Habitat Loss

Temporary disturbance during facility construction is estimated at 419 acres of the 27,520-acre area within the site boundary, 1.5% of the total. Design considerations for reduction of the area affected include keeping grading to the minimum feasible, and burying communication and electrical lines within the area disturbed by temporary road widening. Plants in disturbed areas will be crushed rather than removed whenever possible, to allow potential re-emergence of perennial species. Areas temporarily disturbed during facility construction will be returned to original or better condition as soon as possible. Habitat restoration includes return to agricultural use or reseeding with an appropriate native plant seed mixture, depending on the landscape in which the disturbed areas occur. Seeding mixtures will be determined through consultation with the landowners, and discussions with the Oregon Departments of Fish and Wildlife, Energy, and Agriculture. Noxious weeds, should any appear in reseeded areas, will be controlled using methods recommended by the Oregon Department of Agriculture Plant Division.

[18] Kagan et al. (2000), op. cit.

Permanent Habitat Loss

Permanent disturbance from the facility is estimated at 249 acres of the 27,520-acre area within the site boundary, 0.9% of the total. The Applicant proposes to mitigate for permanent habitat loss by minimizing the area affected, and by replacement of the habitat lost in the impacted area, by development and protection of habit of equivalent or better categories. Planned facility access roads will take maximum advantage of existing unimproved farm and ranch access roads while still avoiding sensitive areas. Turbine and transformer pads will abut the facility roads, reducing both temporary and permanent site disturbance. Final facility roadways will be returned to the narrowest width consistent with safe travel, minimizing the permanent facility footprint.

The north area of the facility site is crisscrossed by unimproved roads, used for such activities as fighting wildfires, accessing stock feeding and watering stations, transporting sheep and herder camps, and servicing transmission lines. There are also many tracks from off-road vehicle use. The extent of habitat loss caused by traveling the site on unimproved ranch roads in difficult terrain is clear in review of aerial photography. To travel across washes or gullies, as many as six different tracks may be discerned. Three to five tracks on steeper slopes are also commonly found. Graveled facility roads will be available for use by landowners. Facility roads will be more easily traversed than remaining unimproved roads, particularly in wet weather or in snow, and maintenance of facility roads will be the responsibility of the facility. The availability of better roads, and the opportunity for landowners to suspend maintenance of many remaining unimproved roads, should result in abandonment of many farm or ranch roads, eliminate the proliferation of alternate routes, and reduce off-road travel. Eventual reclamation of habitat in some existing roadways is expected.

Habitat Replacement

Under OAR 635-415-0025, the mitigation goals for categories of habitat are:

Habitat Category 1: no loss of either habit quantity or quality
Habitat Category 2: no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality
Habitat Category 3: no net loss of either habitat quantity or quality
Habitat Category 4: no net loss in either existing habitat quantity or quality
Habitat Category 5: provide a net benefit in habitat quantity or quality
Habitat Category 6: minimize impacts

No loss of Habitat Category 1 is anticipated. Because mitigation goals for Habitat Categories 2 – 4 include no net loss of habit quantity, the Applicant deemed establishment of conservation easements on or purchase and protection of land containing equivalent amounts of these habitat categories will not prevent net loss. Changes in land ownership do not alter the depletion of regional resources available to plants and wildlife that would be caused by construction of the proposed facility.

The Applicant proposes to mitigate for permanent loss of these habitats by the purchase or lease of a parcel of land that is predominantly Category 5 habitat, and which is equal in area to that permanently lost from development of the facility, estimated to be approximately 249 acres. Ideally, this would be cropland with low agricultural productivity contiguous with areas of high-

quality habitat, such as dryland wheat adjacent to an area of shrub steppe, or irrigated agriculture adjacent to native grasslands or riparian areas. An additional benefit would be location of suitable property situated outside the site boundary between the north and south facility areas. This property would be maintained, monitored and protected for the lifetime of the facility. The Applicant proposes to complete parcel acquisition and develop a habitat conversion program for submission to the Siting Council prior to issuance of the site certificate.

The processes for conversion of the site to higher habitat categories will be developed in consultation with the Oregon Departments of Agriculture, Energy, and Fish and Wildlife. Seeding with native plant species is anticipated, and eventual planting of shrubs such as sage may be appropriate depending on the characteristics of adjacent habitat. Surplus unimproved roads could be removed, and graveled roads allowing site access for management and monitoring constructed in areas with the lowest potential for conversion to higher quality habitat. This may result in reduction of Category 6 habitat on the parcel. Livestock grazing, except when it may prove useful in early vegetation management, would be excluded. Methods for control or management of inappropriate wildfires, noxious weeds, and invasive alien plants and animals would be included in the conversion program.

Artificial enhancement of the site could include installation of raptor nesting platforms or a small feedlot in appropriate sites on the parcel; both could assist in development of Category 1 and 2 habitats. Structures suitable for raptor nesting are rare in the area, and may be more limiting to their local abundance than is the availability of prey species. Platforms would be placed in portions of the parcel removed from roadways and other sources of disturbance. In the area around the site, Washington ground squirrel burrows are frequently associated with livestock feedlots. Adding one, particularly on Warden soil should any be present, may encourage establishment of burrows on the habitat mitigation property. Considerations for feedlot placement, in addition to soil type, would be proximity to field verges and other uncultivated portions of the parcel.

General Disturbance from Facility Activities

Displacement of avian species from nesting sites and Washington ground squirrels from burrows are probably the most serious of potential disturbance impacts. The Applicant proposes to mitigate disturbance impacts by limitations in the timing of construction activities and the establishment of buffers around Washington ground squirrel burrows, raptor nests, and the Category 3 habitat associated with curlew nesting. During the nesting season, suitable raptor nest structures will be resurveyed in areas scheduled for construction. Construction activities will not proceed within 0.5 miles of identified active raptor nests or long-billed curlew nesting areas during nesting season, and construction activities will not take place within 1000 feet of identified Washington ground squirrel activity. These distances from identified resources will be flagged, either seasonally for raptor nests and curlew nesting areas, or continually for Washington ground squirrel activity. The construction contractor will be informed of the location of flagged areas and instructed on their avoidance.

As additional mitigation for disturbance to nesting raptors, the Applicant has removed from within the site boundary, as compared to the boundary proposed in the Notice of Intent, the portion of the leased area containing the floor of the Willow Creek Valley, and has also

eliminated the turbine designated as A-1 on the facility layout proposed in the Notice of Intent. This eliminates two active red tailed hawk nests from locations within the site boundary, increases the distance of the site boundary from an active red tailed hawk and an active golden eagle nest outside of the boundary, and increases the distance of the nearest turbine to an additional active red tailed hawk nest to greater than 0.5 miles. Additional adjustments to the site boundary results in the elimination from within the boundary all locations in which Lewis' woodpeckers were observed.

Collision with or Electrocution by Overhead Power Lines or Guy Wires

The Applicant proposes to mitigate the risk to avian and bat species from wire strikes and electrocution through minimization of above ground lines, installation of protective devices on power poles, and institution of facility speed limits. Un-guyed weather stations and turbine towers will be installed. The majority of electrical and communication lines will be buried underground. Above ground facility electrical poles will have all avian protective devices installed necessary to make them APLIC compliant,[19] to reduce the potential for avian electrocutions. The literature on avian wire strikes indicates that in some locations vehicular traffic is a component of that problem, when automobile traffic startles birds into panicked flight.[20] Additional driving precautions have been effective in reducing avian deaths from wire strikes in those locations. Construction and operation speed limits will be imposed, and should help reduce wire strikes in the proposed facility as well. Additional training of facility personnel will address vehicle-related wire strikes to ensure compliance with the facility speed limit. During the spring season when facility personnel may encounter fledgling raptors still learning controlled flight, personnel will be instructed to use particular care on facility roads. In the event that the facility causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

Collision with Turbines or Towers

For mitigation of impacts from turbine or tower collision, the Applicant proposes to use modern turbines and towers, minimize site lighting, employ industry and wildlife research siting guidance, and institute facility speed limits. The turbines and towers used will incorporate all design improvements considered to help in reduction of wildlife collisions. The most infamous example of avian fatalities caused by collision with wind turbines or towers is in the Altamont Pass California Wind Resource Area, where several thousand small, older turbines with rapidly turning blades are sited in an area of extremely high avian abundance. The impacts at the site are exacerbated by the presence of guyed weather stations, overhead power lines and non-compliant power poles, adding wire strike and electrocution to the toll. Wind facilities and turbine manufacturers have made significant changes in siting, construction and design of turbines and towers to address these factors, with the result that no modern wind power conversion facilities experience the level of avian fatalities seen in the Altamont.

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[19] Avian Powerline Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS). 2005. Avian protection plan (APP) guidelines. Edison Electric Institute. Washington, D.C.

[20] Avian Powerline Interaction Committee. 1994. Mitigating bird collisions with powerlines: the state of the art in 1994. Edison Electric Institute. Washington, D.C.

Changes in turbine design include elimination of all exterior structures and appurtenances permitting birds to perch or construct nests on the turbine itself. Towers are no longer lattice structures, a design that previously allowed perching and nesting to take place in and on the towers. Modern turbines are in an 'upwind' configuration, where the orientation of the nacelle during operation places the blades on the side from which the wind is coming. Modern turbines are taller, placing the blades above the flight height of several species. Turbine blades are larger as well, and their rate of rotation much slower, allowing better detection and avoidance of moving blades by birds. Changes in wind turbine siting have also taken place.

As a full understanding of the effect lighting has on collision rates at lighted structures is lacking, the aviation safety lighting required by the Federal Aviation Administration will be the only external lighting on the turbines or towers, and the number of lights will be the minimum required. Aviation safety lighting will be red only, and operate only at night. No security or other lighting of the facility site will be installed.

Turbine siting will conform to the industry's best siting practices, the siting recommendations in the facility's wildlife reports, and to current turbine siting recommendations backed by scientific evidence. Wildlife biologists survey sites prior to turbine siting, and topographical configurations that tend to increase avian impacts are avoided. Turbines are generally set back from the edges of cliffs or bluffs, areas extensively used by raptors for soaring. Some topographic features tend to funnel flight paths through constricted areas, and wildlife surveyors take notice of these to prevent placement of turbines within a constricted flight path (Attachment P-2). All of these precautions have resulted in significant reductions in avian fatalities at modern wind power conversion facilities. Comments from the Oregon Department of Fish and Wildlife regarding the siting of turbines are invited and will be considered during the final siting process. Institution of speed limits and personnel vehicle operation training may also help reduce incidences of panicked flight that may lead to turbine collisions. In the event that the facility causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

A cumulative effects analysis of the environmental impact of the proposed facility has been commissioned by the Applicant, which, when completed, will be submitted to the Siting Council. The analysis will be of impacts to wildlife, focusing primarily on bats and birds. Cumulative effects analysis will include the proposed facility and other existing and proposed wind power conversion facilities throughout north-central and southern Washington.

Collision with Vehicles

The Applicant proposes to mitigate impacts from wildlife collisions with vehicles by imposition of construction and operation speed limits of 20 miles per hour, the common speed limit in Oregon for school zones. Speed limit signs will be posted throughout the facility roads. In addition, facility personnel will be trained in the importance of cautious driving practices while on facility roads. As vehicle strikes on sheep and sheep dogs are also of great concern (with these quite abundant in the north portion of the site during much of the year), use of safe driving practices by construction and facility personnel will be enforced. In the event that the facility causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

Dust

The Applicant proposes to mitigate impacts from dust deposition through water applications to disturbed ground during construction, by graveling of permanent roadways, by erosion control, and by imposition of construction and operation speed limits of 20 miles per hour. Spraying of water on disturbed ground is an effective dust deterrent, as is reduction of speeds on graveled roads. Water application to disturbed areas and vehicle speed limit impositions are expected to reduce dust during construction to levels without significant impact to vegetation or wildlife species. Upon completion of construction, many of the unimproved roads on the facility site previously used for access to the area will have been graveled. Existence of these roads should significantly reduce traffic on the many unimproved roads and 4-wheel drive tracks now within the site boundary. It is likely that overall dust production from vehicular traffic in the facility area will be reduced from current conditions.

Runoff Water Quality

The Applicant proposes mitigation of impairment to the water quality of stormwater runoff by compliance with the discharge standards of the National Pollutant Discharge Elimination Program (NPDES). The requirement for obtaining an NPDES permit will depend upon the outcome of wetland determinations. Regardless of the requirements for a permit, stormwater pollution prevention and erosion control plans will be established for facility construction and operation. These may include establishment of erosion and siltation control measures (baffles, silt traps, netting, straw ground cover) in appropriate locations. Suspended particulate material from soil erosion and dust deposition are the only impacts to water quality expected. Lubricants and fluids used in turbines and transformers have low potential for toxicological impacts, and spill control reservoirs are incorporated in turbine and transformer design. Aside from stormwater runoff, no other water discharges from the facility will occur.

Wildfires

The Applicant proposes to mitigate for facility-caused fires by graveling of facility roads, equipping facility vehicles with fire extinguishers and shovels, by training of facility personnel in fire avoidance and response, and by establishing a fire plan for the facility. Many of the farm and range access roads are comprised of two ruts with vegetation in the middle, adding to the risk of vehicle-caused fire. Graveled facility access roads will be available to the landowners and emergency personnel. Facility access roads will provide protection against vehicle-caused fires, allow easier access to the site for firefighting, and serve as firebreaks, all of which may reduce the number and limit the extent of wildfires on the property. The role of wildfires in habitat quality has many uncertainties; however, wildfires are known to encourage cheatgrass in replacement of perennial native grass species, and can cause extirpation of big sage from burned areas.

PROPOSED MONITORING PROGRAM

The Applicant proposes no monitoring programs for individual species of concern, and for no listed, proposed or candidate species other than for the Washington ground squirrel, and that only if areas of activity are identified.

The Applicant proposes to develop a plan for monitoring the success of habitat conversion on the habitat replacement parcel (see habitat replacement, above) after the parcel to be purchased or leased is identified. The plan would be amended to include Washington ground squirrel monitoring should any be attracted to the parcel.

Monitoring of Avian Species

Although bat species would not be excluded, the monitoring program proposed by the Applicant is targeted primarily at avian species, and presented in brief, below. The first component is designed to look for information about population-level impacts to the studied species, and the second, a contingency plan, provides for standard fatality counts to which fatality counts from other wind power conversion facilities can be compared. The Applicant will fully develop and submit the program to the Siting Council prior to issuance of the site certificate.

Primary Avian Monitoring Program

It is proposed that annual spring raptor and long-billed curlew nesting surveys and annual fall horned lark censuses take place for a period of ten years, in the hope of providing an indication of impacts to populations, rather than of impacts to individuals, from facility construction and operation. These surveys, proposed to commence upon issuance of the site certificate, will provide pre- and post-construction information about avian use of the area, and local population changes for the surveyed species. One year of use surveys and two years of raptor nesting surveys have been performed within and around the site boundary. Facility construction is anticipated to be a phased operation, and portions of the site will remain available for gathering additional pre-construction use and nesting information. The bald eagle and American peregrine falcon are present on the facility site too infrequently to use for analysis of population impacts. Raptor species and the long-billed curlew encompass many federal and state avian species of concern found in surveys of the area. The horned lark (the most abundant avian species found on the site) may be an appropriate sentinel species for passerines, and a good surrogate species for estimation of impacts to those species less frequently observed.

In addition to the described studies, a life-of-the-facility Wildlife Response and Reporting System (WRRS) is proposed. This system would be similar to that accepted for Klondike III.[21] These programs provide reasonably accurate information about fatality levels for large avian species, including large hawks and owls, eagles, and geese. The programs are less precise for estimation of bat or small bird fatalities unless the fatality incident involves large numbers. The WRRS will be capable of indicating unexpected levels of avian or bat fatalities, even of small species. If such should occur, the studies proposed under the primary program can be terminated and those proposed for the contingency plan can commence.

Avian Monitoring Contingency Plan

This plan includes those studies standard to monitoring of wind power conversion facilities: avian and bat fatality monitoring through standard carcass searches of a statistically representative subset of turbines, including studies of sampling bias; and standard avian use

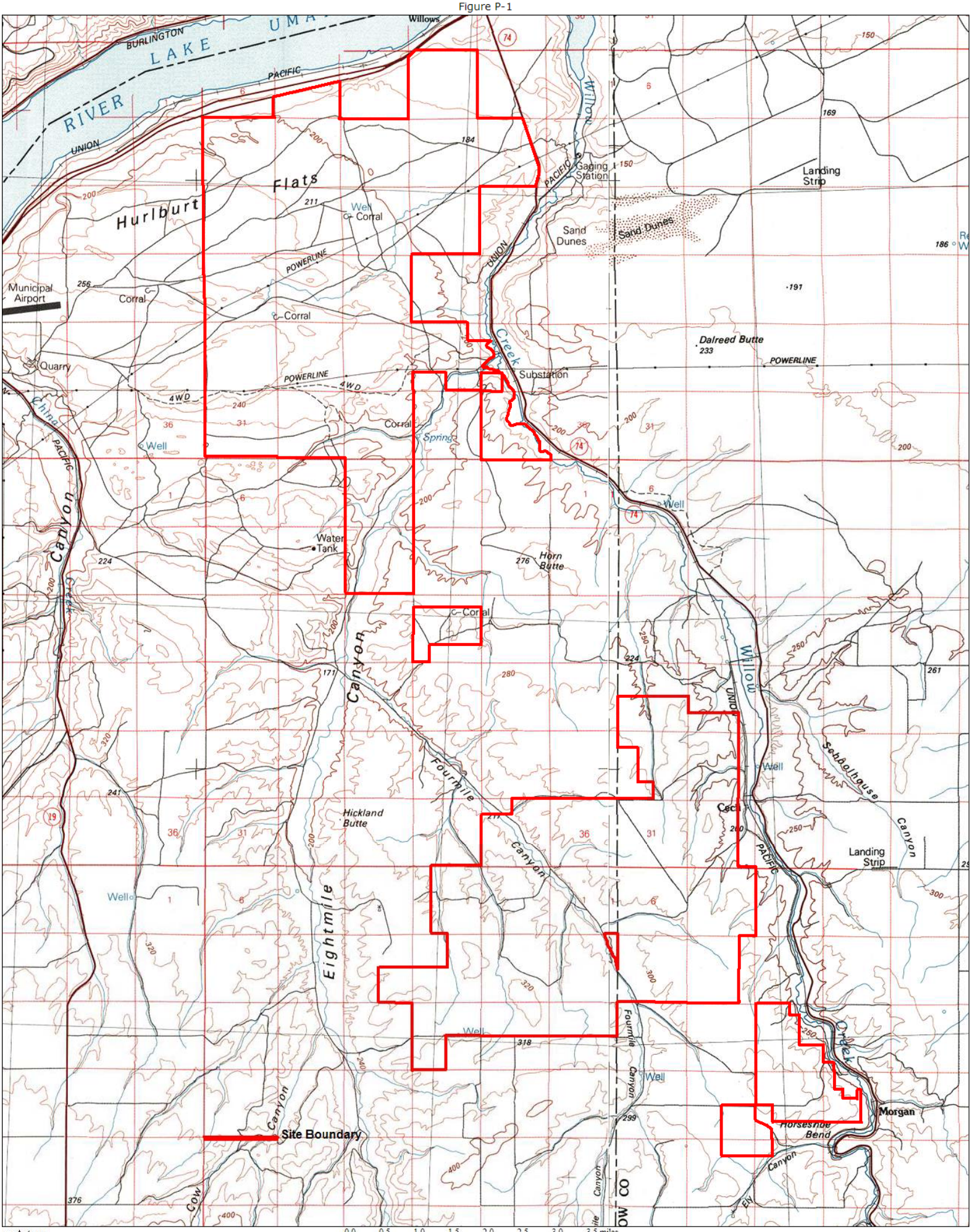
[21] http://www.oregon.gov/ENERGY/SITING/docs/KWPOA.pdf

studies. Both are proposed to last for a period of two years. In addition, two years of raptor nesting surveys are proposed (adjusted for those that may have already taken place while the primary plan was in effect), followed by nesting surveys at five-year intervals for the life of the facility. As in the primary program, the WRRS would continue. The contingency plan would provide information about the impact of facility construction and operation on individual birds and bats, and would give a more accurate fatality count than would the primary program. This would aid in assessment of relative fatality rates, by allowing comparison on a fatalities-per turbine or -per megawatt basis to bird and bat fatalities at other wind power conversion facilities.

RESPONSE TO AGENCY COMMENTS NOT ADDRESSED IN THE EXHIBIT

Although the Oregon Department of Fish and Wildlife has expressed an interest in obtaining permission to conduct wildlife surveys in the project area, the Applicant's wind project ground leases do not allow the Applicant authority to grant third party access to private lands.

Figure P-1



TN MN 17°

0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 miles

0 1 2 3 4 5 km

Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

Figure P-2

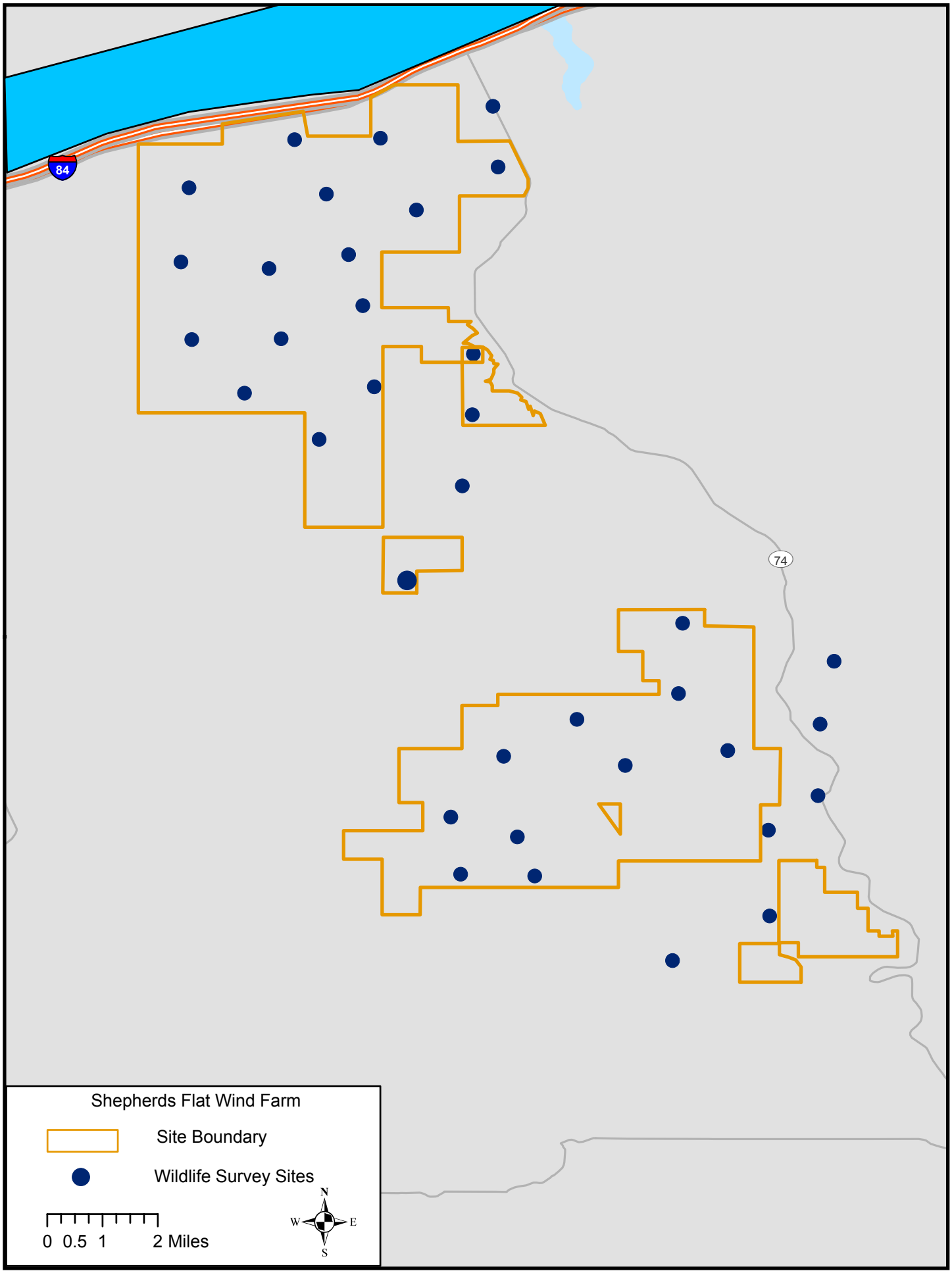

84
74
Shepherds Flat Wind Farm
Site Boundary
Wildlife Survey Sites
0 0.5 1 2 Miles
N
W
E
S

Figure P-3

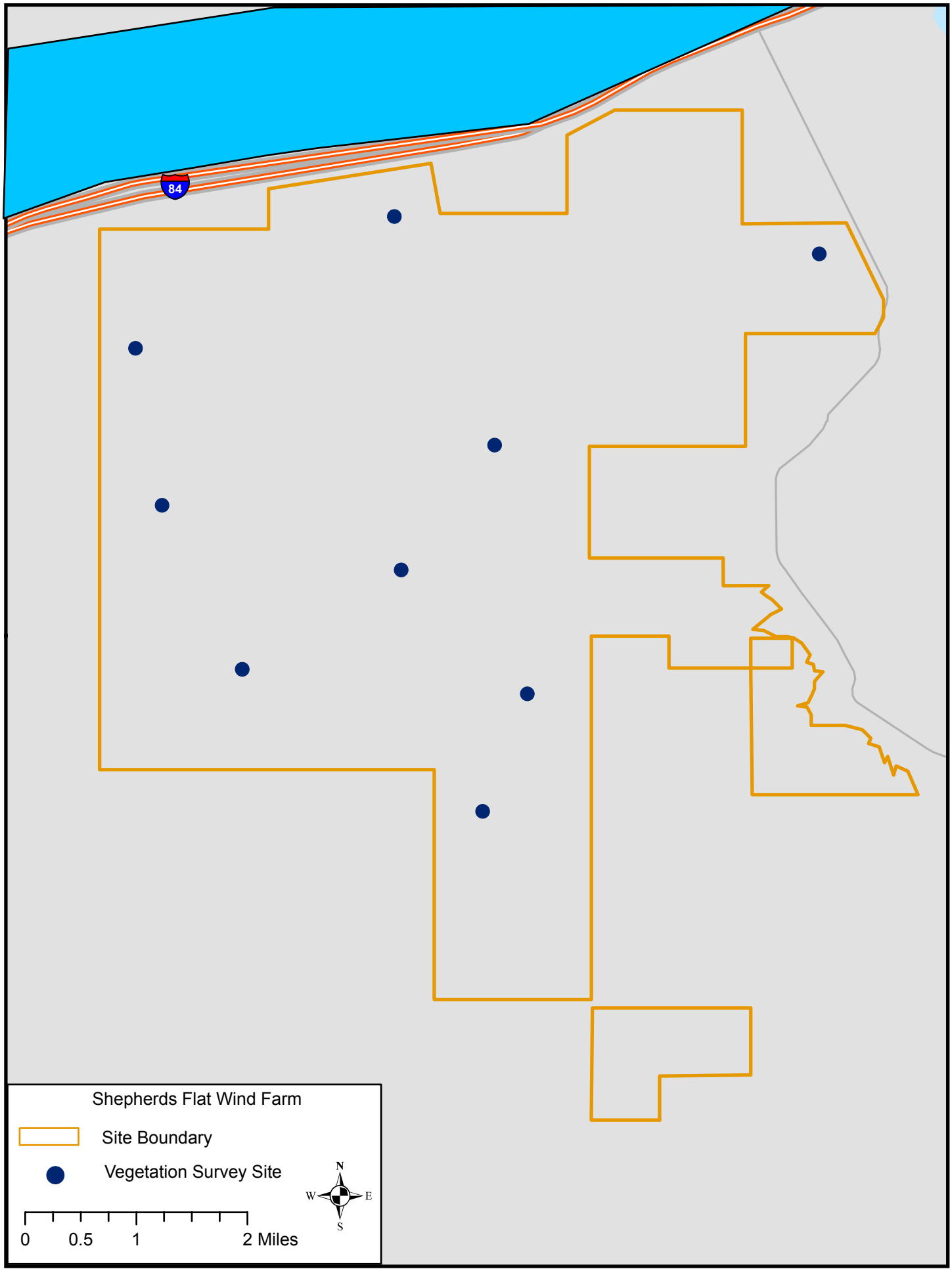

84
Shepherds Flat Wind Farm
Site Boundary
Vegetation Survey Site
N
W
E
S
0
0.5
1
2 Miles

Figure P-4

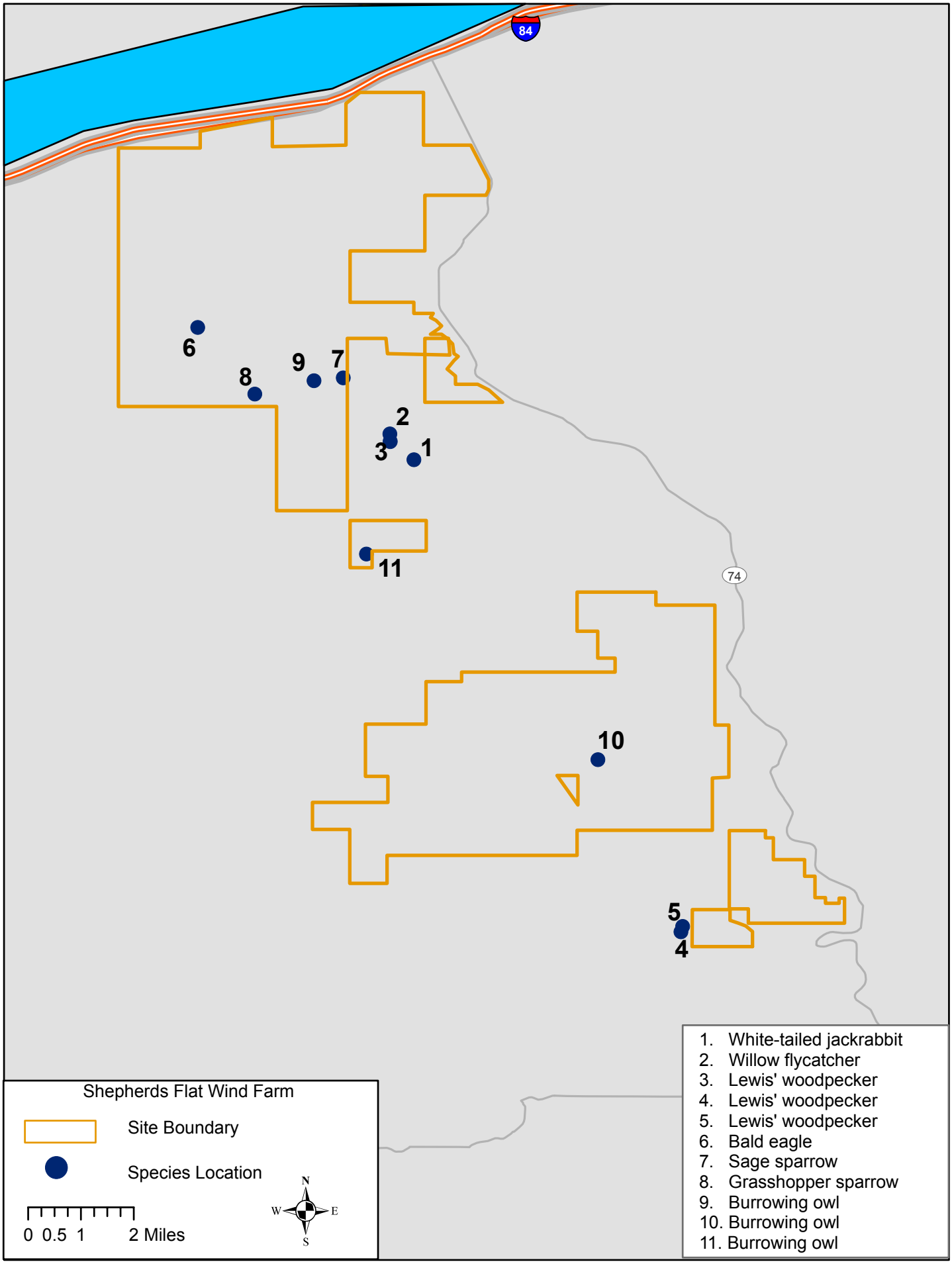

84
74
6
8
9
7
2
3
1
11
10
5
4
Shepherds Flat Wind Farm
Site Boundary
Species Location
0 0.5 1 2 Miles
N
W
E
S
1. White-tailed jackrabbit
2. Willow flycatcher
3. Lewis' woodpecker
4. Lewis' woodpecker
5. Lewis' woodpecker
6. Bald eagle
7. Sage sparrow
8. Grasshopper sparrow
9. Burrowing owl
10. Burrowing owl
11. Burrowing owl

Figure P-5

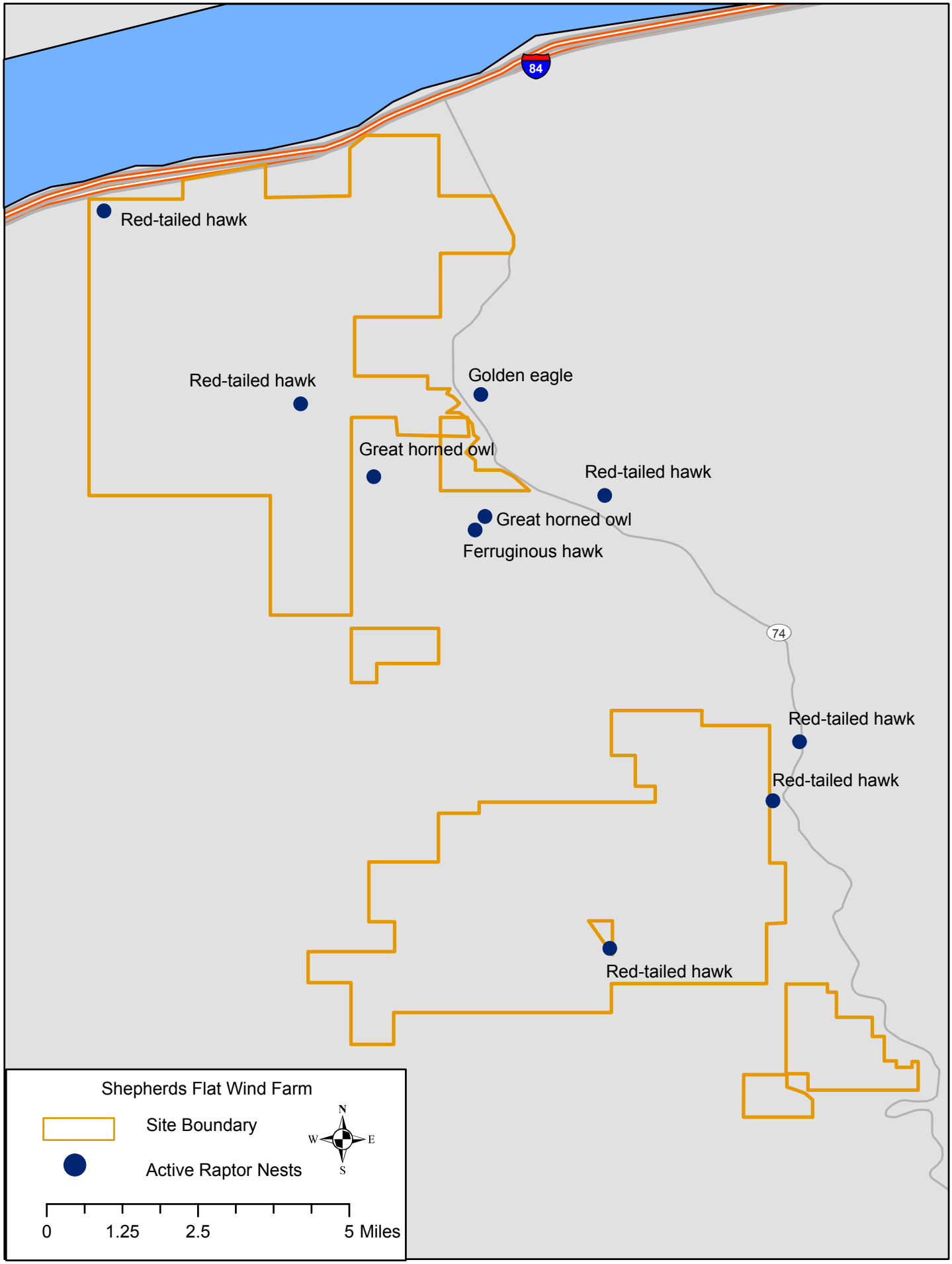
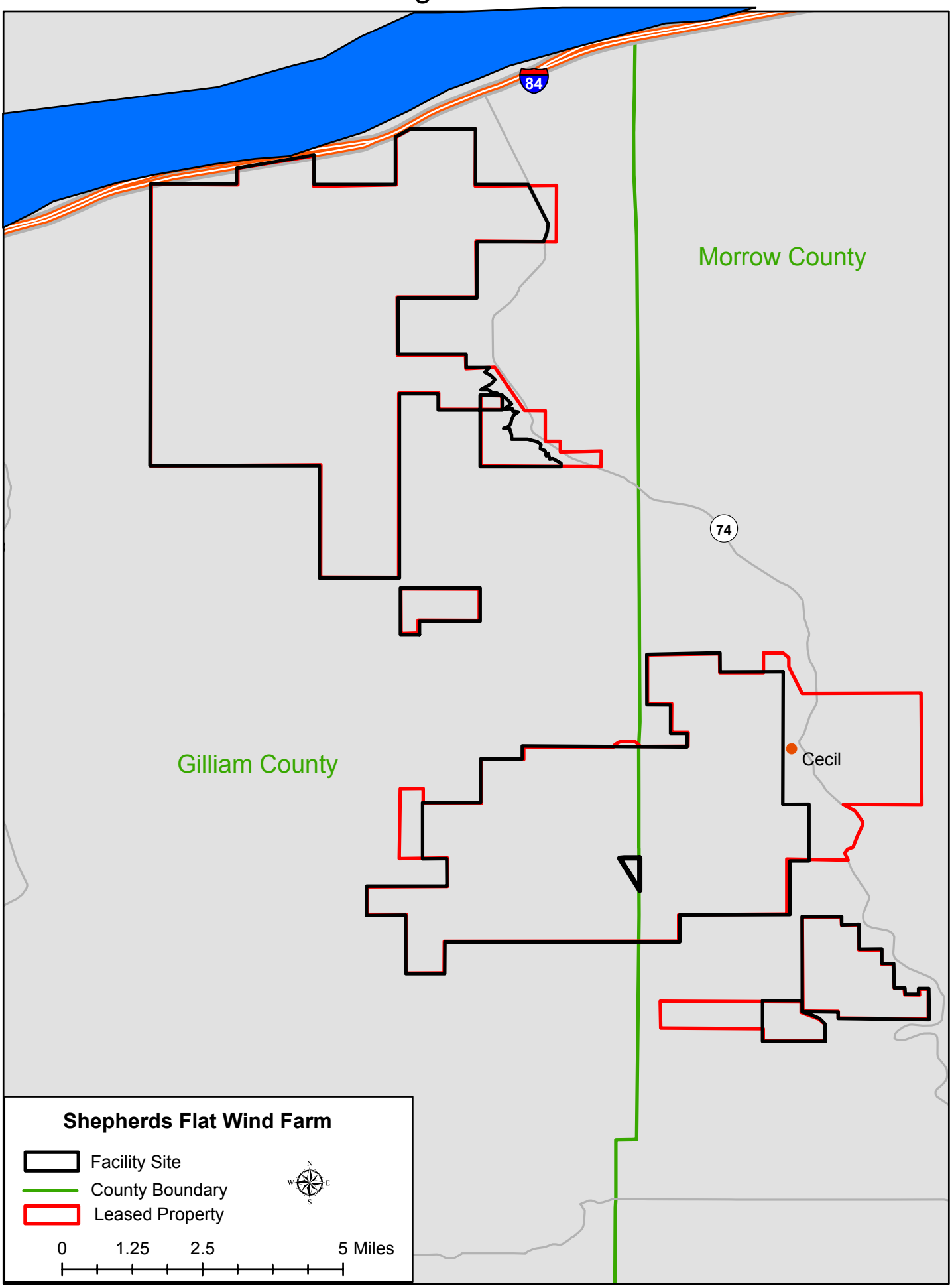
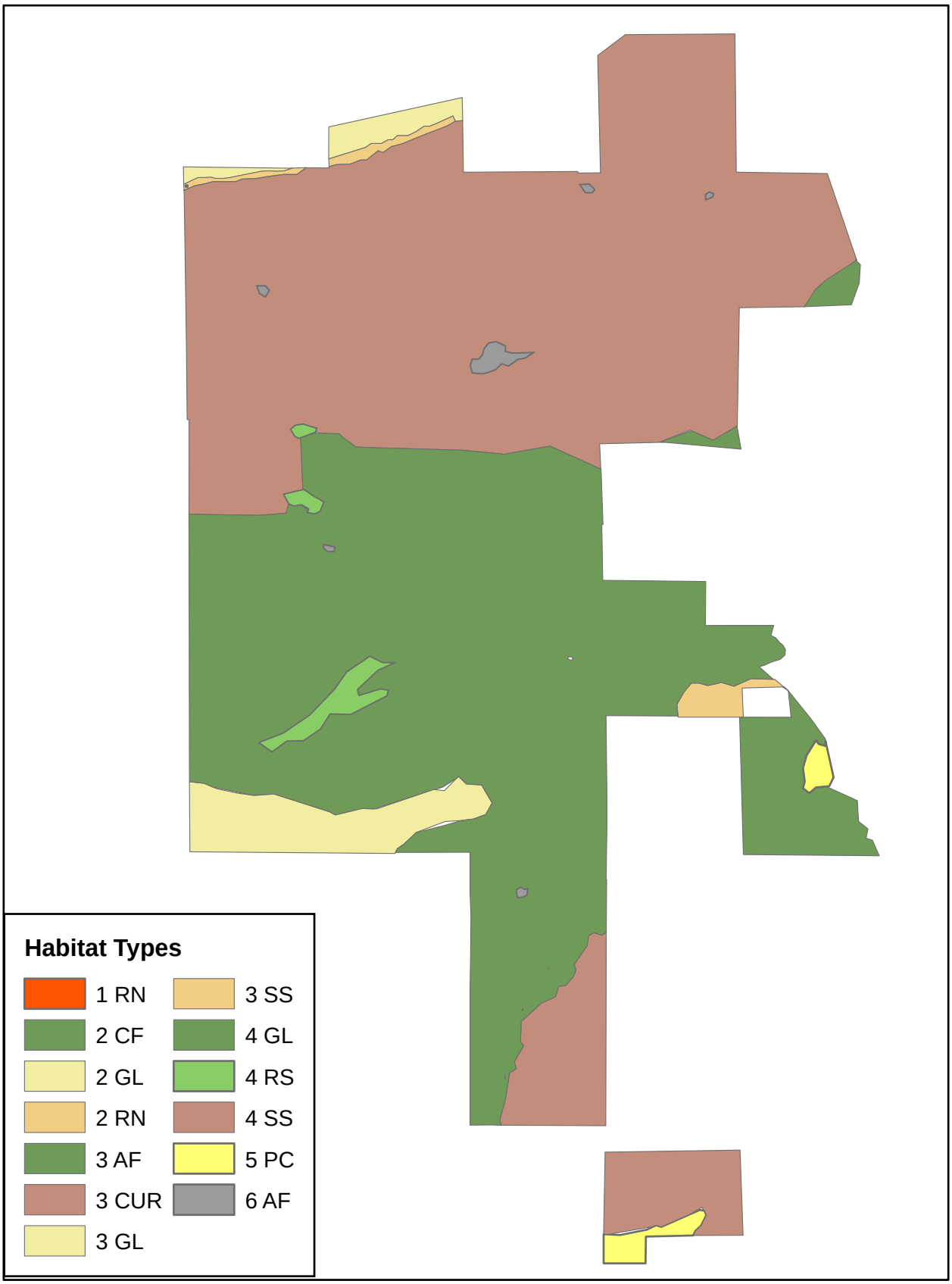

84
Red-tailed hawk
Red-tailed hawk
Golden eagle
Great horned owl
Red-tailed hawk
Great horned owl
Ferruginous hawk
74
Red-tailed hawk
Red-tailed hawk
Red-tailed hawk
Shepherds Flat Wind Farm
Site Boundary
Active Raptor Nests
N
W
E
S
0
1.25
2.5
5 Miles

Figure P-6


84
Morrow County
74
Gilliam County
Cecil
Shepherds Flat Wind Farm
Facility Site
County Boundary
Leased Property
N
W
E
S
0
1.25
2.5
5 Miles

Shepherds Flat Wind Farm North
Figure P-7



Shepherds Flat Wind Farm South
Figure P-8

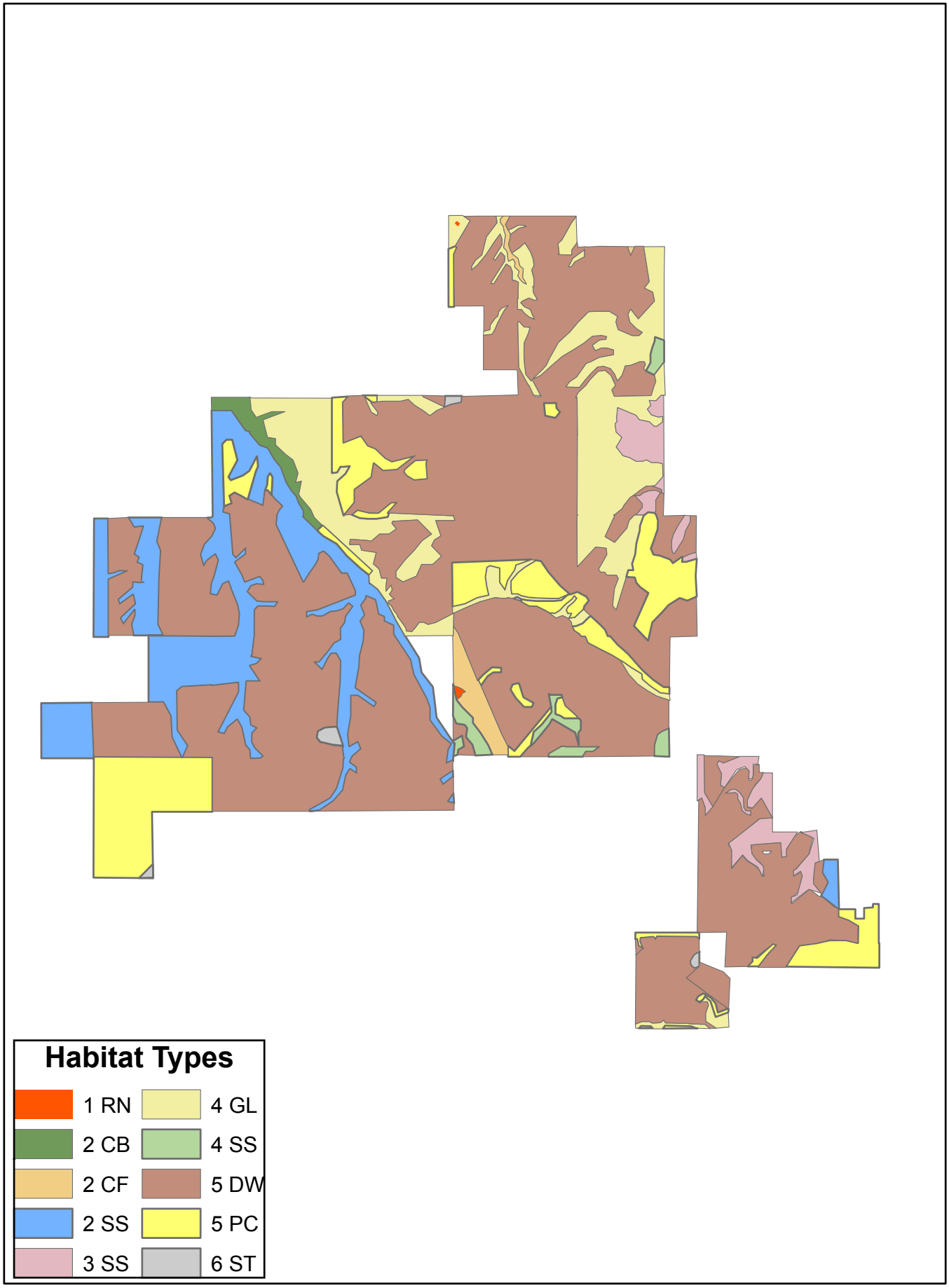


EXHIBIT Q

THREATENED AND ENDANGERED SPECIES

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:

(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;

(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;

(C) For each species identified under (A), a description of measures proposed by the applicant, if any, to avoid or reduce adverse impact;

(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);

(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;

(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; and

(G) The applicant's proposed monitoring program, if any, for impacts to threatened and endangered species;

In its Project Order dated October 16, 2006, the Oregon Department of Energy expanded upon the requirements of Exhibit Q as follows:

> [Applicant] should include in its application a list of both state- and federally-listed endangered, threatened, and candidate plant species that have potential to occur in the analysis area [defined as [t]he area within the site boundary and 5 miles from the site boundary]. [Applicant] should identify these species based on a review of literature, consultation with knowledgeable individuals and reference to the list of species on the Oregon Natural Heritage Program.[1]

[Applicant] should include in its application a description and the results of a field survey for the listed plant species. The survey must be conducted by a person with expertise in field botany, plant taxonomy and biological conservation. The survey should be conducted during the time of year when it is possible to identify any listed plants (usually when these plants are in flower and fruit). The field survey report should include written descriptions of the survey methods and areas surveyed. [Applicant] should consult with the Oregon Department of Agriculture, Native Plant Conservation Program, regarding field survey methods, appropriate survey seasons, qualifications of field survey personnel and the information to be included in the survey report.

The Oregon Department of Fish and Wildlife (ODFW) provides technical review and recommendations on compliance with Council standards. ODFW will base its review and recommendations on threatened and endangered species policy (ORS 496.171 - .192).

State-listed threatened or endangered plant species that may be affected by the proposed facility are subject to the requirements of OAR 603-073-0090(5)(d)(A)-(E).

[1] OAR 345-022-0070 applies only to state-listed plant and animal species. Nevertheless, OAR 345-021-0010(1)(q) requires applicants to consider plant and animal species listed as endangered or threatened under both state and federal law. This requirement applies because the Council, in making its decision, must be mindful of possible adverse impacts to federally listed species. Note also that OAR 345-022-0070 applies to all lands affected by a proposed facility, including state, federal and private lands.

IDENTIFICATION OF LISTED, PROPOSED AND CANDIDATE SPECIES

The Shepherd Flats Wind Farm site straddles the county line between Gilliam and Morrow Counties, with Klickitat County, Washington north of the facility site across the Columbia River. The analysis area lies within the Columbia Basin ecoregion of Oregon and Washington. Selection of species occurring within Gilliam, Morrow and Klickitat Counties in the Columbia Basin ecoregion includes a margin beyond the site boundary greater than the required analysis area of five miles (Figure Q-1).

Correspondence from the U.S. Fish and Wildlife Service (USF&WS) (Attachment Q), and databases and reports from the USF&WS Threatened and Endangered Species System,[1] the USF&WS Oregon Fish and Wildlife Office,[2] the Oregon Department of Fish and Wildlife (ODFW),[3] the Oregon Department of Agriculture Plant Division,[4] and the Oregon Natural Heritage Information Center[5] were surveyed to determine the species listed in the analysis area. These determinations were updated for the facility site and analysis area in January 2007. The criteria for species selection were: species listed as threatened or endangered at the federal or state level and species proposed for or candidates for listing as threatened or endangered at the federal or state level; and species with historical or current records as having occurred in either

[1] http://ecos.fws.gov/tess_public/StartTESS.do
[2] http://www.fws.gov/oregonfwo/Species/EndSpeciesMainPage.asp
[3] http://www.dfw.state.or.us/wildlife/diversity/index.asp
[4] http://www.oregon.gov/ODA/PLANT/CONSERVATION/statelist.shtml
[5] http://oregonstate.edu/ornhic/data.html

Morrow or Gilliam County within the Columbia Basin ecoregion.[6, 7, 8] A review of federal threatened, endangered, proposed or candidate species within the analysis area in Klickitat County did not add any species to this list. Where the species is a listed, proposed or candidate species in an ecoregion other than the Columbia Basin, it was not included. Species occurring in Oregon within the analysis area that are federally listed in other states but not listed in Oregon were included.

INDIVIDUAL SPECIES ACCOUNTS

Plants

Non-vascular Plants

There are no Listed, Candidate or Proposed non-vascular plant species in the analysis area.

Vascular Plants

Five vascular plants are listed, candidate or proposed species currently or historically occurring within the Columbia Basin ecoregion in Gilliam or Morrow County. Of these, there are current observation records of one plant species within the analysis area in Oregon, outside of the site boundary. None of the other species has been observed within the analysis area in Oregon or on the facility site, and no surveys were performed specifically for their detection. All are discussed, below, as there is the potential for eventual reintroduction of some species within the site boundary should their current ranges expand.

The south area of the facility site is largely cultivated, used for growing dryland wheat. The north area of the facility site has been used for the grazing of sheep since at least 1917. The vegetative characteristics of the north area were assessed as part of the review of wildlife habitat on the site (Exhibit P). Nine locations were surveyed (Figure Q-2), and at 21 sites within a 100-meter radius from the survey location, the species of all plants present was identified. Although the study was not designed as a survey for specific plant species, it did provide an opportunity to detect members of listed, proposed or candidate plant species in the unlikely event any were present.

Laurence's Milkvetch (*astragalus collinus* var. *laurentii*)

Federal Status: Species of Concern
Oregon State Status: Listed Threatened

The historic or current distribution of Laurence's milkvetch includes both Morrow and Gilliam Counties. Habitats in which the plant can occur include basaltic grassland, sagebrush desert, and dry slopes. The plant is a perennial; were it to occur on the site it would be present year-round. Appearance of the species on the property is unlikely, as its range occurs at higher elevations. Whether from sheep grazing, agricultural practices or altitude limitations, recent (post-1980)

[6] Oregon Natural Heritage Program (2001). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Program, Portland, Oregon.
[7] Oregon Natural Heritage Program (2004). Rare, Threatened and Endangered Plants and Animals of Oregon. Oregon Natural Heritage Information Center, Oregon State University, Portland, Oregon.
[8] NatureServe (2006). NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia: http://www.natureserve.org/explorer

known occurrences of Laurence's milkvetch are considerably south and east of the facility site,[9] with the closest near Heppner and outside of the analysis area. Primary threats to Laurence's milkvetch are roadside herbicide spraying and livestock grazing. The proposed facility is not anticipated to result in changes to current landowner grazing or herbicide application practices. Although the facility site includes appropriate habitats types, no plants were found during the survey of vegetative characteristics (Attachment P-4). Although the timing of the survey was not optimal for identification of Laurence's milkvetch, the more commonly observed wooly-pod milkvetch (*astragalus purshii*) was identified by the survey.

Dwarf Evening-Primrose (*camissonia pygmaea*)

Federal Status: Species of Concern
Oregon State Status: Candidate for Listing

The historic distribution of dwarf evening-primrose includes Gilliam County. No records were located of current detections in either Morrow or Gilliam County, nor was the plant found during the vegetative survey. The plant is a perennial, so if it occurred on the site it would be present year-round. Habitats in which the plant can occur include sagebrush uplands, and it is typically found in open areas of loose, rubbly substrate.

Disappearing Monkeyflower (*mimulus evanescens*)

Federal Status: Species of Concern
Oregon State Status: Candidate for Listing

The historic distribution of disappearing monkeyflower includes Gilliam County. The plant is an annual, so if it occurred on the site, it would be present only during the growing season and its location could change from year to year. No records were located of current detections in either Morrow or Gilliam County, nor was the plant found during the vegetative survey. The plant grows in sagebrush-juniper plant associations, and requires seeps, riparian or seasonally moist areas.

Hepatic Monkeyflower (*mimulus jungermannioides*)

Federal Status: None
Oregon State Status: Candidate for Listing

The historic and current distribution of hepatic monkeyflower includes Gilliam County. The plant grows on wet seep areas in steep basalt canyon walls, and could occur in appropriate areas of the facility site, such as on the basalt walls of the Columbia River at the north end of the facility site. No examples of this species were discovered during botanical surveys of the facility site; however, the cliff faces were not surveyed. The only known current occurrence of the plant in the Umatilla Basin is in the Umatilla River Canyon,[10] outside of the analysis area.

[9] Kagan J.S., R. Morgan and K. Blakeley (September 2000). Umatilla and Willow Creek Basin Assessment for Shrub Steppe, Grasslands, and Riparian Wildlife Habitats. EPA Regional Geographic Initiative.
[10] Ibid.

Sessile Mousetail (*myosurus sessilis*)

Federal Status: Species of Concern
Oregon State Status: Candidate for Listing

The historic and current distribution of sessile mousetail includes Gilliam County. The plant grows in alkaline vernal pools, and could occur within the site boundary in appropriate habitats. None was found during vegetative surveys, although the surveys did not take place during the optimum season for detection of the plant. All sites at which the plants are known in Oregon are southwest of Arlington, next to the regional landfill.[11] These locations are outside of the site boundary but within the analysis area. The only aquatic resources thus far identified within the site boundary (Figure J-1) are unsuitable: two features classified PUBFx – palustrine, unconsolidated bottom, semi permanently flooded and excavated.

Invertebrates

There are no Listed, Candidate or Proposed invertebrate species in the analysis area.

Vertebrates

There are three fish, three birds and four mammals that are listed, candidate or proposed species currently or historically occurring within the Columbia Basin ecoregion in Gilliam or Morrow County. The fish are confined to the Columbia River and environs, outside of the site boundary but within the analysis area. For one bird species, current observations within the analysis area occur only in Klickitat County, Washington, and not within the site boundary or in the analysis area on the Oregon side of the river. The other bird species are expected to be rare visitors to the site. Of the mammals, one is currently present within the analysis area and may be present within the site boundary, and there are no current observations of the remaining three mammals within the analysis area or the site boundary.

Wildlife observations in the facility area commenced in September 2002 and ended in October 2004. All locations other than a portion of the south area were surveyed for an entire year; the remaining portion was surveyed during fall 2004. Observations included surveys of avian use at 39 locations throughout the area (Figure Q-3), raptor nesting and breeding bird surveys on the facility site and in its vicinity, and surveys for signs of burrowing owl and Washington ground squirrel activities. Observations of mammal species were also collected while the field biologists were at bird use sites, and collected for both birds and mammals while in transit to or around the property.

<u>Fish</u>

The three listed fish species occurring in Morrow or Gilliam Counties are anadromous species that travel the Columbia River north of the facility site within the analysis area (species are detailed, below). There are no perennial streams within the site boundary that can support the presence of these fish or their habitat. No fish, listed or unlisted, were found on the facility site during surveys of the area. No listed, proposed or candidate fish species are anticipated to occur within the site boundary, no water will be removed from their habitats, and any facility-related

[11] Ibid.

rainwater runoff discharged to streams leading to their habitats will meet the standards of the National Pollutant Discharge Elimination System (NPDES). No impact to proposed, candidate or listed fish or their habitats is expected to occur from construction or operation of the facility.

Chinook Salmon (*oncorhynchus tshawytscha*)

Population Listed: Snake River, fall run
Federal Status: Listed Threatened
Oregon State Status: Listed Threatened

Population Listed: Snake River, spring/summer run
Federal Status: Listed threatened
Oregon State Status: Listed Threatened

Steelhead (*oncorhynchus mykiss*)

Population Listed: Middle Columbia River
Federal Status: Listed Threatened
Oregon State Status: Sensitive Species, Critical

Population Listed: Snake River Basin
Federal Status: Listed Threatened
Oregon State Status: Sensitive Species, Vulnerable

Sockeye Salmon (*oncorhynchus nerka*)

Population Listed: Snake River
Federal Status: Not Listed in Oregon; Idaho stock Listed Endangered wherever found
Oregon State Status: None

Amphibians

There are no Listed, Candidate or Proposed amphibian species in the analysis area.

Reptiles

There are no Listed, Candidate or Proposed reptile species in the analysis area.

Birds

Greater Sage-Grouse (*centrocercus urophasianus*)

Ecoregion in which Listed: Columbia Basin
Federal Status: Candidate for Listing
Oregon State Status: Sensitive Species, Vulnerable

The historic distribution of the greater sage-grouse includes Gilliam County. No records were located of current detections in either Morrow or Gilliam County, nor was the bird observed during wildlife studies of the facility site. The analysis area may intercept the very southern portion of the current greater sage-grouse range in Klickitat County, Washington. Although historically present throughout the Columbia Basin, nearly all current observations of the species

in Oregon are outside of this ecoregion.[12] Habitat for the species includes foothills, plains and mountain slopes where sagebrush is present; although extremely limited, appropriate areas exist on the facility site.

Bald Eagle (*haliaeetus leucocephalus*)

Federal Status: Listed Threatened
Oregon State Status: Listed Threatened

The historic and current distribution of the bald eagle includes Gilliam and Morrow Counties. Generally wintering along the Columbia River to the north, the bald eagle is a rare visitor to the upland area. Only one observation was recorded during the entire wildlife study period (Attachment P-1), within the site boundary in the north area. Although the occasional sheep carcasses that occurs on the site should provide an acceptable food source, no local bald eagles appear to take advantage of them – there appear to be ample preferred food resources elsewhere. No evidence of any bald eagle nests was found on or near the facility site during nesting and breeding bird surveys.

American Peregrine Falcon (*falco peregrinus anatum*)

Federal Status: None
Oregon State Status: Listed Endangered

The historic distribution of the American peregrine falcon includes Gilliam and Morrow Counties. Records were located showing current observations of the falcon in Gilliam County but not in Morrow County, and appearances in the analysis area may be extremely rare. No individuals of this species were observed on or off the facility site during the entire wildlife study period, nor were any peregrine falcon nests discovered on or near the site during nesting and breeding bird studies. One preferred nesting location is on ledges or in holes on cliff faces. The bluffs along the Columbia River north of the site, and cliff faces within Eightmile Canyon (running through southern portion of the north facility area) were examined and no peregrine falcon nests were found. No American peregrine falcon activity was observed from survey locations near bluffs or cliffs that would indicate the presence of nesting locations.

Mammals

Canada Lynx (*lynx Canadensis*)

Federal Status: Listed Threatened
Oregon State Status: None

The historic distribution of the Canada lynx includes Morrow County. No records were located of current detections in either Morrow or Gilliam County, and no lynx were observed during wildlife surveys on the facility site. Most current sightings of the Canada lynx are from the Cascade Range and the Blue Mountains. Given the species' preference for coniferous or mixed forests, it is unlikely that the historic range in Morrow County included the facility site.

[12] US Fish and Wildlife Service (2003). Candidate Assessment and Listing Priority Assignment Form for the Greater Sage Grouse: http://ecos.fws.gov/docs/candforms_pdf/r1/B06W_V01.pdf

Although use of the Columbia Basin ecoregion is listed for the species, it is most likely the portion of the Basin adjacent to the Blue Mountain ecoregion in southern Morrow County.

Gray Wolf (*canis lupus*)

Federal Status: Listed Threatened
Oregon State Status: Listed Endangered

The historic distribution of the gray wolf includes Gilliam and Morrow Counties. No records were located of current detections of natural wolf populations in either Morrow or Gilliam County or in the state. No wolves were observed during wildlife studies of the site. An experimental population may be reintroduced in Oregon on or near the facility site, although there are no members of experimental populations currently present.

Grizzly Bear (*ursus arctos horribilis*)

Federal Status: Listed Threatened
Oregon State Status: None

The historic distribution of the grizzly bear includes Gilliam and Morrow Counties. No records were located of current detections in either Morrow or Gilliam County or in the state. No bears were observed during wildlife surveys of the facility site. Oregon contains none of the six ecosystems suitable for grizzly bears in which the U.S. Fish and Wildlife Service plans to focus efforts to restore species populations.[13]

Washington Ground Squirrel (*spermophilus washingtoni*)

Federal Status: Candidate for Listing
Oregon State Status: Listed Endangered

The historic and current distribution of the Washington ground squirrel includes Gilliam and Morrow Counties. A non-migratory species, any present on the facility site would be present year-round. Although associated with sagebrush-grasslands, of particular importance to the species' range is soil type. The squirrel occupies burrow systems requiring deep soils with high silt contents. In Oregon, this is predominantly Warden soils,[14] although Roloff soils may also be suitable. Except in areas too steep to cultivate, the deeper soils in the south area of the proposed facility are is covered by dryland wheat and previously plowed land either in the Conservation Reserve Program (CRP) or fallow. Wheat farming is precluded in the north area, where soils are generally too shallow and rocky for cultivation. Although the southern portion may contain adequate depths of appropriate soils, Washington ground squirrel burrows are not compatible with agricultural cultivation. Washington ground squirrels are known to occur within the analysis area, but no Washington ground squirrels were observed within the site boundary, nor were any observed in any portion of the area surveyed during other wildlife studies in the two years wildlife biologists were present on and around the facility site. No sign (scat, burrows) was observed during two years of focused searches for Washington ground squirrels. The areas

[13] Servheen C. (1993). Grizzly Bear Recovery Plan. US Fish and Wildlife Service, Missoula, Montana.
[14] Oregon Fish and Wildlife Office (2004). Washington Ground Squirrel Endangered Species Fact Sheet, US Fish and Wildlife Service Oregon Fish and Wildlife Office.

surveyed included the route of roads and turbine strings in the current layout, in those areas where ground squirrel presence was most likely – in the unplowed portions of the south area of the proposed facility.

The increase in agricultural use of the species' historic range is one the primary reasons posited for its decline. Intensive grazing is another reason cited, although in the north area of the proposed facility where sheep grazing currently occurs, it is grazed primarily because the soils are too shallow for agricultural productivity and thus for Washington ground squirrel burrows. Although Warden and Roloff silt loams exist in small portions of the north area (Figure Q-4), they appear to be shallow.

POTENTIAL IMPACTS TO LISTED, PROPOSED AND CANDIDATE SPECIES

Temporary and Permanent Habitat Loss

Habit loss includes destruction of plants, displacement of mobile wildlife, and destruction of burrowing wildlife. Habitat would be temporarily lost in laydown areas, from the widening of roads during construction, and through similar ground disturbing construction-related activities. Habitat would also be lost from the footprint of new roads, turbine towers and transformers. Although the facility may eventually be decommissioned, in relation to the lifetimes of most of the plant and animal species affected, the loss would essentially be permanent. Secondary impacts include reduction of foraging, courting and breeding habitat for wildlife and the population of prey species. Temporary and permanent habitat loss is a potential impact to all species discussed in the species accounts.

Disturbance from Facility Activities

Noise during construction or decommissioning may be the predominant source of disturbance to wildlife. Additionally, the presence of facility staff and vehicular activity, the presence of structures such as the turbines, and the motion and noise of the turbine blades or nacelles could be sources of wildlife disturbance. The presence of tall structures, such as wind turbine towers, is a particular disturbance to sage grouse and leads to avoidance of the area in which they are installed. Disturbance could cause displacement of wildlife from nesting, burrowing, breeding or foraging sites and cause redistribution of prey species, but would not impact plants. Secondary impacts include the loss of eggs or young if nests, burrows or similar sites were abandoned while young or eggs are present, and the added risk to reproductive success if mating wildlife or pregnant mammals were displaced to other locations. Disturbance caused by decommissioning of the facility is anticipated to be equivalent to construction disturbance. Disturbance is a potential impact to all birds and mammals discussed in the species accounts.

Collision with or Electrocution by Overhead Power Lines or Guy Wires

Collisions and electrocutions, possibly causing injury or the death of the individual involved, are potential impacts to all birds discussed in the species accounts. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Collision with Turbines or Towers

Turbine and tower collisions, possibly causing injury or the death of the individual involved, is a potential impact to all birds discussed in the species accounts. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Collision with Vehicles

Vehicular collision is a potential impact to all species discussed in the species accounts, including impacts to plants during off-road travel. These collisions have the potential to cause injury or the death of the individual involved. Secondary effects include loss of or disadvantage to the young of the species, if one or both parents were impaired or killed while the young were still dependants.

Dust

Dust, from vehicular traffic or wind movement of soil in disturbed areas, could impact water quality and affect aquatic plants and wildlife, reduce photosynthesis or transpiration in plant species, and reduce air quality for all wildlife species. Secondary effects may include dust production as a cause of disturbance to and subsequent displacement of wildlife. Dust is a potential impact to all species discussed in the species accounts.

Runoff Water Quality

Impairment of water quality, from particulate material or other contaminants from facility construction and operation, could impact aquatic plants and wildlife in the receiving waters. Impacts could include wildlife displacement or wildlife and plant injury or death. Secondary effects could be loss of or disadvantage to the young of wildlife species, if one or both parents were displaced, impaired or killed while the young were still dependants. Runoff water quality is a potential impact to all fish species discussed in the species accounts, and to the plants disappearing monkeyflower, hepatic monkeyflower, and sessile mousetail.

Wildfires

Caused by facility construction and operation vehicles or by other facility-related activities, wildfires are a potential impact to all species discussed in the species accounts. Impacts could include impairment or death of individual plants and animals, reduction of habitat quality in terrestrial and aquatic habitats even in areas that are not burnt, increased soil loss through wind or water erosion where plant cover was destroyed, and displacement of wildlife from the burned areas due to loss of food resources, appropriate habitat types or cover. Secondary effects include loss of or disadvantage to the young of wildlife species, if one or both parents were displaced, impaired or killed while the young were still dependants.

PROPOSED MITIGATION MEASURES

Habitat Loss

The Applicant proposes to mitigate for habitat loss through facility layout, facility design, construction practices, habitat restoration and habitat replacement. Although difficult to quantify, some facility components are expected to improve habitat quantity and quality within the site boundary, such as the presence of graveled facility access roads and the steps taken to prevent facility-related soil erosion and contamination of stormwater runoff; these can also be regarded as mitigation.

Also as mitigation of habitat loss the Applicant has removed from within the site boundary, as compared to the boundary proposed in the Notice of Intent, the portion of the leased area containing Willow Creek, the floor of the Willow Creek Valley, and all leased property east of Willow Creek. This preserves the only perennial stream within the boundary of the leased land, the riparian habitat present in the valley, and the only large tract of big sage habitat in good condition within the leased area. Although the area in which the proposed facility is located historically contained substantial stands of big sagebrush over much of the site,[15] it has been largely replaced by cultivated fields and grazed grasslands. Big sage exists in isolated pockets throughout the remainder of the facility site, although condition, size and lack of contiguity reduce their habitat value.

In the current facility layout (Exhibit C), the Applicant has avoided all identified wetlands and aquatic resources, the faces of bluffs or rock outcroppings, and trees or other structures with active raptor nests. For those without active raptor nests, every attempt will be made in micrositing and construction to avoid loss of any of the few trees present within the site boundary. Locations of habitat to be avoided during construction will be flagged for the duration of construction activities in the area, and the construction contractor instructed of their locations and the need for avoidance.

For two years, surveys for Washington ground squirrels were performed during the period in which they are expected to be active and none were found. Although unlikely, Washington ground squirrel burrows may still exist within the site boundary undetected. The Applicant proposes to survey soil depth in uncultivated areas of Warden and Roloff silt loam soils within 1000 feet of projected ground disturbing activity – along the turbine strings, facility roads and transmission line routes of the facility plan. Burrows are generally deeper than 1 meter.[16] In areas in which soil depth is 0.6 meters or more, surveys for signs of ground squirrels will be performed during the period in spring when Washington ground squirrels are active. During micrositing, the Applicant proposes to avoid ground-disturbing activity within 1000 feet of identified Washington ground squirrel burrows.

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[15] Kagan et al. (2000), op. cit.

[16] US Fish and Wildlife Service (2005). Species Assessment and Listing Priority Assignment Form for the Washington Ground Squirrel.

Temporary Habitat Loss

Temporary disturbance during facility construction is estimated at 419 acres of the 27,520-acre area within the site boundary, 1.5% of the total. Design considerations for reduction of the area affected include keeping grading to the minimum feasible, and burying communication and electrical lines within the area disturbed by temporary road widening. Plants in disturbed areas will be crushed rather than removed whenever possible, to allow potential re-emergence of perennial species. Areas temporarily disturbed during facility construction will be returned to original or better condition as soon as possible. Habitat restoration includes return to agricultural use or reseeding with an appropriate native plant seed mixture, depending on the landscape in which the disturbed areas occur. Seeding mixtures will be determined through consultation with the landowners, and discussions with the Oregon Departments of Fish and Wildlife, Energy, and Agriculture. Noxious weeds, should any appear in reseeded areas, will be controlled using methods recommended by the Oregon Department of Agriculture Plant Division.

Permanent Habitat Loss

Permanent disturbance from the facility is estimated at 249 acres of the 27,520-acre area within the site boundary, 0.9% of the total. Applicant proposes to mitigate for permanent habitat loss by minimizing the area affected, and by replacement of the impacted area by development and protection of habit of equivalent or better categories. The Applicant proposes to mitigate for the permanent 249-acre loss of habitat as described in Exhibit P: purchase or lease of a 249-acre parcel and restoration of habitat through conversion of cultivated land to more native landscapes, with the parcel maintained for the life of the facility. No net loss of suitable habitat will occur. Planned facility access roads will take maximum advantage of existing unimproved farm and ranch access roads while still avoiding sensitive areas. Turbine and transformer pads will abut the facility roads, reducing both temporary and permanent site disturbance. Final facility roadways will be returned to the narrowest width consistent with safe travel, minimizing the permanent facility footprint.

The north area of the facility site is crisscrossed by unimproved roads, used for such activities as fighting wildfires, accessing stock feeding and watering stations, transporting sheep and herder camps, and servicing transmission lines. There are also many tracks from off-road vehicle use. The extent of habitat loss caused by traveling the site on unimproved ranch roads in difficult terrain is clear in review of aerial photography. To travel across washes or gullies, as many as six different tracks may be discerned. Three to five tracks on steeper slopes are also commonly found. Graveled facility roads will be available for use by landowners. Facility roads will be more easily traversed than remaining unimproved roads, particularly in wet weather or in snow, and maintenance of facility roads will be the responsibility of the facility. The availability of better roads, and the opportunity for landowners to suspend maintenance of most remaining unimproved roads, should result in abandonment of many farm or ranch roads, eliminate the proliferation of alternate routes, and reduce off-road travel. Eventual reclamation of habitat in some existing roadways is expected.

General Disturbance from Facility Activities

Displacement of avian species from nesting sites and Washington ground squirrels from burrows are probably the most serious of potential disturbance impacts. The Applicant proposes to

mitigate disturbance impacts by limitations in the timing of construction activities and the establishment of buffers around Washington ground squirrel burrows and raptor nests. During the nesting season, suitable raptor nest structures will be resurveyed in areas scheduled for construction. Construction activities will not proceed within 0.5 miles of identified active raptor nests during nesting season, and construction activities will not take place within 1000 feet of identified Washington ground squirrel burrows. These distances from identified resources will be flagged, either seasonally for raptor nests, or continually for Washington ground squirrel burrows. The construction contractor will be informed of the location of flagged areas and instructed on their avoidance.

The bald eagle and American peregrine falcon are carnivores and piscivores. Impacts to these species from prey species redistribution are expected to be minimal due to the rarity of their use of the facility site. The gray wolf, also potentially affected by prey species redistribution, is not present within the site boundary. Prey species generally reestablish themselves quickly when construction is completed in an area, and only portions of the site will be under construction at any one time. No mitigation is proposed for bald eagle, American peregrine falcon or gray wolf prey species redistribution.

Collision with or Electrocution by Overhead Power Lines or Guy Wires

The Applicant proposes to mitigate the risk to avian species from wire strikes and electrocution through minimization of above ground lines, installation of protective devices on power poles, and institution of facility speed limits. Un-guyed weather stations and turbine towers will be installed. The majority of electrical and communication lines will be buried underground. Above ground facility electrical poles will have all avian protective devices installed necessary to make them APLIC compliant,[17] to reduce the potential for avian electrocutions. The literature on avian wire strikes indicates that in some locations vehicular traffic is a component of that problem, when automobile traffic startles birds into panicked flight.[18] Additional driving precautions have been effective in reducing avian deaths from wire strikes in those locations. Construction and operation speed limits will be imposed, and should help reduce wire strikes in the proposed facility as well. Additional training of facility personnel will address vehicle-related wire strikes to ensure compliance with the facility speed limit. During the spring season when facility personnel may encounter fledgling raptors still learning controlled flight, personnel will be instructed to use particular care on facility roads. In the event that the facility causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

Collision with Turbines or Towers

For mitigation of impacts from turbine or tower collision, the Applicant proposes to use modern turbines and towers, minimize site lighting, employ industry and wildlife research siting guidance, and institute facility speed limits. The turbines and towers used will incorporate all design improvements considered to help in reduction of wildlife collisions. The most infamous

[17] Avian Powerline Interaction Committee (APLIC) and U.S. Fish and Wildlife Service (USFWS). 2005. Avian protection plan (APP) guidelines. Edison Electric Institute. Washington, D.C.
[18] Avian Powerline Interaction Committee. 1994. Mitigating bird collisions with powerlines: the state of the art in 1994. Edison Electric Institute. Washington, D.C.

example of avian fatalities caused by collision with wind turbines or towers is in the Altamont Pass Wind Resource Area in California, where several thousand small, older turbines with rapidly turning blades are sited in an area of extremely high avian abundance. The impacts at the site are exacerbated by the presence of guyed weather stations, overhead power lines and non-compliant power poles, adding wire strike and electrocution to the toll. Wind facilities and turbine manufacturers have made significant changes in siting, construction and design of turbines and towers to address these factors, with the result that no modern wind power conversion facilities experience the level of avian fatalities seen in the Altamont.

Changes in turbine design include elimination of all exterior structures and appurtenances permitting birds to perch or construct nests on the turbine itself. Towers are no longer lattice structures, a design that previously allowed perching and nesting to take place in and on the towers. Modern turbines are in an 'upwind' configuration, where the orientation of the nacelle during operation places the blades on the side from which the wind is coming. Modern turbines are taller, placing the blades above the flight height of several species. Turbine blades are larger as well, and their rate of rotation much slower, allowing better detection and avoidance of moving blades by birds. Changes in wind turbine siting have also taken place.

As a full understanding of the effect lighting has on collision rates at lighted structures is lacking, the aviation safety lighting required by the Federal Aviation Administration will be the only external lighting on the turbines or towers, and the number of lights will be the minimum required. Aviation safety lighting will be red only, and operate only at night. No security or other lighting of the facility site will be installed.

Turbine siting will conform to the industry's best siting practices, the siting recommendations in the facility's wildlife reports, and to current turbine siting recommendations backed by scientific evidence. Wildlife biologists survey sites prior to turbine siting, and topographical configurations that tend to increase avian impacts are avoided. Turbines are generally set back from the edges of cliffs or bluffs, areas extensively used by raptors for soaring. Some topographic features tend to funnel flight paths through constricted areas, and wildlife surveyors take notice of these to prevent placement of turbines within a constricted flight path (Attachment P-2). All of these precautions have resulted in significant reductions in avian fatalities at modern wind power conversion facilities. Comments from the Oregon Department of Fish and Wildlife regarding the siting of turbines are invited and will be considered during the final micrositing process. Institution of speed limits and personnel vehicle operation training may also help reduce incidences of panicked flight that may lead to turbine collisions. In the event that the facility causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

A cumulative effects analysis of the environmental impact of the proposed facility has been commissioned by the Applicant, which, when completed, will be submitted to the Siting Council. The analysis will be of impacts to wildlife, focusing primarily on bats and birds. Cumulative effects analysis will include the proposed facility and other existing and proposed wind power conversion facilities throughout north-central and southern Washington.

Some avian species are less susceptible to impacts from wind conversion facilities in relationship to their abundance or use of the facility area. These include American crows, turkey vultures and most owls, which appear to be too canny, and species such as the burrowing owl, which flies too low. Neither the bald eagle nor American peregrine falcon has experienced significant fatalities at modern wind power conversion facilities. Few sightings and no fatalities have been reported at regional facilities.[19, 20, 21, 22] We do not know if the absence of fatalities is because presence of these species on the types of terrain occupied by these facilities is extremely rare, or if the species are less susceptible to impact from modern facilities. Should a facility-related fatality of either species occur, USF&WS, who has jurisdiction over take of these species, will be notified. In addition, ODFW and the Oregon Department of Energy will be notified. Mitigation measures will be discussed with these agencies if any fatalities were to occur.

Collision with Vehicles

The Applicant proposes to mitigate impacts from wildlife collisions with vehicles by prohibition of off-road travel and imposition of construction and operation speed limits of 20 miles per hour, the common speed limit in Oregon for school zones. Speed limit signs will be posted throughout the facility roads. In addition, facility personnel will be trained in the importance of cautious driving practices while on facility roads. As vehicle strikes on sheep and sheep dogs are also of great concern (with these quite abundant in the north portion of the site during much of the year), use of safe driving practices by construction and facility personnel will be enforced. In the event that the facility causes the death of a listed species, the appropriate jurisdictional authority may impose additional mitigation measures.

Dust

The Applicant proposes to mitigate impacts from dust deposition through water applications to disturbed ground during construction, by graveling of permanent roadways, by erosion control, by revegetation, and by imposition of construction and operation speed limits of 20 miles per hour. Spraying of water on disturbed ground is an effective dust deterrent, as is reduction of speeds on graveled roads. Water application to disturbed areas and vehicle speed limit impositions are expected to reduce dust during construction to levels without significant impact to vegetation or wildlife species. Upon completion of construction, many of the unimproved roads on the facility site previously used for access to the area will have been graveled. Existence of these roads should significantly reduce traffic on the many unimproved roads and 4-wheel drive tracks now within the site boundary. It is likely that overall post-construction dust production from vehicular traffic on the site will be reduced from current conditions.

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[19] Erickson W.P., G.D. Johnson, M.D. Strickland and K. Kronner (2000). Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon. Western EcoSystems Technology, Inc, Cheyenne, Wyoming.
[20] Erickson W., K. Kronner and B. Gritski (2003). Nine Canyon Wind Power Project Avian and Bat Monitoring Report. WEST, Inc., Cheyenne, Wyoming and Northwest Wildlife Consultants, Inc., Pendleton, Oregon.
[21] Western EcoSystems Technology and Northwest Wildlife Consultants (2004). Stateline Wind Project Wildlife Monitoring Final Report. Western EcoSystems Technology, Inc, Cheyenne, Wyoming and Walla Walla, Washington, and Northwest Wildlife Consultants, Inc., Pendleton, Oregon.
[22] Young D., K. Bay and V. Poulton (2006). Cumulative Impacts Analysis or Avian Resources from Proposed Wild Projects in Sherman County, Washington. Western EcoSystems Technology, Inc, Cheyenne, Wyoming.

Runoff Water Quality

The Applicant proposes mitigation of impairment to the quality of stormwater runoff by compliance with the discharge standards of the National Pollutant Discharge Elimination System (NPDES). The requirement for obtaining an NPDES permit will depend upon the outcome of wetlands determinations. Regardless of the requirements for a permit, stormwater pollution prevention and erosion control plans will be established for facility construction and operation. These may include establishment of erosion and siltation control measures (baffles, silt traps, netting, straw ground cover) in appropriate locations. Suspended particulate material caused by soil erosion and dust deposition is the only impact to water quality expected. Lubricants and fluids used in turbines and transformers have low potential for toxicological impacts, and spill control reservoirs are incorporated in turbine and transformer design. Apart from stormwater runoff, no other water discharges from the facility will occur.

Wildfires

The Applicant proposes to mitigate for facility-caused fires by graveling facility roads, equipping facility vehicles with fire extinguishers and shovels, training facility personnel in fire avoidance and response, and establishing a fire plan for the facility. Many of the farm and range access roads are comprised of two ruts with vegetation in the middle, adding to the risk of vehicle-caused fire. Graveled facility access roads will be available to the landowners and emergency personnel. Facility access roads will provide protection against vehicle-caused fires, allow easier access to the site for firefighting, and serve as firebreaks, all of which may reduce the number and limit the extent of wildfires on the property. The role of wildfires in habitat quality has many uncertainties; however, wildfires are known to encourage cheatgrass in replacement of perennial native grass species, and can cause extirpation of big sage from burned areas.

PLANT PROTECTION AND CONSERVATION

There is no plant protection and conservation program for the site adopted by the Oregon Department of Agriculture. With plant protecting measures instituted for dust control, stormwater pollution prevention, wildfire prevention and prohibitions against off-road travel by facility personnel, the proposed facility will have no impact to listed, proposed or candidate plants or their critical habitats outside of the site boundary. With the described measures, the facility will have no potential significant impact on the continued existence or critical habitat of any identified plant species outside of the site boundary, and the facility is expected to cause no significant reduction in the likelihood of off-site identified plant species survival or recovery.

No listed, proposed and candidate plant species has been observed within the site boundary. Plant species that may reestablish on the site at a later time include dwarf evening-primrose, sessile mousetail, hepatic monkeyflower and disappearing monkeyflower; the elevation of the facility site may be too low for Laurence's milkvetch.

Of these, disappearing monkeyflower, hepatic monkeyflower and sessile mousetail require seeps, riparian areas or vernal pools. The Applicant proposes to avoid disturbance of any of these features, and avoid diversion or alteration of surface water resources and water quality. With the plant protecting measures described, above, the facility will have no potential significant impact

on the continued existence or critical habitat of these species, and the facility will cause no significant reduction in the likelihood of survival or recovery of these species.

On the northern portion of the facility site, there are suitable substrates for growth of Laurence's milkvetch and dwarf evening primrose that will be disturbed during facility construction and lost to the species through occupation by facility components. The permanent loss will be restored in the habitat replacement parcel. This restored land could be used by either plant species should they become reestablished in the vicinity of the facility. With habitat replacement and plant protecting measures described, above, the facility will have no potential significant impact on the continued existence or critical habitat of these species, and the facility will cause no significant reduction in the likelihood of survival or recovery of these species.

ANIMAL PROTECTION AND CONSERVATION

With animal protecting measures instituted for dust control, stormwater pollution prevention, wildfire prevention and prohibitions against off-road travel by facility personnel, the proposed facility will have no impact to listed, proposed or candidate animals or their critical habitats outside of the site boundary. An additional protection measure for the greater sage grouse is exclusion from within the site boundary of the only large stand of big sage that occurs within the leased area. The distance from the sage stand to the nearest proposed turbines is sufficient to prevent avoidance behavior should the species become reestablished in the area. With the described measures, the facility will have no potential significant impact on the continued existence or critical habitat of any identified animal species outside of the site boundary, and the facility is expected to cause no significant reduction in the likelihood of off-site identified animal species survival or recovery.

Listed, proposed or candidate animal species that may currently exist on the facility site are the bald eagle, American peregrine falcon and Washington ground squirrel. Of these, only the bald eagle has been observed within the site boundary. The gray wolf is the only listed, proposed or candidate animal species expected to return to the site, initially most probably as an experimental population. Along with the animal protecting measures described, above, additional measures proposed for protection of on-site species include habitat restoration and replacement, institution of disturbance buffers, and institution of speed limits and safe driving practices.

The Applicant proposes to avoid all sites with identified Washington ground squirrel burrows. With the addition of the animal protection measures described, above, the facility will have no potential significant impact on the continued existence or critical habitat of this species, and the facility will cause no significant reduction in the likelihood of survival or recovery of this species.

As rare visitors with no reports of fatalities caused by regional wind facilities similarly sited, there is a very low probability for adverse impacts to the bald eagle or the American peregrine falcon from construction and operation of the facility. Low use of the facility site indicates there are no resources present within the site upon which members of either species rely, and there are no indications that operation of a wind power conversion facility significantly alters raptor use of a site. Animal protection measures proposed for these species include use of modern wind turbine and tower designs, turbine locations set back from cliff edges and outside of flight

corridors, burial of the majority of power and communication lines, absence of guyed weather stations or turbine towers, APLIC-compliant power poles, nest structure preservation and limitation of construction to periods outside of the breeding season near identified nesting areas. With the addition of the animal protection measures described, above, the facility will have no potential significant impact on the continued existence or critical habitat of the bald eagle or American peregrine falcon, and the facility will cause no significant reduction in the likelihood of survival or recovery of these species.

Potential impacts to the gray wolf from facility construction or operation are limited to the risk of vehicle strikes and the redistribution or reduction of prey species. Redistribution of prey species is expected to be highly local and temporary. The small reduction in the number of prey species available within the site boundary caused by permanent habitat loss will be balanced by the increase in prey in the habitat replacement parcel. With the addition of the animal protection measures described, above, the facility will have no potential significant impact on the continued existence or critical habitat of the gray wolf, and the facility will cause no significant reduction in the likelihood of survival or recovery of this species.

PROPOSED MONITORING PROGRAM

The Applicant proposes no monitoring programs for individual listed, proposed or candidate species other than for the Washington ground squirrel, and that only if areas of activity are identified.

The Applicant proposes to develop a plan for monitoring the success of habitat conversion on the habitat replacement parcel (see Exhibit P) after the parcel to be purchased is identified. The plan would be amended to include Washington ground squirrel monitoring should any be attracted to the parcel.

Monitoring of Avian Species

Although bat species would not be excluded, the monitoring program proposed by the Applicant is targeted primarily at avian species, and presented in brief, below. The first component is designed to look for information about population-level impacts to the studied species, and the second, a contingency plan, provides for standard fatality counts to which fatality counts from other wind power conversion facilities can be compared. The Applicant will fully develop and submit the program to the Siting Council prior to issuance of the site certificate.

Primary Avian Monitoring Program

It is proposed that annual spring raptor and long-billed curlew nesting surveys and annual fall horned lark censuses take place for a period of ten years, in the hope of providing an indication of impacts to populations, rather than of impacts to individuals, from facility construction and operation. These surveys, proposed to commence upon issuance of the site certificate, will provide pre- and post-construction information about avian use of the area on and around the site, and local population changes for the surveyed species. One year of use surveys and two years of raptor nesting surveys have been performed within and around the site boundary. Facility construction is anticipated to be a phased operation, and portions of the site will remain

available for gathering additional pre-construction use and nesting information. The bald eagle and American peregrine falcon are present on the facility site too infrequently to use for analysis of population impacts. Raptor species and the long-billed curlew encompass many federal and state avian species of concern found in surveys of the area. The horned lark (the most abundant avian species found on the site) may be an appropriate sentinel species for passerines, and a good surrogate species for estimation of impacts to those species less frequently observed.

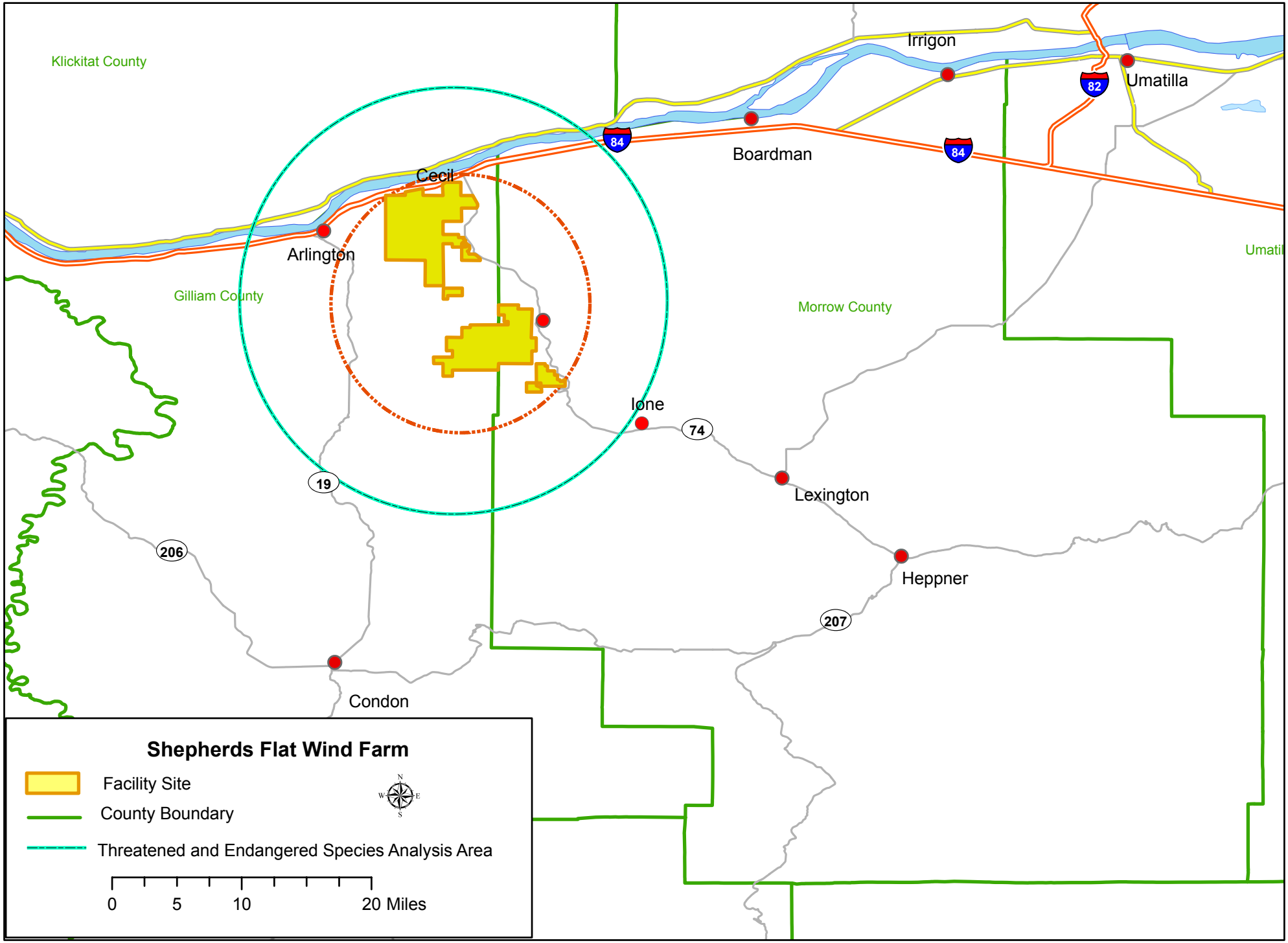
In addition to the described studies, a life-of-the-facility Wildlife Response and Reporting System (WRRS) is proposed. This system would be similar to that accepted for Klondike III.[23] These programs provide reasonably accurate information about fatality levels for large avian species, including large hawks and owls, eagles, and geese. The programs are less precise for estimation of bat or small bird fatalities unless the fatality incident involves large numbers. The WRRS will be capable of indicating unexpected levels of avian or bat fatalities, even of small species. If such should occur, the studies proposed under the primary program can be terminated and those proposed for the contingency plan can commence.

Avian Monitoring Contingency Plan

This plan includes those studies standard to monitoring of wind power conversion facilities: avian and bat fatality monitoring through standard carcass searches of a statistically representative subset of turbines, including studies of sampling bias; and standard avian use studies. Both are proposed to last for a period of two years. In addition, two years of raptor nesting surveys are proposed (adjusted for those that may have already taken place while the primary plan was in effect), followed by nesting surveys at five-year intervals for the life of the facility. As in the primary program, the WRRS would continue. The contingency plan would provide information about the impact of facility construction and operation on individual birds and bats, and would give a more accurate fatality count than would the primary program. This would aid in assessment of relative fatality rates, by allowing comparison on a fatalities-per turbine or -per megawatt basis to bird and bat fatalities at other wind power conversion facilities.

[23] http://www.oregon.gov/ENERGY/SITING/docs/KWPOA.pdf

Figure Q-1


Klickitat County
Irrigon
Umatilla
82
84
84
Boardman
Cecil
Arlington
Gilliam County
Morrow County
Umatil
Ione
74
19
Lexington
206
Heppner
207
Condon
Shepherds Flat Wind Farm
Facility Site
County Boundary
Threatened and Endangered Species Analysis Area
N
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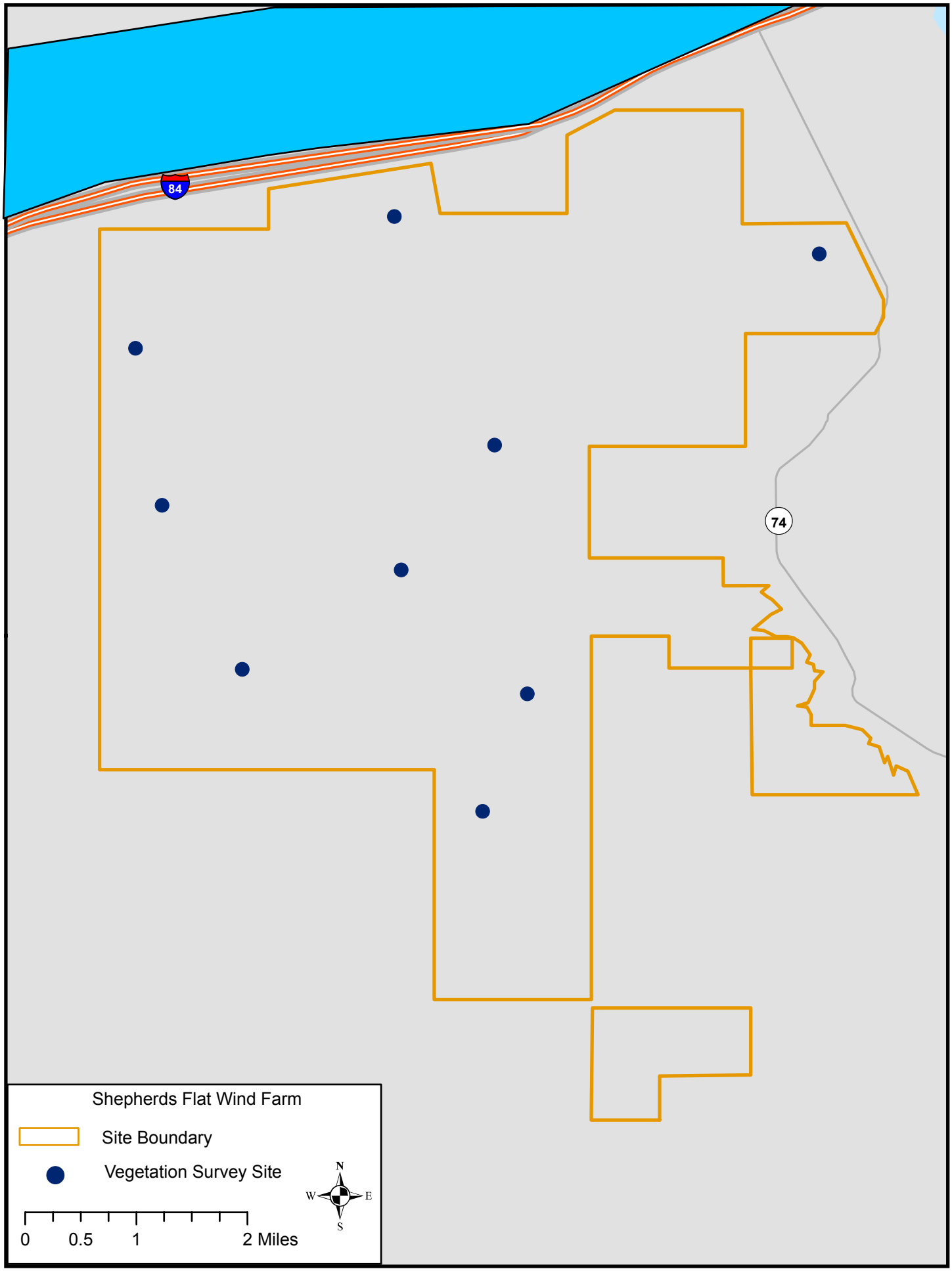
E
S
0
5
10
20 Miles

Figure Q-2


84
74
Shepherds Flat Wind Farm
Site Boundary
Vegetation Survey Site
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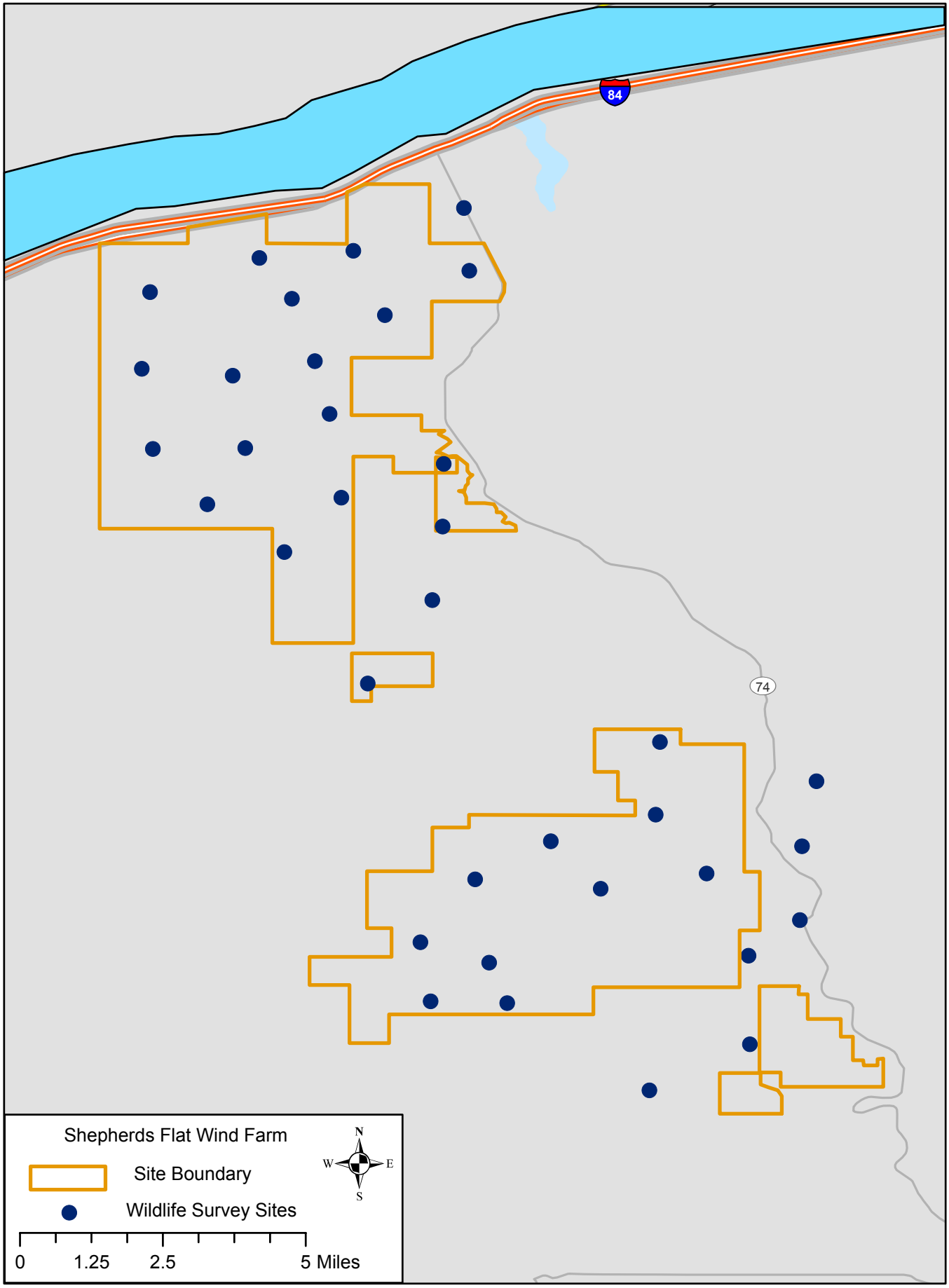
0.5
1
2 Miles

Figure Q-3


84
74
Shepherds Flat Wind Farm
Site Boundary
Wildlife Survey Sites
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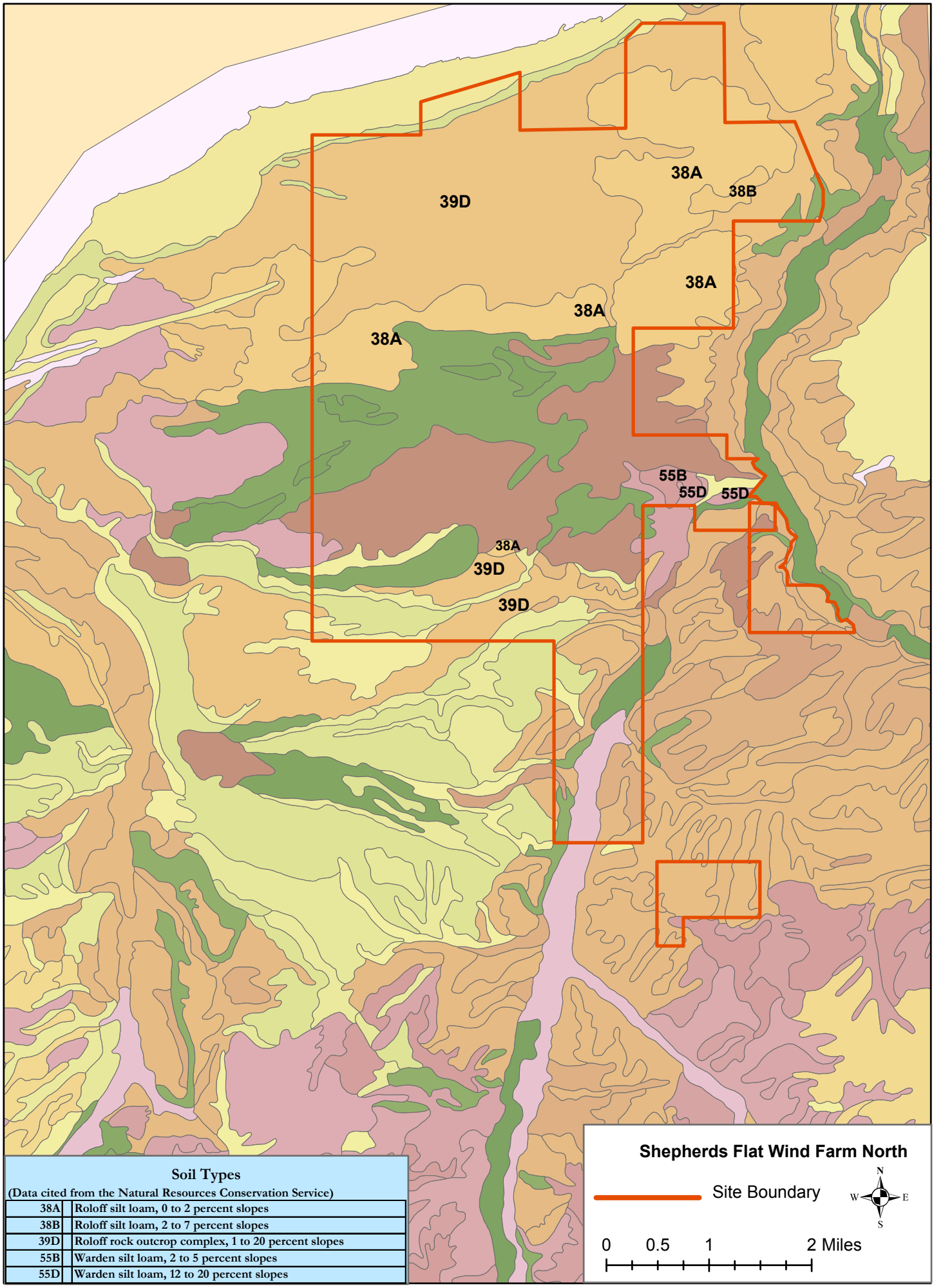
W
E
S
0
1.25
2.5
5 Miles

Figure Q-4



Soil Types

(Data cited from the Natural Resources Conservation Service)

38A	Roloff silt loam, 0 to 2 percent slopes
38B	Roloff silt loam, 2 to 7 percent slopes
39D	Roloff rock outcrop complex, 1 to 20 percent slopes
55B	Warden silt loam, 2 to 5 percent slopes
55D	Warden silt loam, 12 to 20 percent slopes

EXHIBIT R

SCENIC AND AESTHETIC VALUES

An analysis of significant potential impacts of the proposed facility, if any, on scenic and aesthetic values identified as significant or important in applicable federal land management plans or in local land use plans for the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0080, including:

(A) Identification of the applicable federal land management plans and local use plans;

(B) Identification and description of the scenic and aesthetic values identified as significant or important in the applicable plans;

(C) A description of significant potential adverse impacts to the scenic and aesthetic values identified in (B), including, but not limited to, potential impacts such as:

(i) Loss of vegetation or alteration of the landscape as a result of construction or operation;

(ii) Visual impacts of facility structures, including cooling tower or other plumes, if any; and

(iii) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class 1 visual resources as described in OAR 340-031-0120;

(D) The measures the applicant proposes to avoid, reduce or otherwise mitigate any significant adverse impacts;

(E) A map or maps showing the location of the visible scenic and aesthetic values analyzed under (B); and

(F) The applicant's proposed monitoring program, if any, for impacts to scenic and aesthetic values;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit R as follows:

> All paragraphs apply. The reference in (C)(iii) is incorrect; the correct reference is OAR 340-204-0050.

SCENIC AND AESTHETIC VALUES

The thirty mile area for scenic and aesthetic analysis is shown in Figure R-1. Approximately one third of the analysis area is within the state of Washington, which is not considered in this Exhibit (although it is noted that Klickitat County, Washington hosts wind turbine installations along the Columbia River).

LAND MANAGEMENT AND USE PLANS

Federal land management plans

The analysis area includes the John Day River, which is designated a National Wild and Scenic River. No facility structures will be visible from the John Day River. The federal area of jurisdiction extends to a buffer zone which is at its maximum one mile from the river. No facility structures will be visible from within this buffer zone.

The Oregon Trail runs through the project site itself, and there is an Oregon Trail Interpretive Center in Four Mile Canyon, adjacent to the project site. The Oregon Trail Historic Site at Four Mile Canyon has been designated a Special Management Area by the federal Bureau of Land Management. The potential for the Shepherds Flat Wind Farm (SFWF) to impact the Oregon Trail is discussed in Exhibit S, and the potential for the facility to impact the Oregon Trail Interpretive Center in Four Mile Canyon is discussed in Exhibit L.

Local land use plans

The analysis area covers portions of Sherman, Wheeler and Umatilla Counties in addition to Gilliam and Morrow Counties within which the project site is located. Project structures will not be visible from locations in Wheeler and Umatilla Counties.

Sherman County

The *Sherman County Comprehensive Land Use Plan* identifies important landscape features (trees, rock outcroppings and its river canyons). The SFWF, if visible at all from Sherman County, will appear on the far eastern horizon. The most noticeable visual impact is likely to be the nighttime aircraft hazard lighting required by the Federal Aviation Administration (FAA). The SFWF will work with the FAA to minimize visual impact through lighting placement and fixture selection.

The Sherman County Plan also encourages the development of renewable resources, and the county hosts wind turbine installations at Klondike.

Gilliam County

The *Gilliam County Comprehensive Land Use Plan* also identifies important landscape features, which include rock outcroppings and the John Day River corridor. The SFWF compatibility with the Gilliam County Plan is addressed in Exhibit CC.

Morrow County

The *Morrow County Comprehensive Land Use Plan* does not designate any sites or areas as high in scenic-resource value. The SFWF compatibility with the Morrow County Plan is addressed in Exhibit CC.

The *City of Boardman Comprehensive Plan* notes that there are limited scenic views, none of which could be considered outstanding.

SIGNIFICANT POTENTIAL ADVERSE IMPACTS TO SCENIC AND AESTHETIC VALUES

Vegetation is already sparse in the project area, and vegetative loss will be limited to project roads and turbine pads. This change will only be apparent within the project site, due to topography. The overall landscape, however, will be altered by the installation of the project's turbine towers.

The scenic and aesthetic values analysis area is framed by the McNary Dam with its 980 MW powerhouse to the west, and the John Day Dam with its 2,160 MW powerhouse to the east. Rows of high-voltage transmission towers, sometimes five abreast, cross the Columbia River and run along its shores to connect these two facilities. Four separate rows of these tall towers cross the SFWF site.

The 550 MW Boardman Coal Plant with its smokestacks and plumes is visible on the horizon from most of the eastern half of the analysis area. The two Coyote Springs natural gas combined-cycle turbines (503 MW total) emit steam and are located on Lake Umatilla.

There are whose who find wind turbines a graceful addition to the rural landscape, as well as to the generating capacity identified above. And there are those who do not. The important or significant values contained in the federal land management plans and local comprehensive land use plans considered in Exhibit R do not address this difference of opinion nor discourage the proposed change to the landscape.

Therefore, no impact on scenic and aesthetic values identified as significant or important in applicable federal land management plans or in local land use plans is anticipated. Neither mitigation nor monitoring is proposed.

Figure R-1

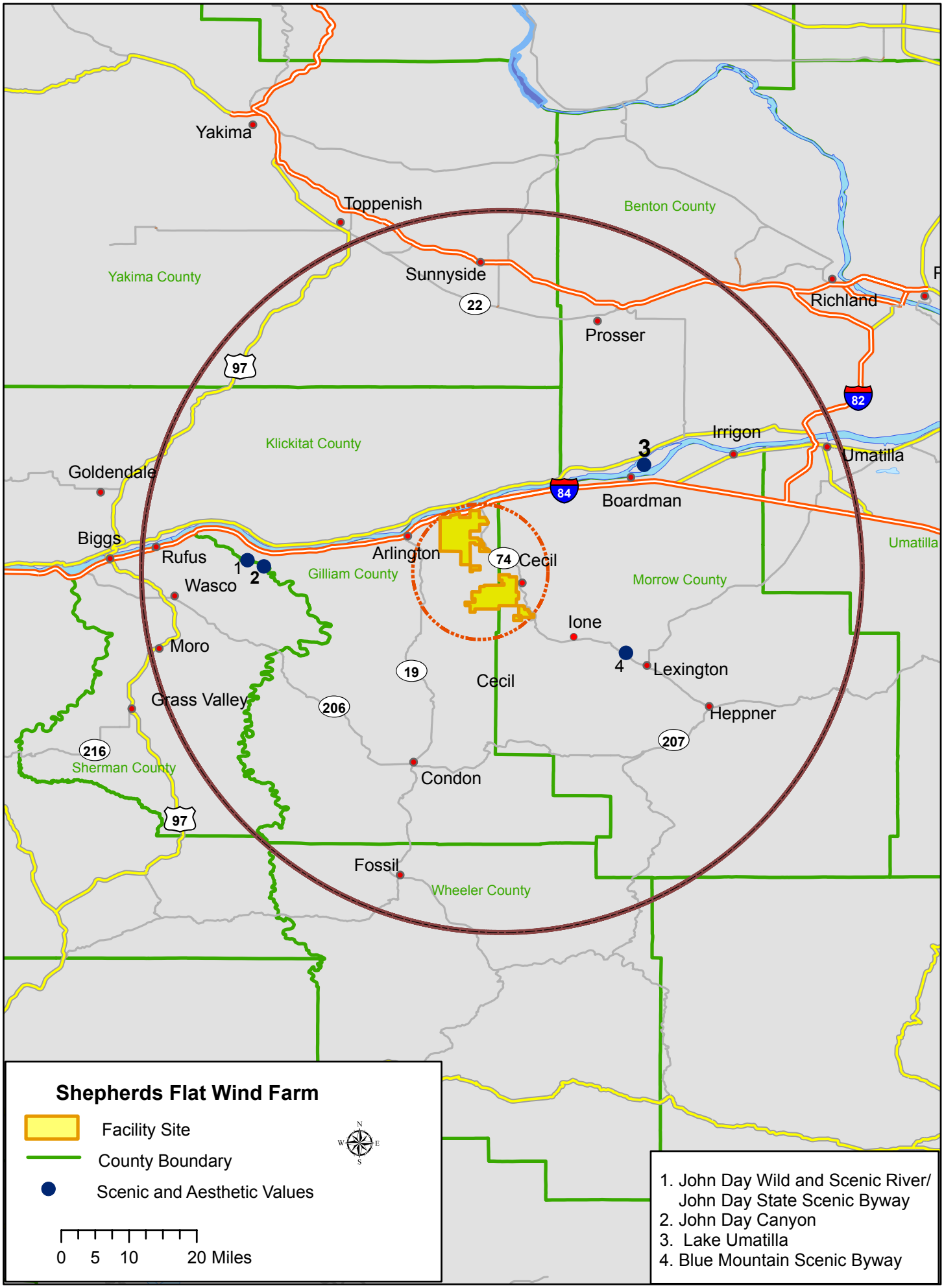

Yakima
Toppenish
Benton County
Yakima County
Sunnyside
22
Richland
Prosser
97
82
Klickitat County
Irrigon
3
Umatilla
Goldendale
84
Boardman
Biggs
Umatilla
Rufus
1
2
Arlington
74
Cecil
Gilliam County
Morrow County
Wasco
Ione
Moro
4
Lexington
19
Cecil
Grass Valley
206
Heppner
207
216
Sherman County
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Facility Site
County Boundary
Scenic and Aesthetic Values
N
W
E
S
0 5 10 20 Miles
1. John Day Wild and Scenic River/
John Day State Scenic Byway
2. John Day Canyon
3. Lake Umatilla
4. Blue Mountain Scenic Byway

EXHIBIT S

HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

Information about historic, cultural and archaeological resources providing evidence to support a finding by the council as required by OAR 345-022-090, including:

(A) 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;

(B) For private lands, archaeological objects, as defined in ORS 359.905(1)(a), and archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area;

(C) For public lands, archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area;

(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:

(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);

(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;

(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

(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; and

(E) The applicants proposed monitoring program, if any, for impacts to historic, cultural and archaeological resources during construction, operation and retirement of the proposed facility;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit S as follows:

> All paragraphs except (C) apply.
> The application should include evidence of consultation with affected tribes, including the Confederated Tribes of Umatilla and the Confederated Tribes of Warm Springs, regarding archaeological and cultural sites and materials within the site boundary. The affected tribes provide technical review and recommendations in reference to the

Council's Historic, Cultural and Archaeological Resources Standard (OAR 345-022-0090).

The Oregon Parks and Recreation Department provides technical review and recommendations on compliance with Council standards.

The State Historic Preservation Office (SHPO) within the Oregon Parks and Recreation Department provides technical review and recommendations in reference to the Council's Historic, Cultural and Archaeological Resources Standard (OAR 345-022-0090). The application should include an archaeological and cultural survey conducted by a qualified archaeologist.

Note: Information concerning the location of archaeological sites or objects may be exempt from public disclosure under ORS 192.501(11). Please do not include specific location information in the text of site certificate application. Such information, including archaeological survey reports, should be provided only after consultation with the Department.

Agency Comments

The Oregon Parks and Recreation Department, Oregon Historic Trails Advisory Council has expressed concerns with respect to the potential impact of the facility on Oregon Trail sites.

NATIONAL REGISTER OF HISTORIC PLACES

There are no resources within the project boundaries that are currently listed on the National Register of Historic Places. Two resources to the east of the site outside of the facility boundary in the south area may be eligible: the Cecil store and post office, and a portion of the Oregon Trail with wagon ruts still visible. Both of these are within or near the community of Cecil, in Willow Creek Valley. The Wells Springs Segment of the Oregon Trail is listed, situated south of Boardman to the east of the project.

One known archeological site, 35GM19, is located within the project boundary in the north area of the project. The site is an extensive lithic scatter with artifacts. Prior to dam construction and the filling of Lake Umatilla, surveys along the Columbia River identified prehistoric sites on or near the shoreline. Some remain and many have been inundated. In the course of archaeological surveys in the project area, 6 identified sites remain along the Columbia on the Oregon side of the river and 10 on the Washington side. These are directly north of the proposed facility and outside of the site boundary. A site was also identified in Willow Creek Valley, in the vicinity of but outside the northeast edge of the site boundary.

RESOURCES SURVEYS

To provide a background for pending archeological field studies, a cultural resource overview of the site was conducted in March 2006 by Archaeological Investigations Northwest, Inc. (AINW), Portland, Oregon. AINW performed a comprehensive survey of the records and literature and

examined the results of previous studies on the project site or in the immediate vicinity. Locations within the project boundaries at which archeological or historical resources are likely to occur were identified for periods pre- and post European settlement. Two previous archeological field surveys had been conducted within the project boundaries in portions of the north project area. One survey, covering several hundred acres, identified the site known to occur within the project boundaries. The second, a survey for a transmission line corridor that included an area within the project boundaries, located no resources. No surveys have been performed on or near the south area of the project, and no sites have been identified.

In the cultural resources overview, American Indian land use patterns in the upland areas of the project site, where most construction will occur, was expected to have been limited to occasional travel between rivers, hunting, and plant collection (Attachment S). Based on this use, the most likely locations for detection of archeological deposits were estimated to include canyon bottoms and terraces in the lower portions of the walls of Willow Creek Valley, and Eightmile and Fourmile Canyons. Areas close to springs were considered to have the potential for location of archaeological resources, as were minor drainages and upland travel corridors. Based on expected land use patterns, AINW mapped areas within the project boundaries having a high-to-moderate potential for American Indian archeological resources.

There are three locations in which Euroamerican resources may be present or are known to occur. The project is crossed by a segment of the Oregon Trail and by the route of a telegraph line constructed in 1869. These routes, and the community of Cecil, were considered to be areas having the potential for location of archeological deposits.

In areas where turbine string, road and other project or construction-related corridors intersect these identified probability areas for prehistoric or historic-period sites, systematic ground surveys for surface evidence of archeological and historic resources are pending. The use of more intensive survey methods, such as subsurface testing, will be based upon the results of these ground surveys. Preliminary consultation with the affected tribes has occurred, and they will participate in the field surveys of the project property.

POTENTIAL IMPACTS AND RESOURCE PROTECTION

Potential impacts to resources from construction, operation and decommissioning of the proposed facility include damage to or destruction of sites and artifacts, or displacement of artifacts from their current locations by ground disturbing activities; there is also the potential for preclusion of access to sites underneath facility components.

The Applicant proposes to prevent damage of identified resources during construction or decommissioning by avoiding any ground disturbing activity or component siting within 50 feet of known resources. The circumference of this buffer will be flagged for the duration of construction or decommissioning activities in the area, and the construction or decommissioning contractor instructed of their locations and the need for avoidance. Should potential resource sites be discovered in the course of construction or decommissioning, activity in the area will cease until the location is evaluated by AINW.

The Applicant has also eliminated the Cecil store and post office and the still-visible section of Oregon Trail wagon ruts from within the site boundary as it was shown in the Notice of Intent. The Applicant proposes to build a low rustic fence around part of the identified area of visible Oregon Trail wagon ruts. Although the fence will help prevent inadvertent damage to the site, it is intended primarily to provide definition for display of an important cultural resource. An informational posting for the Trail is also proposed. The Oregon Historic Trails Advisory Council of the Parks and Recreation Department will be consulted on the location and design of both the fence and posting.

MONITORING

The Applicant proposes to monitor the condition of the Oregon Trail fence annually, and to repair it as needed.

EXHIBIT T

RECREATIONAL OPPORTUNITIES

Information about the impacts the proposed facility would have on important recreational opportunities in the analysis area, providing evidence to support a finding by the Council, as required by OAR 345-022-0100, including:

(A) A description of any important recreational opportunities in the analysis area considering the criteria in OAR 345-022-0100;

(B) An assessment 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;
(ii) Noise resulting from facility construction or operation;
(iii) Increased traffic resulting from facility construction or operation;
(iv) Water use during facility construction or operation;
(v) Wastewater resulting from facility construction or operation;
(vi) Visual impacts of facility structures, including cooling tower or other plumes, if any; and
(vii) Visual impacts from air emissions resulting from facility construction or operation, including, but not limited to, impacts on Class 1 visual resources as described in OAR 340-204-0050;

(C) A description of any measures the applicant proposes to avoid, reduce or otherwise mitigate the significant adverse impacts identified in (B);

(D) A map of the analysis area showing the locations of important recreational opportunities identified in (A); and

(E) The applicant's proposed monitoring program, if any, for impacts to important recreational opportunities;

IMPORTANT RECREATIONAL OPPORTUNITIES IN THE ANALYSIS AREA

The site of the Shepherds Flat Wind Farm offers no public recreational opportunities. Similar properties might offer camping, hunting and off-road vehicle sport; however, the project is sited on privately-owned land that has been traditionally posted against trespass and hunting. Such posting is expected to continue.

The analysis area for potential impacts on important recreational opportunities extends five miles beyond the facility site, and that area is shown in Figure T-1.

Within the analysis area we find The Earl Snell and Alkali Parks and the China Creek Golf Course in the Arlington area, and the Columbia River & RV Resort, a public marina and day use area at the Port of Arlington. These facilities are well maintained and demonstrably provide

pleasure to residents and visitors alike. They do not, however, meet the criteria set forth in OAR 345-022-0100 as "important."

Therefore, no impact on important recreational facilities in the analysis area is anticipated, and no monitoring program is proposed.

Figure T-1

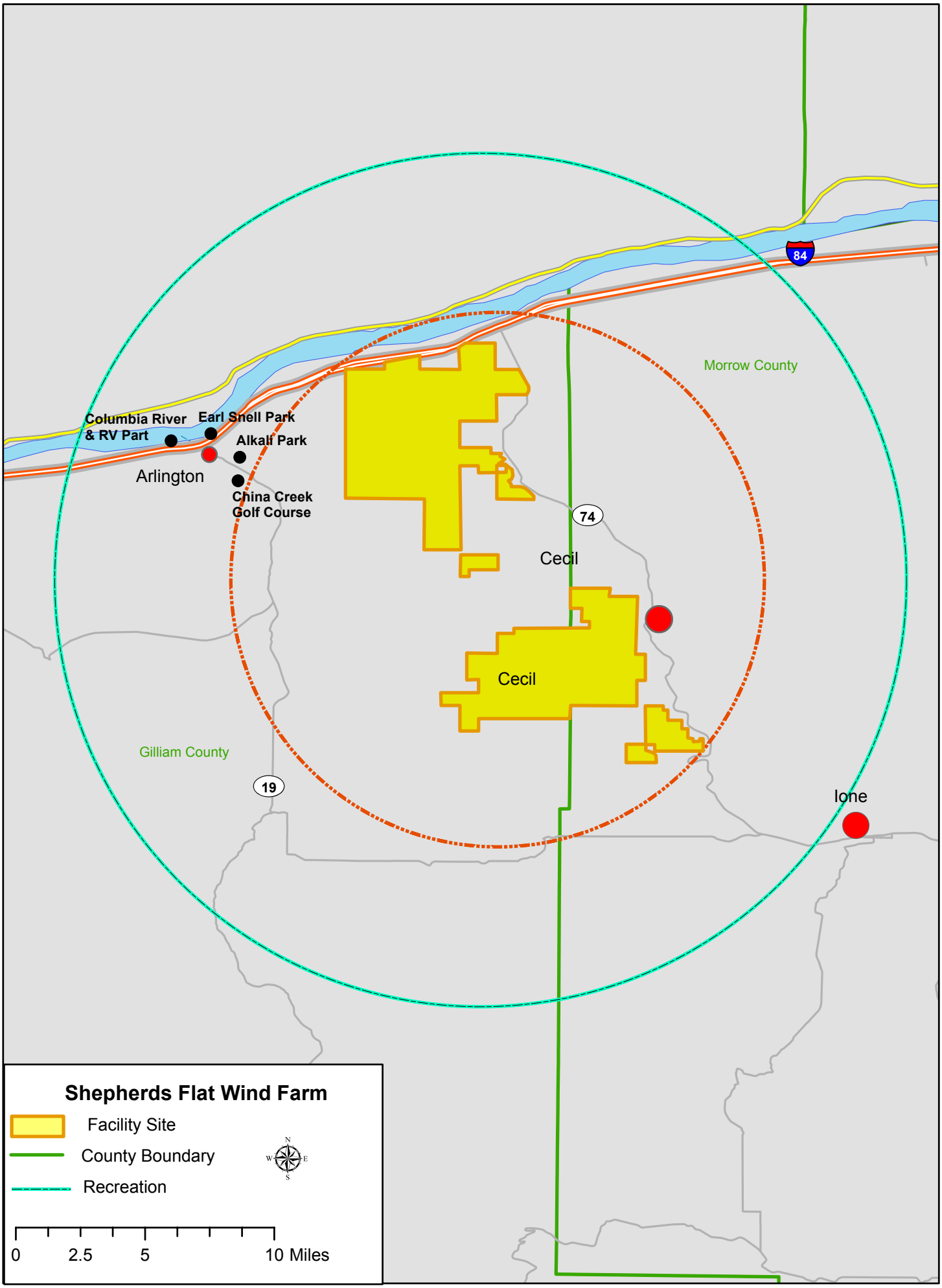

Shepherds Flat Wind Farm
Facility Site
County Boundary
Recreation
0
2.5
5
10 Miles
Columbia River & RV Part
Earl Snell Park
Alkali Park
Arlington
China Creek Golf Course
Morrow County
Gilliam County
Cecil
Cecil
Ione
84
74
19

EXHIBIT U

IMPACTS ON PUBLIC SERVICES

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;

(A) The important assumptions the applicant used to evaluate potential impacts;

(B) Identification of the public and private providers in the analysis area that would likely be affected;

(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;

(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

(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 345-022-0110;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit U as follows:

> Include an analysis of estimated facility-related traffic during construction and operation and the potential impact on traffic safety. Discuss transportation of heavy equipment and shipments of facility components during construction.

IMPACTS ON PUBLIC SERVICES

Please see Figure U-1 for a map showing the Shepherds Flat Wind Farm (SFWF) in relation to the thirty mile radius analysis area.

The wind power facility itself requires few public services. Potential impacts to services will be caused, if at all, by increased population during construction and operations, and construction related traffic. Providers of services within the analysis area, and their potential for any impacts from the construction and operation of the Shepherds Flat Wind Farm, are shown in the following table:

Service Providers	Public Services								
	Sewers and sewage treatment	Water	Stormwater drainage	Solid waste management	Housing	Traffic Safety	Police and fire protection	Health care	Schools
Arlington	P	P	N	P	P	P	P	P	P
Boardman	N	N	N	N	P	N	N	P	P
Ione	P	N	N	N	P	N	P	P	P
Lexington	P	P	N	N	P	N	N	P	P
Irrigon	N	N	N	N	N	N	N	N	N
Heppner	N	N	N	N	N	N	N	N	N
Condon	N	N	N	N	N	N	N	N	N
Fossil	N	N	N	N	N	N	N	N	N
Rufus	N	N	N	N	N	N	N	N	N
Wasco	N	N	N	N	N	N	N	N	N
Moro	N	N	N	N	N	N	N	N	N

N=None
P=Potential for any impact

Significant potential adverse impacts have been judged relative to significant changes in population. During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families. The maximum direct employment during operations is expected to 25. Discussion of the impacts of these population increases on cities and town showing a potential for impacts follows.

Arlington and Boardman

Due to their size and proximity to the project area, the cities of Arlington and Boardman are likely to feel the greatest impact. During construction, it is expected that there will be a short-term affect on the availability and price of temporary housing (rentals, motels and RV parks). Arlington and Boardman contain sufficient temporary housing stocks for which basic public services are already provided. No adverse impact is predicted.
While permanent operating employment preference will be given to local applicants, it is likely that some experienced personnel will be recruited from outside the analysis area. Civic and business leaders in both cities have indicated that the addition of even the maximum number of

recruited employees, some with families, will have a beneficial rather than adverse impact on the area. No adverse impact on public services is predicted.

Ione and Lexington

Applicant is in consultation with the Willow Creek Valley Economic Development Committee, and with the cities of Ione and Lexington, assisting them in their efforts to attract as many project personnel as possible to these communities. No adverse impact on public services is predicted.

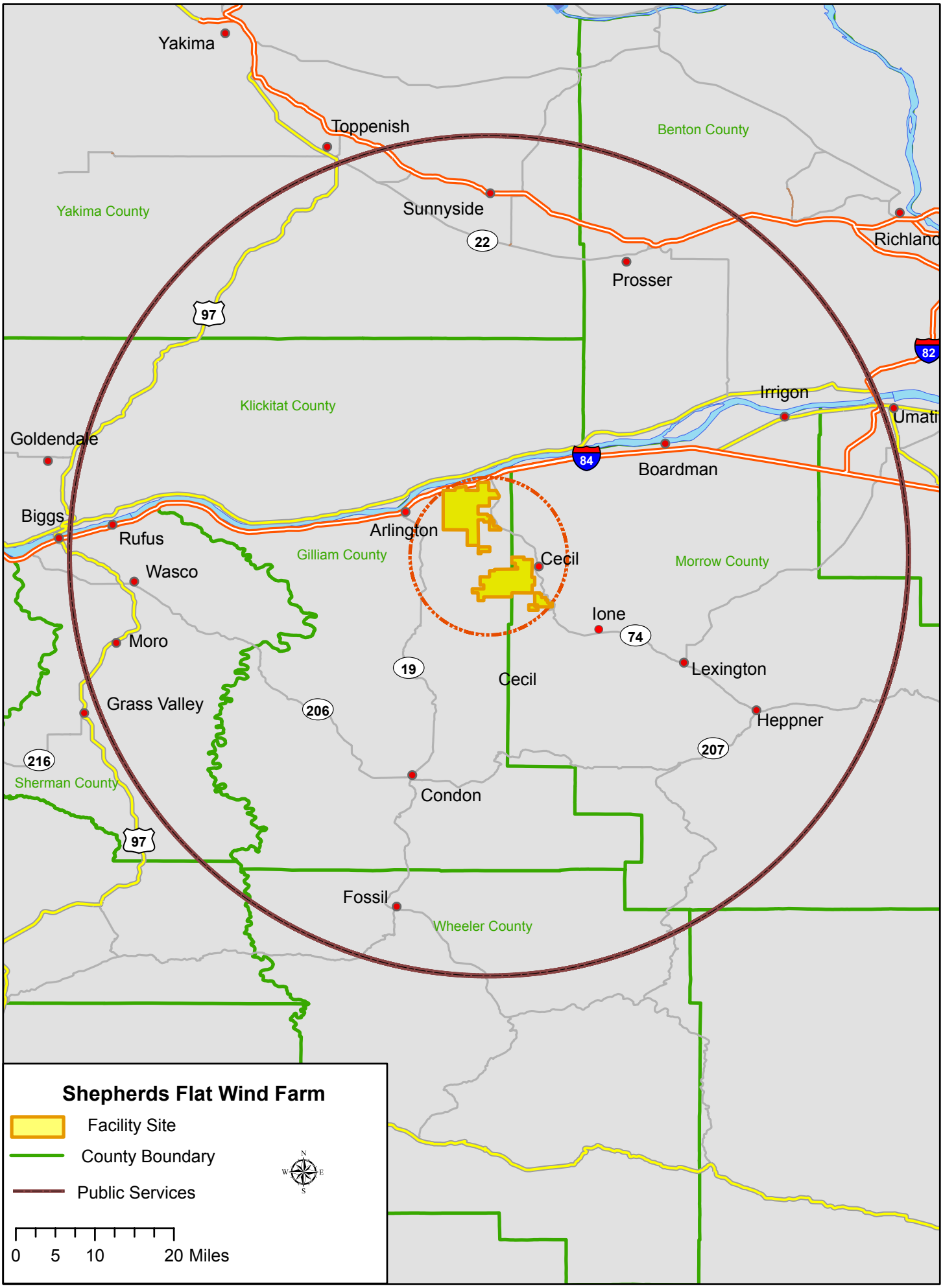
TRAFFIC

Construction of project roads, facilities and collection and communication lines will occur at about the same time, using individual vehicles for multiple tasks. During the construction period, construction, delivery and personal vehicles will make approximately 25 to 50 round trips (50 to 100 one-way trips) daily. This estimate includes the round trips of flatbed trucks delivering the tower sections, nacelles and blades, as well as all dump trucks, concrete trucks, cranes, other construction vehicles, trade vehicles and personal vehicles.

Most heavy equipment will be delivered via Interstate 84, and most vehicles will exit I-84 at Arlington. Traffic in Arlington will be disrupted, particularly during the delivery of towers and rotors. City residents and the sheriff's department will be notified of these deliveries. Flaggers will be employed at all affected intersections.

During facility operation, two to four daily round trips to and from the project site are expected. Ordinary traffic will consist of personal vehicles and, typically, project pickup trucks. Occasionally, but infrequently, larger equipment such as flatbed trucks or a crane may be required. During storm conditions, personnel may use snow removal equipment on project site roads and may use specialized snow travel vehicles. These activities are not expected to adversely affect traffic in the area, nor present a safety hazard.

Figure U-1


Yakima
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Benton County
Yakima County
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Richland
Prosser
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Klickitat County
Irrigon
Umati
Goldendale
84
Boardman
Biggs
Arlington
Rufus
Gilliam County
Cecil
Morrow County
Wasco
Ione
74
Moro
19
Cecil
Lexington
Grass Valley
206
Heppner
207
216
Sherman County
Condon
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Facility Site
County Boundary
Public Services
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20 Miles

EXHIBIT V

SOLID WASTE AND WASTEWATER

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:

(A) A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate;

(B) The applicants plans to minimize, recycle or reuse the solid waste and wastewater described in (A);

(C) A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility;

(D) Evidence that adverse impacts described in (C) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts; and

(E) The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit V as follows:

> Septic System
> If [Applicant] intends to discharge sanitary wastes to an on-site septic system during operation, the facility may need a WPCF permit depending on the design capacity of the system. [Applicant] must first verify that the site is suitable for an on-site septic system by applying to DEQ or its designated agency for a site evaluation of groundwater and soil conditions.
>
> The WPCF permit is a state permit. If the permit is needed, the Council would make the issuing decision in consultation with DEQ. The requirements for the WPCF permit are set forth in OAR Chapter 340, Division 71. Regulations pertaining to WPCF permits are in OAR Chapter 340, Division 45. [Applicant] must include in the site certificate application all information that would otherwise be required by DEQ in an application for the permit.

STORMWATER RUNOFF

Although not a waste directly generated by the facility, construction and operation of the Shepherds Flat Wind Farm may impact the quality of stormwater runoff discharged from the project site. A National Pollutant Discharge Elimination System (NPDES) permit may or may not be required for the facility depending upon the results of pending wetland determinations and

jurisdictional delineations; the Applicant proposes to meet the requirements of NPDES water quality criteria regardless of the requirement for a permit. Impacts to water quality from construction, operation and decommissioning of the facility are limited to the particulate content of runoff affected by erosion from areas of disturbed soil. Protection of stormwater quality will include placement of erosion and siltation control measures (baffles, silt traps, netting, straw ground cover) in appropriate facility construction locations, and establishment of a stormwater pollution prevention plan for the site.

SOURCES OF FACILITY-GENERATED SOLID AND LIQUID WASTE

Construction

Potential sources of solid waste generation include excess soil removed from turbine foundation excavations, excess concrete from turbine and transformer pad construction, wood from concrete foundation forms, scraps of wire and cable from trimming of connections, construction material packaging, waste bolts and nuts from component assembly, used construction flagging, and used erosion control materials such a netting or strew bales. The occurrence of excess soil and concrete will be minimized as far as is practicable, and the remainder used as fill where needed on the facility site. The residual materials other than those such as straw that are biodegradable will be removed in each area of the facility site as construction is completed. The removed material will be sorted and recycled to the full extent practical, and the remainder transported to the local landfill. Portable sanitation facilities will be provided for use by construction personnel in areas of the facility site under construction, but the contents will be pumped out and disposed of off-site by the contracted provider of the facilities. The only wastewater expected to be generated during construction comes from the wash-down of concrete trucks. Wash-down will take place off-site at the concrete contractor's batch plant.

Facility Operation

The Operation and Maintenance building, including its sanitary waste discharge, will be located off-site and not physically connected to the proposed facility. No discharge of sanitary wastes to an on-site septic system during operation is proposed. Miscellaneous solid waste generated on the site, including packaging from lunches of project personnel, degraded project signage, and broken tools or small parts, will be removed from the site and recycled as appropriate. Project personnel will be instructed in recycling procedures.

Replacement of major project components such as blades or turbine parts will involve both installation of the replacement equipment and removal, using the same equipment, of the components replaced. When under warranty, components will be disposed of in accordance with the directions of the manufacturer. Otherwise, removed components will be recycled when possible or disposed of in the local landfill. Most major components of the facility that might eventually need to be replaced are too valuable as scrap to dispose of.

The primary source of liquid waste are the lubricating and hydraulic fluids used in turbine gearboxes and control mechanisms. Depending on the model selected, each turbine nacelle may enclose in excess of 200 gallons of hydraulic and lubricating fluids. Although contained by spill control reservoirs preventing contamination of the facility site, used lubricating and hydraulic

fluid is the primary waste stream that the facility will produce during operation. The economic advantages attendant upon reduction of oil changes to only those necessary generally leads to condition monitoring programs, where lubrication and hydraulic oils are regularly tested but not replaced until chemical analysis (water or particulate content, etc.) indicate the need for an oil change. Used oil from wind turbines is easily recycled, as it does not contain the hazardous components common to used oil from other electricity-generating technologies, such as the cancer-causing polynuclear hydrocarbons produced by the burning of fossil fuels that are entrained in used combustion turbine oils. All used lubricating and hydraulic fluids generated by the facility will be recycled. It is both economically and environmentally advantageous to do so.

Facility retirement

In general, facility components contain resources far too valuable for disposal as waste. The recycling of components, should the facility be retired, is discussed in Exhibit W.

IMPACTS FROM ACCUMULATION, DISPOSAL OR TRANSPORTATION OF WASTE

No waste will be accumulated or stored on site. The minor quantity of waste produced destined for disposal is environmentally and toxicologically benign. While the waste may occupy landfill space, it will not cause contamination of soil or groundwater or cause any other adverse environmental impact. The major operational waste stream produced by the proposed facility is used oil, also benign as to toxicity although slightly hazardous due to flammability. Used oil will be transported from the site in U.S. Department of Transportation-approved containers for recycling, and no significant adverse impacts are anticipated.

EXHIBIT W

FACILITY RETIREMENT AND SITE RESTORATION

Information about facility retirement and site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1). The applicant shall include;

(A) The estimated useful life of the proposed facility;

(B) The actions that the applicant proposes for retirement of the facility and restoration of the site to a useful, non-hazardous condition;

(C) The estimated costs to retire the facility and restore the site to a useful, non-hazardous condition and a discussion of the methods and assumptions used to estimate retirement and restoration costs; and

(D) For facilities that might produce site contamination by hazardous materials, any proposed monitoring plan, such as periodic environmental site assessment and reporting, or an explanation why a monitoring plan is unnecessary.

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit W as follows:

> All paragraphs apply. The Department recommends estimating retirement costs based on determining the unit retirement costs for facility components.

FACILITY RETIREMENT AND SITE RESTORATION

Applicant estimates that the useful life of the facility, assuming equipment upgrades and repowering, is indefinite.

Estimated retirement costs of facility components:

Summary Restoration Cost

	Unit Cost	Units	Total Cost
Turbine restoration	$27,158	303	$8,228,980
Road restoration	$150	205	30,750
Met tower removal	$1,800	10	18,000
Substation restoration	$30,075	2	60,150
Site restoration			$8,337,880

Estimated unit cost of facility component retirement:

Single WTG removal (including transformer and foundation)	Tons	Hours	Acres	Rate ($)	Unit Total
Crane rental		15		600	$9,000
Labor		140		75	10,500
Blade demolition	39	28		150	4,200
Foundation demolition	17	8		165	1,320
Disposal fees	56			38	2,128
Pad gravel removal and grading			0.138	40	6
Reseeding			0.138	35	5
Total cost per turbine					$27,158
Road restoration per acre					
Cable removal			1	75	$75
Gravel removal and grading			1	40	40
Reseeding			1	35	35
Total cost per road acre					$150
Met tower removal		24		75	$1,800
Substation restoration					
Demolition		200		150	$30,000
Gravel removal and grading			1	40	40
Reseeding			1	35	35
Total cost per substation					$30,075

EXHIBIT X

NOISE

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 340-35-0035. The applicant shall include;

(A) A baseline noise assessment for the proposed site and vicinity;

(B) Predicted noise levels resulting from construction and operation of the proposed facility;

(C) An assessment of the proposed facility's compliance with the applicable noise regulations in OAR 340-35-0035;

(D) Any measures the applicant proposes to reduce noise levels or noise impacts;

(E) The assumptions and methods used in the noise analysis; and

(F) The applicant's proposed monitoring program, if any, for noise generated by construction and operation of the facility;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit X as follows:

> All paragraphs apply. The analysis should include noise predictions based on a "worst case analysis" that assumes that turbines would be located within micrositing corridors in a position closest to the nearest noise sensitive receiver.
>
> [Applicant] should include a noise analysis in the application. The analysis must contain information to support a finding by the Council that the proposed facility would comply with the requirements of OAR 340-035-0035. The analysis must:
>
> - Identify the locations of all noise sensitive properties that might receive noise levels potentially exceeding applicable limits from SFWF turbines
> - Identify all turbine locations used in performing the analysis
> - Provide manufacturer's warranted sound power levels, including octave band data, for all turbine types that might be used at the SFWF (if specific turbine types are not known, [Applicant] must provide the maximum sound power level and octave band data that would not be exceeded by any turbine type used at the SFWF)
> - Identify all input parameters used in performing noise modeling

TURBINE NOISE

The project area, and the properties adjacent to the project area, contain few noise sensitive properties (Figure X-1), and all save one of these properties are owned by the project's landlords.

Turbine number 7-A (as presented on the site layout filed with the Applicant's NOI) has been removed from the site layout as mitigation for any noise disturbance.

The Department has requested a noise analysis which is underway and will be completed before the issuance of a site certificate.

Figure X-1

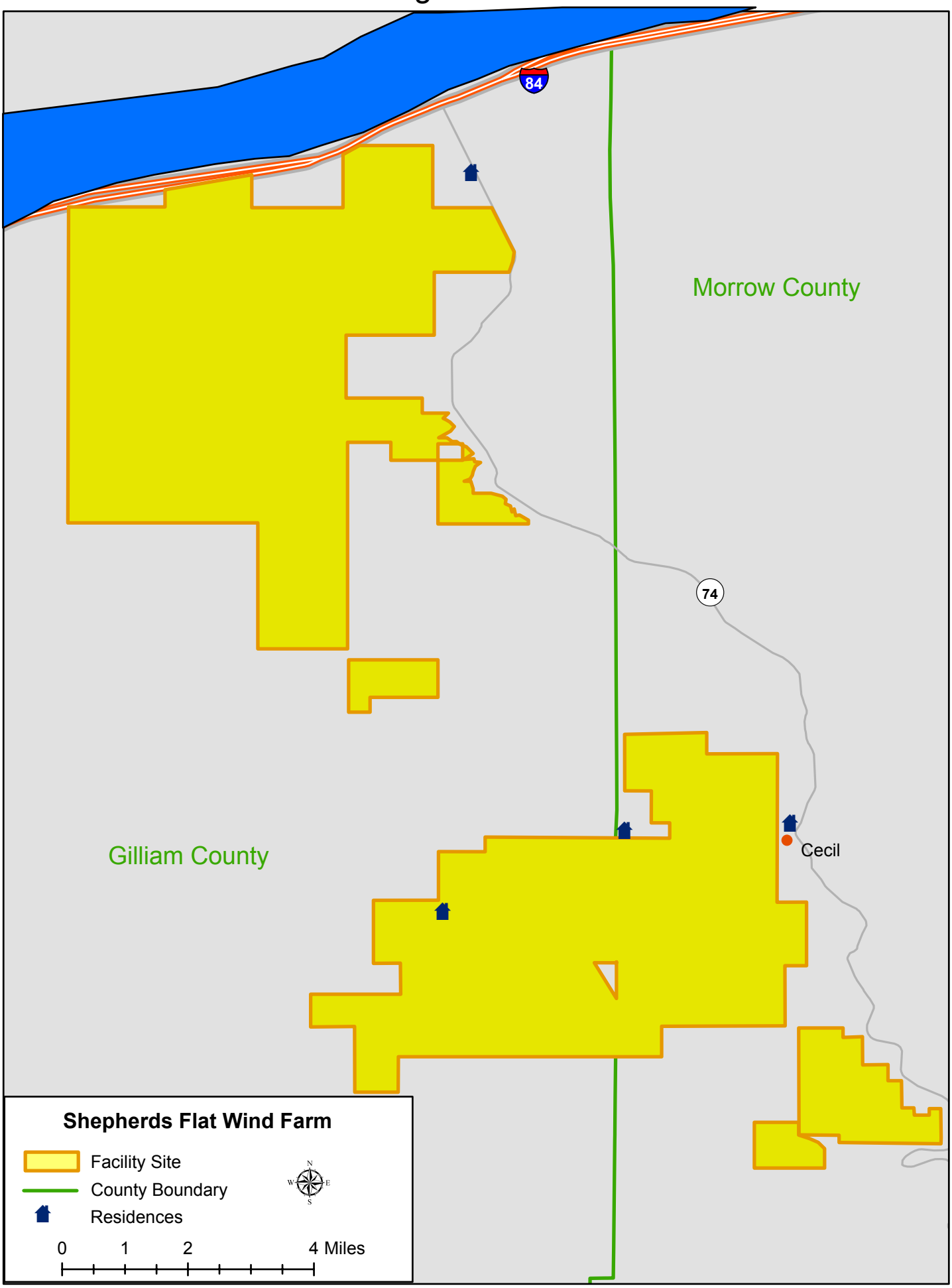
84
Morrow County
74
Cecil
Gilliam County
Shepherds Flat Wind Farm
Facility Site
County Boundary
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EXHIBIT Y

CARBON DIOXIDE EMISSIONS

If the facility is a base load gas plant, a non-base load power plant, or a nongenerating energy facility that emits carbon dioxide, a statement of the means by which the applicant elects to comply with the applicable carbon dioxide emissions standard under OAR 345-024-0560, OAR 345-024-0600, or OAR 345-024-0630 and information, showing detailed calculations, about the carbon dioxide emissions of the energy facility. The applicant may present the calculations in tabular form. The applicant shall include the following calculations:

(A) The total gross carbon dioxide emissions for 30 years, unless an applicant for a non-base load power plant or non generating energy facility proposes to limit operation to a shorter time;

(B) The gross carbon dioxide emissions rate expressed as:

(i) Pounds of carbon dioxide per kilowatt-hour of net electric power output for a base load gas plant, including operation with or without power augmentation, as appropriate, or for a non-base load power plant;

(ii) Pounds of carbon dioxide per horsepower hour for nongenerating facilities for which the output is ordinarily measured in horsepower; or

(iii) A rate comparable to pounds of carbon dioxide per kilowatt-hour of net electric power output for nongenerating facilities other than those measured in horsepower;

(C) The total excess carbon dioxide emissions for 30 years, unless an applicant for a non-base load power plant or a nongenerating energy facility proposes to limit operation to a shorter time;

(D) The excess carbon dioxide emissions rate, using the same measure as required for paragraph (B);

(E) The average annual site conditions, including temperature, barometric pressure and relative humidity, together with a citation of the source and location of the data collection devices;

(F) For a non-base load power plant (or when using power augmentation), the average temperature, barometric pressure and relative humidity at the site during the times of the year when the facility is intended to operate, together with a citation of the source and location of the data collection devices;

(G) The annual fuel input in British thermal units, higher heating value, to the facility for each type of fuel the facility will use, assuming:

(i) For a base load gas plant, a 100-percent capacity factor on a new and clean basis and the maximum number of hours annually that the applicant proposes to use alternative fuels;

(ii) For a non-base load power plant, the the applicant's proposed annual hours of operation on a new and clean basis, the maximum number of hours annually that the applicant proposes to use alternative fuels and, if the calculation is based on an operational life of fewer than 30 years, the proposed operational life of the facility;

(iii) For a nongenerating energy facility, the reasonably likely operation of the facility bases on one year, 5-year, 15-year, and 30-year averages, unless an applicant proposes to limit operation to a shorter time;

(H) For each type of fuel a base load gas plant or a non-base load power plant will use, the estimated heat rate and capacity of the facility measured on a new and clean basis with no thermal energy to cogeneration, consistent with the data supplied in Exhibit B;

(I) For each type of fuel a nongenerating energy facility will use, the estimated efficiency and capacity of the facility with no thermal energy to cogeneration;

(J) If the facility provides thermal energy for cogeneration to lower its net carbon dioxide emissions rate, the applicant shall include:

(i) The estimated annual useful thermal energy available from the facility for non-electric processes, annual useful thermal energy used by non-electric processes, and annual thermal energy rejected as heat waste;

(ii) For a base load gas plant or non-base load power plant, the estimated annual net electric power output and annual fuel input in British thermal units higher heating value for the facility for each type of fuel the facility will use and the basis of such estimates;

(iii) A description of the non-electric thermal processes, the names and addresses of the persons intending to use the non-electric thermal energy, and a description and an estimate of the fuel displaced by cogeneration including supporting assumptions;

(iv) A description of the products produced and thermal energy needed for production of the primary products made by the persons intending to use the non-electric thermal energy produced by the proposed facility, supported by fuel use and steam production records or estimates, if the production facility is new;

(v) The efficiency of each boiler that the thermal energy will displace;

(vi) For each boiler, the annual fossil fuel displace in million Btu, higher heating value, by type of fuel that will be displace by the thermal energy;

(vii) The annual carbon dioxide offset by the cogeneration host, using a rate of 117 pounds of carbon dioxide per million Btu of natural gas fuel (higher heating value) and a rate of 161 pounds of carbon dioxide per million Btu of distillate fuel (higher heating value);

(viii) The cumulative carbon dioxide offset by the steam host through the thirtieth year of facility operation, or for a shorter period if an applicant for a nongenerating facility proposes a shorter operational period;

(ix) A copy of the contractual agreement between the applicant and the cogeneration host for the use of the thermal energy;

(x) A description of the guarantees of offsets that the applicant shall provide for cogeneration projects, pursuant to OAR 345-024-0560(1) and OAR 345-024-0600(1);

(xi) A proposed monitoring and evaluation plan and an independent verification plan, pursuant to subparagraphs (K)(xix) and (K)(xx);

(xii) A copy of the instrument by which the certificate holder will transfer the offsets to the Council for it to hold in trust;

(K) If the applicant proposes to offset carbon dioxide emissions as described in OAR 345-024-0550(3), OAR 345-024-0560(2), OAR 345-024-0590(3), OAR 345-024-0600(2), OAR 345-024-0620(3) or OAR 345-024-0630(1), the applicant shall include:

(i) A description of each offset project;

(ii) A description of who will implement the offset project, including qualifications and experience;

(iii) Detailed estimates of the of carbon dioxide offset, measured in short tons, that the offset projects will achieve over the life of the project;

(iv) For each offset project, an explanation of how the applicant quantified its carbon dioxide estimates to a degree of certainty acceptable to the Council though a transparent and replicable calculation methodology;

(v) For each offset project, evidence that the offset project would not likely have been implemented if not for the applicant's activities or funding;

(vi) For each offset project, a description of a "Baseline" projection that does not include the proposed project and a "Project Case" projection that does. The historic Baseline shall use reliable emissions data or pre-project data available for the most recent three years unless the applicant can demonstrate that a different period more closely represents historical operations or unless it can demonstrate that another method provides a more reasonable estimate. The applicant shall show how the Baseline projection changes over time if changes from business-as-usual could be reasonably anticipated during the project life;

(vii) For each offset project, a description, in a transparent and realistic manner, of the assumptions and methodologies used to quantify the Baseline and the Project Case projections, including a description of key parameters and data sources. This shall include a description of the formulae used to estimate carbon dioxide emissions or sequestration within the project boundary and a net change of carbon dioxide emissions or sequestration that occurs outside of the project boundary that is measurable and attributable to the project activity;

(viii) For projects that avoid conventional electricity generation, a description of a Baseline that calculates the carbon dioxide emissions per kilowatt hour in two steps: (1) for the first five years of operation, a description of the rate base on dispatch data or models or, absent that, a weighted average of all resources in a power pool except zero-fuel-cost or must-run facilities, and (2) a description of the rate for any subsequent years based on a group of similar facilities built within the prior five years or under construction in the electrical distribution region of the project or the three most recent plants built in the region, whichever rate is lower;

(ix)) For projects that avoid conventional electricity generation, a description of avoided transmission and distribution losses, using average grid area or national losses;

(x) A description of any guarantee for offsets from projects that the applicant proposes pursuant to OAR 345-024-0560(2), OAR 345-024-060(2) and OAR 345-024-630(1), if the applicant chooses to offer a guarantee;

(xi) A description of the offset project boundary. The boundary shall encompass all carbon dioxide emissions under the control of the project that are significant and reasonably attributable to the project activity. If the project is being conducted by one part of a corporation, the boundary shall include the emissions and reductions of the whole corporation entity and the carbon dioxide emissions resulting from processes and facilities that are related to the project, with identification of subsidiaries that are affected by the project;

(xii) A description of significant risks and risk mitigation strategies, including an estimate of the range of uncertainty around the expected carbon dioxide offsets;

(xiii) For biological sequestration projects, an assessment of the risk of climate change to natural systems that are sequestering the carbon dioxide, including, if appropriate, the risks from forest fires, pest and other unplanned releases of carbon from sequestration;

(xiv) A description of whether the offset project will permanently avoid or displace emissions of carbon dioxide. If a project only temporarily sequesters carbon, an indication of the duration of sequestration or storage;

(xv) A description of the amount of funding the applicant will provide for each offset project it proposes;

(xvi) If the applicant anticipates that a project will have funding sources in addition to itself, identification to the sources of those funds, the amount of other funding that is required to implement a project , the amount of funds other parties have committed, and the risks of other funds not being available;

(xvii) If the applicant proposes that a project will have funding sources in addition to itself, a description of how ownership of the offsets will be allocated among the several funding sources;

(xviii) A copy of the instrument by which the certificate holder will transfer all the offsets to the Council for it to hold in trust;

(xix) A description of a transparent and replicable methodology for the applicant's monitoring and evaluation plan and for an independent verification plan, including (1) procedures the applicant and the independent entity will employ, (2) how the applicant will assure funds for ongoing monitoring, evaluation and verification, (3) the time frame and frequency over which the applicant will conduct monitoring and evaluation and over which the independent entity will conduct verification, including the frequency of site visits, if applicable, (4) the reporting procedures and guidelines for the plans, and (5) whether the applicant has identified the independent entity that will perform the verification;

(xx) The monitoring and evaluation plan and the verification plan shall identify the data needs and data quality with regard to accuracy, comparability, completeness, and validity. It shall include methodologies to be use for data collection, monitoring, storage, reporting and management, including quality assurance and quality control provisions. It shall provide complete calculations used to calculate and estimate carbon dioxide emissions from activity within the project boundary. It shall show any formulae and assumptions the applicant used to calculate offset project leakage;

(xxi) A description of reasonably likely, significant undesirable long-term environmental impacts from the implementation of an offset project; and

(L) If the applicant elects to comply with the applicable carbon dioxide emissions standard by using the monetary path under OAR 345-024-0560(3), OAR 345-024-0600(3) or OAR 345-024-0630(2), the applicant shall include:

(i) A statement of the applicant's election to use the monetary path;

(ii) The amount of carbon dioxide reduction, in tons, for which the applicant is taking credit by using the monetary path;

(iii) The qualified organization to whom the applicant will provide offset funds and funds for the cost of selecting and contracting for offsets. The applicant shall include evidence that the

organization meets the definition of a qualified organization under OAR 345-001-0010. The applicant may identify an organization that has applied for, but has not received, an exemption from federal income taxation, but the Council shall not find that the organization is a qualified organization unless the organization is exempt from federal taxation under section 501(c)(3) of the Internal Revenue Code as amended and in effect on December 31, 1996; and

(iv) A statement of whether the applicant intends to provide a bond or letter of credit to secure the funds it must provide to the qualified organization or whether it requests the option of providing either a bond or a letter of credit.

CARBON DIOXIDE EMISSIONS

Does not apply.

EXHIBIT Z

COOLING TOWER

If the proposed facility has an evaporative cooling tower, information about the cooling tower plume, including:

(A) The predicted size and frequency of occurrence of a visible plume and an assessment of its visual impact;

(B) The predicted locations and frequency of occurrence of ice formation on surfaces and ground level fogging and an assessment of significant potential adverse impacts, including, but not limited to, traffic hazards on public roads;

(C) The predicted locations and rates of deposition of solids released from the cooling tower (cooling tower drift) and an assessment of significant potential adverse impacts to soils, vegetation and other land uses;

(D) Any measures the applicant proposes to reduce adverse impacts from the cooling tower plume or drift;

(E) The assumptions and methods used in the plume analysis; and

(F) The applicant's proposed monitoring program, if any, for cooling tower plume impacts;

COOLING TOWER

Does not apply.

EXHIBIT AA

ELECTRIC TRANSMISSION LINE

If the proposed facility includes an electric transmission line:

(A) Information about the expected electric and magnetic fields, including:

(i) The distance in feet from the proposed center line of each proposed transmission line to the edge of the right-of-way;

(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;

(iii) The approximate distance in feet from the proposed center line to each structure identified in (A);

(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;

(v) Any measures the applicant proposes to reduce electric or magnetic field levels;

(vi) The assumptions and methods used in the electric and magnetic field analysis, including the current in amperes on each proposed transmission line; and

(vii) The applicant's proposed monitoring program, if any, for actual electric and magnetic field levels; and

(B) An evaluation of alternate methods and costs of reducing radio interference likely to be cause by the transmission line in the primary reception area near interstate, U.S. and state highways;

In its Project Order dated October 16, 2006, the Department expanded upon the requirements of Exhibit AA as follows:

> All paragraphs apply to any transmission line, regardless of size, that is a related or supporting facility, including collector lines.

ELECTRIC TRANSMISSION LINES

Applicant has completed its new facility layout and is in the process of completing the design of the corresponding transmission system. This Exhibit AA will be amended upon re-design completion.

EXHIBIT BB

OTHER INFORMATION

Any other information that the Office requests in the project order;

In its Project Order dated October 16, 2006, the Department requested that Exhibit BB include:

> [I]nformation to support findings by the Council that the proposed facility complies with the Public Health and Safety Standards for Wind Energy Facilities (OAR 345-024-0010), the Siting Standards for Wind Energy Facilities (OAR 345-024-0015) and the Siting Standards for Transmission Lines (OAR 345-024-0090).

The Oregon Department of Energy received a comment letter raising a concern about the proximity of the project to the airspace of military training areas.

COMPLIANCE WITH STANDARDS

Applicant's expertise and the potential environmental impacts from the project are addressed in Exhibits D and P, respectively. The Applicant proposes to limit creation of artificial habitat for raptors or raptor prey by graveling of the area around turbine foundations, and modern turbines and towers are designed to minimize perching opportunities. Although there will be transformers installed at the base of each turbine, they provide little height advantage over natural perching locations, and are not expected to prove to be attractions to raptors. The area around transformer bases will also be graveled to reduce use by prey species.

The proposed facility is sited entirely on private property, much of which is posted against public access. The Applicant proposes to add additional postings, monitor for unauthorized access, and add locked gates on any project roadways that are regularly used for unauthorized trespass. Doors into turbine towers will be locked except when they are in use by project personnel, and there are no exterior ladders providing access to towers or turbine nacelles.

The Applicant proposes to install modern horizontal axis wind turbines and tubular towers that are commercially manufactured, and that meet the international standards for wind turbines. These include standards for safety of wind turbine generator systems (IEC 61400-1) and for turbine blade structural testing (IEC 61400-23) developed by Technical Committee-88 of the International Electrotechnical Commission. These standards specify requirements for wind turbine safety, including design, installation, maintenance, and operation, and address control and protection mechanisms, internal electrical and mechanical systems, turbine towers and electrical interconnection equipment. Facility transmission lines and electric fields and induced currents are discussed in Exhibit AA.

The Applicant proposes to place no advertising in the facility, although the logos of the transformer, turbine and tower manufacturers may appear on the equipment; signs are expected to be limited to facility and manufacturer identification, and those required by law or for health and safety reasons, such as emergency contact information, public access restrictions, and project

speed limits. The Applicant proposes to install only the external lighting required by the Federal Aviation Administration or Oregon Department of Transportation.

MILITARY AVIATION AIRSPACE

Applicant has contacted the Department of the Navy, Naval Air Station Whidbey Island, with respect to the concerns it raised about the possibility that turbine placement might interfere with low altitude Military Training Routes.

Applicant and the Navy are cooperating in the exchange of mapping data, and will continue to cooperate throughout facility re-design.

EXHIBIT CC

STATE STATUTES, ADMINISTRATIVE RULES, AND LOCAL ORDINANCES

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.

OTHER STATUTES, RULES AND ORDINANCES

Citation	Agency
Plant Conservation Biology Program ORS Chapter 564, OAR Chapter 603, Division 73.	Oregon Department of Agriculture

The Oregon Department of Agriculture (ODA) provides technical review and recommendations regarding compliance with the Council's threatened and endangered species standard (OAR 345-022-0070) as it relates to plant species. OAR 603-073-0070 contains the state list of endangered and threatened plant species. OAR 603-073-0080 gives ODA the authority to designate candidate plants. State-listed threatened or endangered plant species and candidates for state listing that may be affected by the proposed facility are addressed in Exhibit Q.

Noise Control Regulations ORS 467.020, ORS 467.030, OAR Chapter 340, division 35.	Department of Environmental Quality

The proposed facility must comply with the noise control regulations applicable to wind energy facilities. The requirement is incorporated in the general standard of review, OAR 345-022-000. Please see Exhibit X.

Citation	Agency
Hazardous Materials	Department of Environmental Quality

ORS Chapters 465 and 466, OAR Chapter 340, divisions 100 through 122.

The proposed facility must comply with DEQ regulations concerning the use, cleanup and disposal of hazardous materials. The requirement is incorporated in the general standard of review, OAR 345-022-000. Please see Exhibit G.

Wildlife Policy	Oregon Department of Fish and Wildlife

ORS Chapter 496, OAR Chapter 635, Division 415.

The OAR classifies habitat into six categories and establishes a mitigation goal for each category. Please see Exhibit P.

Threatened and Endangered Species Policy	Oregon Department of Fish and Wildlife

ORS Chapter 496, OAR Chapter 635, Division 100.

The OAR provides authority for adoption of the state sensitive species list and the Wildlife Diversity Plan and contains the state list of threatened and endangered wildlife species. Please see Exhibit Q.

Attachment A-1

AFFIDAVIT AS TO TRUTH AND ACCURACY

State of New York)
) ss:
County of New York)

I, Christopher McCallion, being first duly sworn, depose and say as follows:

1. I am the Executive Vice President and Chief Financial Officer of Caithness Shepherds Flat, LLC, a Delaware limited liability company and am authorized to act on behalf of Caithness Shepherds Flat, LLC.

2. Caithness Shepherds Flat, LLC is submitting this Application for Site Certificate for the Shepherds Flat Wind Facility. To the best of my knowledge and belief, the information contained in this Application is true and accurate.

CAITHNESS SHEPHERDS FLAT, LLC

By: _____
Christopher McCallion
Executive Vice President
and Chief Financial Officer

SUBSCRIBED AND SWORN to me this 26th day of January, 2007.

_____

GAIL M. CONBOY
Notary Public, State of New York
No. 4964579
Qualified in New York County
Commission Expires 4/2/10

CAITHNESS SHEPHERDS FLAT, LLC

WRITTEN CONSENT OF MANAGER

The undersigned, Caithness Energy, L.L.C., a Delaware limited liability company, being the manager (the "Manager") of Caithness Shepherds Flat, LLC, a Delaware limited liability company (the "Company"), does hereby adopt, by written consent, the following resolution:

RESOLVED, that the Company is hereby authorized to file an Application for a Site Certificate for the Shepherds Flat Wind Farm with the Oregon Energy Facility Siting Council;

RESOLVED FURTHER, that the Company's Business Manager, or any of its officers are hereby authorized to execute and deliver on behalf of the Company any instrument they may deem necessary or appropriate in furtherance of the foregoing resolution, as conclusively evidenced by their signature on such instrument, and that all actions heretofore taken on behalf of the Company in furtherance of said purpose be, and they hereby are, ratified and approved.

IN WITNESS WHEREOF, the undersigned Manager has adopted this consent resolution effective as of January 24, 2007.

Manager:

Caithness Energy, L.L.C.

By: _____
Christopher McCallion
Executive Vice President
and Chief Financial Officer

Secretary of State
Corporation Division
255 Capitol Street NE, Suite 151
Salem, OR 97310-1327

Phone:(503)986-2200
Fax:(503)378-4381
www.filinginoregon.com

Registry Number: 390384-92
Type: FOREIGN LIMITED LIABILITY COMPANY

Next Renewal Date: 10/20/2007

CAITHNESS SHEPHERDS FLAT, LLC
C/O CAITHNESS CORPORATION
565 FIFTH AVE 29TH FL
NEW YORK NY 10017

Acknowledgment Letter

The document you submitted was recorded as shown below. Please review and verify the information listed for accuracy.

If you have any questions regarding this acknowledgement, contact the Secretary of State, Corporation Division at (503)986-2200. Please refer to the registration number listed above. A copy of the filed documentation may be ordered for a fee of $5.00. Submit your request to the address listed above or call (503)986-2317 with your Visa or MasterCard number.

Document
APPLICATION FOR AUTHORITY

Filed On
10/20/2006

Jurisdiction
DELAWARE

Name
CAITHNESS SHEPHERDS FLAT, LLC

Principal Place of Business
C/O CAITHNESS CORPORATION
565 FIFTH AVE 29TH FL
NEW YORK NY 10017

Registered Agent
CORPORATION SERVICE COMPANY
285 LIBERTY ST NE
SALEM OR 97301

Mailing Address
C/O CAITHNESS CORPORATION
565 FIFTH AVE 29TH FL
NEW YORK NY 10017

JODFOR
ACK
10/20/2006

Phone: (503) 986-2200
Fax: (503) 378-4381

Application for Authority to Transact—Foreign Limited Liability Company

Secretary of State
Corporation Division
255 Capitol St. NE, Suite 151
Salem, OR 97310-1327
FilingInOregon.com

FILED
OCT 20 2006
OREGON
SECRETARY OF STATE

REGISTRY NUMBER: 390384-92
For office use only

In accordance with Oregon Revised Statute 192.410-192.490, the information on this application is public record. We must release this information to all parties upon request and it will be posted on our website. For office use only

Please Type or Print Legibly in **Black** Ink. Attach Additional Sheet if Necessary.

1) **NAME** CAITHNESS SHEPHERDS FLAT, LLC

NOTE: (Must contain the words "Limited Liability Company" or the abbreviations "LLC" or "L.L.C.") Must be identical to the name on the Certificate of Existence. See #3.

2) **STATE OR COUNTRY OF ORGANIZATION**
DELAWARE
Date of Organization: JUNE 29, 2006

3) **CERTIFICATE OF EXISTENCE**
☐ An original certificate of existence, current within 60 days of delivery to this Division, authenticated by the official having custody of the organization, is attached.

4) **DURATION** (Please check one.)
☐ Latest date upon which the Limited Liability Company is to dissolve is _____
☑ Duration shall be perpetual.

5) **THIS FOREIGN LIMITED LIABILITY COMPANY SATISFIES THE REQUIREMENTS OF ORS 63.714(3).**

6) **NAME OF OREGON REGISTERED AGENT**
Corporation Service Company

7) **ADDRESS OF OREGON REGISTERED AGENT** (Must be an Oregon Street Address, which is identical to the registered agent's business office.)
285 Liberty Street, NE
Salem, OR 97301

8) **ADDRESS OF PRINCIPAL OFFICE OF THE BUSINESS**
c/o Caithness Corporation
565 Fifth Avenue, 29th floor
New York, NY 10017

9) **ADDRESS WHERE THE DIVISION MAY MAIL NOTICES**
c/o Caithness Corporation
565 Fifth Avenue, 29th floor
New York, NY 10017

10) **IF THIS LIMITED LIABILITY COMPANY IS NOT MEMBER MANAGED, CHECK ONE BOX BELOW.**
☐ This limited liability company is managed by a single manager.
☐ This limited liability company is managed by multiple manager(s).

11) **EXECUTION** (At least one member or manager must sign.)

Signature	Printed Name	Title
Caithness Energy, L.L.C., its Member		
By:	Christopher McCallion	EVP and CFO

12) **CONTACT NAME** (To resolve questions with this filing.)
Gail Conboy

DAYTIME PHONE NUMBER (Include area code.)
212-921-9099

FEES

Required Processing Fee $50 Confirmation Copy (Optional) $5
Processing Fees are nonrefundable.
Please make check payable to "Corporation Division."
NOTE:
Fees may be paid with VISA or MasterCard. The card number and expiration date should be submitted on a separate sheet for your protection.

Delaware

The First State

FILED
OCT 20 2006
OREGON
SECRETARY OF STATE

I, HARRIET SMITH WINDSOR, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY "CAITHNESS SHEPHERDS FLAT, LLC" IS DULY FORMED UNDER THE LAWS OF THE STATE OF DELAWARE AND IS IN GOOD STANDING AND HAS A LEGAL EXISTENCE SO FAR AS THE RECORDS OF THIS OFFICE SHOW, AS OF THE TWENTIETH DAY OF OCTOBER, A.D. 2006.

AND I DO HEREBY FURTHER CERTIFY THAT THE SAID "CAITHNESS SHEPHERDS FLAT, LLC" WAS FORMED ON THE TWENTY-NINTH DAY OF JUNE, A.D. 2006.

AND I DO HEREBY FURTHER CERTIFY THAT THE ANNUAL TAXES HAVE NOT BEEN ASSESSED TO DATE.

SECRETARY'S OFFICE 1793 DELAWARE 1855

Harriet Smith Windsor

Harriet Smith Windsor, Secretary of State

4183429 8300

060963966

AUTHENTICATION: 5131445

DATE: 10-20-06

LIMITED LIABILITY COMPANY AGREEMENT OF CAITHNESS SHEPHERDS FLAT, LLC

LIMITED LIABILITY COMPANY AGREEMENT of CAITHNESS SHEPHERDS FLAT, LLC (the "***Company***") made as of June 29, 2006, by Caithness Energy, L.L.C., a Delaware limited liability company ("***Caithness***").

WHEREAS, Caithness authorized the execution of a certificate of formation of the Company and the filing thereof with the Secretary of State of Delaware for the purpose of forming the Company as a limited liability company pursuant to and in accordance with the Delaware Limited Liability Company Act, 6 *Del. C.* §§18-101, *et seq.*, as amended from time to time.

NOW, THEREFORE, in consideration of the agreements and obligations set forth herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Members (defined below) hereby agree as follows:

ARTICLE 1
DEFINED TERMS

Unless the context otherwise requires, the terms defined in this Article 1 shall, for the purposes of this Agreement, have the meanings herein specified.

Section 1.1 "***AAA***" has the meaning set forth in Section 16.1 hereof.

Section 1.2 "***Additional Members***" has the meaning set forth in Section 13.1 hereof.

Section 1.3 "***Additional Units***" has the meaning set forth in Section 13.1 hereof.

Section 1.4 "***Affiliate***" means with respect to a specified Person, any Person that directly or indirectly controls, is controlled by, or is under common control with, the specified Person. As used in this definition, the term "***control***" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a Person, whether through ownership of voting securities, by contract or otherwise.

Section 1.5 "***Agreement***" means this Limited Liability Company Agreement, as amended, modified, supplemented or restated from time to time.

Section 1.6 "***Capital Account***" means, with respect to any Unit Holder, the account maintained for such Unit Holder in accordance with the provisions of Section 4.4 hereof.

Section 1.7 "***Capital Contribution***" means, with respect to any Unit Holder, the aggregate amount of money and the initial Gross Asset Value of any property (other than money) contributed to the Company pursuant to Section 4.1 hereof with respect to the Units held by such Unit Holder. In the case of a Unit Holder that acquires an interest in the Company by virtue of an assignment in accordance with the terms of this Agreement, "***Capital Contribution***" has the meaning set forth in Section 4.4(a) hereof.

Section 1.8 "***Certificate***" means the certificate of formation and any and all amendments thereto and restatements thereof filed on behalf of the Company with the office of the Secretary of State of the State of Delaware pursuant to the Delaware Act.

Section 1.9 "***Code***" means the Internal Revenue Code of 1986, as amended from time to time, or any corresponding federal tax statute enacted after the date of this Agreement. A reference to a specific section (§) of the Code refers not only to such specific section but also to any corresponding provision of any federal tax statute enacted after the date of this Agreement, as such specific section or corresponding provision is in effect on the date of application of the provisions of this Agreement containing such reference.

Section 1.10 "***Company***" means Caithness Shepherds Flat, LLC, the limited liability company formed pursuant to the Delaware Act as ratified and governed by this Agreement.

Section 1.11 "***Covered Person***" means a Member, the Manager, any Affiliate of a Member or of the Manager, or any officer, director, shareholder, partner, member, employee, representative or agent of a Member or the Manager or their respective Affiliates, or of the Company or its Affiliates.

Section 1.12 "***Delaware Act***" means the Delaware Limited Liability Company Act, 6 *Del. C.* §§18-101, *et seq.*, as amended from time to time.

Section 1.13 "***Delaware Arbitration Act***" has the meaning set forth in Section 16.1 hereof.

Section 1.14 "***Depreciation***" means, for each Fiscal Year or other period, an amount equal to the depreciation, amortization or other cost recovery deduction allowable with respect to an asset for such Fiscal Year or other period; *provided, however*, that if the Gross Asset Value of an asset differs from its adjusted basis for federal income tax purposes at the beginning of such Fiscal Year or other period, Depreciation shall be an amount that bears the same ratio to such beginning Gross Asset Value as the federal income tax depreciation, amortization or other cost recovery deduction with respect to such asset for such Fiscal Year or other period bears to such beginning adjusted tax basis; and *provided further*, that if the federal income tax depreciation, amortization or other cost recovery deduction for such Fiscal Year or other period is zero, Depreciation shall be

determined with reference to such beginning Gross Asset Value using any reasonable method selected by the Manager.

Section 1.15 "***Fiscal Year***" means (a) the period commencing upon the formation of the Company and ending on December 31, 2006, (b) any subsequent twelve (12) month period commencing on January 1 and ending on December 31, or (c) any portion of the period described in clause (b) of this Section for which the Company is required to allocate Profits, Losses and other items of Company income, gain, loss or deduction pursuant to Article 8 hereof.

Section 1.16 "***Gross Asset Value***" means, with respect to any asset, such asset's adjusted basis for federal income tax purposes, except as follows:

(a) the initial Gross Asset Value of any asset contributed by a Member to the Company shall be the gross fair market value of such asset, as agreed to by the contributing Member and the Manager;

(b) the Gross Asset Values of all Company assets shall be adjusted to equal their respective gross fair market values, as determined by the Manager, as of the following times: (i) the acquisition of Additional Units in the Company by any existing Member or Additional Member in exchange for more than a *de minimis* Capital Contribution; (ii) the distribution by the Company to a Unit Holder of more than a *de minimis* amount of Company assets as consideration for an interest in the Company; and (c) the liquidation of the Company within the meaning of Treasury Regulation §1.704-1(b)(2)(ii)(g); *provided, however*, that adjustments pursuant to clause (i) and clause (ii) of this sentence shall be made only if the Manager reasonably determines that such adjustments are necessary or appropriate to reflect the relative economic interests of the Unit Holders in the Company; and

(c) the Gross Asset Value of any Company asset distributed to any Unit Holder shall be the gross fair market value of such asset on the date of distribution, as determined by the distributee Member and the Manager. If the Gross Asset Value of an asset has been determined or adjusted pursuant to subsection (a) or subsection (b) above, such Gross Asset Value shall thereafter be adjusted by the Depreciation taken into account with respect to such asset for purposes of computing Profits and Losses.

Section 1.17 "***Liquidating Trustee***" has the meaning set forth in Section 15.2 hereof.

Section 1.18 "***Majority Vote***" means the written approval of, or the affirmative vote by, Members holding a majority of the Units held by all of the Members.

Section 1.19 "***Manager***" means the Person designated by the Members in Section 6.1 hereof as the manager of the Company within the meaning of the Delaware Act and shall include a successor appointed pursuant to the provisions of this Agreement.

Section 1.20 "***Management Fee***" has the meaning set forth in Section 6.4 hereof.

Section 1.21 "***Member***" means any Person named as a member of the Company on Schedule A hereto and includes any Person admitted as an Additional Member pursuant to the provisions of this Agreement, and "***Members***" means two (2) or more of such Persons when acting in their capacities as members of the Company. For purposes of the Delaware Act, the Members shall constitute one (1) class or group of members.

Section 1.22 "***Net Cash Flow***" means, for each Fiscal Year or other period of the Company, the gross cash receipts of the Company from all sources, but excluding any amounts, such as gross receipts taxes, that are held by the Company as a collection agent or in trust for others or that are otherwise not unconditionally available to the Company, *less* all amounts paid by or for the account of the Company during the same Fiscal Year or other period (including, without limitation, payments of principal and interest on any Company indebtedness, payment of the Management Fee to the Manager pursuant to Section 6.4 hereof, expenses reimbursed to the Members under Section 5.2 hereof and expenses reimbursed to the Manager under Section 6.5 hereof), and *less* any amounts determined by the Manager to be necessary to provide a reasonable reserve for working capital needs or any other contingencies of the Company. Net Cash Flow shall be determined in accordance with the cash receipts and reimbursements method of accounting and otherwise in accordance with generally accepted accounting principles, consistently applied. Net Cash Flow shall not be reduced by depreciation, amortization, cost recovery deductions, depletion, similar allowances or other non-cash items, but shall be increased by any reduction of reserves previously established.

Section 1.23 "***Person***" includes any individual, corporation, association, partnership (general or limited), joint venture, trust, estate, limited liability company, or other legal entity or organization.

Section 1.24 "***Profits***" and "***Losses***" means, for each Fiscal Year, an amount equal to the Company's taxable income or loss for such Fiscal Year, determined in accordance with §703(a) of the Code (but including in taxable income or loss, for this purpose, all items of income, gain, loss or deduction required to be stated separately pursuant to §703(a)(1) of the Code), with the following adjustments:

(a) any income of the Company exempt from federal income tax and not otherwise taken into account in computing Profits or Losses pursuant to this definition shall be added to such taxable income or loss;

(b) any expenditures of the Company described in §705(a)(2)(B) of the Code (or treated as expenditures described in §705(a)(2)(B) of the Code pursuant to Treasury Regulation §1.704-1(b)(2)(iv)(i)) and not otherwise taken into account in computing Profits or Losses pursuant to this definition shall be subtracted from such taxable income or loss;

(c) in the event the Gross Asset Value of any Company asset is adjusted in accordance with subsection (b) or subsection (c) of the definition of "Gross Asset Value" above, the amount of such adjustment shall be taken into account as gain or loss from the disposition of such asset for purposes of computing Profits or Losses;

(d) gain or loss resulting from any disposition of any asset of the Company with respect to which gain or loss is recognized for federal income tax purposes shall be computed by reference to the Gross Asset Value of the asset disposed of, notwithstanding that the adjusted tax basis of such asset differs from its Gross Asset Value; and

(e) in lieu of the depreciation, amortization and other cost recovery deductions taken into account in computing such taxable income or loss, there shall be taken into account Depreciation for such Fiscal Year or other period, computed in accordance with the definition of "Depreciation" above.

Section 1.25 "***Tax Matters Member***" has the meaning set forth in Section 11.1 hereof.

Section 1.26 "***Treasury Regulations***" means the income tax regulations, including temporary regulations, promulgated under the Code, as such regulations may be amended from time to time (including corresponding provisions of succeeding regulations).

Section 1.27 "***Unit***" means an interest in the Company representing such fractional part of the interest of all Unit Holders pursuant to this Agreement as is equal to the quotient of one (1) divided by the total number of Units.

Section 1.28 "***Unit Holder***" means any Person who holds one (1) or more Units, regardless of whether such Person is a Member and regardless of whether such Units were initially acquired by such Person from the Company or by assignment from another Unit Holder.

ARTICLE 2
FORMATION AND TERM

Section 2.1 *Formation*.

(a) The Manager, being the sole Member, hereby acknowledges and ratifies that: (i) Aislinn Smith was authorized by the Manager to execute the Certificate and cause it to be filed, and is an authorized person within the meaning of the Delaware Act, (ii) on June 29, 2006, Aislinn Smith executed the Certificate and caused it to be filed on June 29, 2006 with the Delaware Secretary of State and upon such filing the powers of Gail Conboy ceased and the Manager thereupon became and is hereby designated as an authorized person within the meaning of the Delaware Act.

(b) The name and mailing address of each Unit Holder shall be listed on Schedule A attached hereto. The Manager shall update Schedule A from time to time as necessary to reflect accurately the information therein. Any amendment or revision to Schedule A made in accordance with this Agreement shall not be deemed an amendment to this Agreement. Any reference in this Agreement to Schedule A shall be deemed to be a reference to Schedule A as amended and in effect from time to time.

Section 2.2 Name. The name of the Company to be formed hereunder is Caithness Shepherds Flat, LLC. The business of the Company may be conducted upon compliance with all applicable laws under any other name designated by the Manager.

Section 2.3 Term. The Company shall remain in existence in perpetuity, unless dissolved in accordance with Section 15.1.

Section 2.4 Registered Agent and Office. The Company's registered agent and office in Delaware shall be Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, New Castle County, Delaware 19808. At any time, the Manager may designate another registered agent and/or registered office.

Section 2.5 Principal Place of Business. The principal place of business of the Company shall be c/o Caithness Corporation at 565 Fifth Avenue, New York, New York 10017. Upon ten (10) days' notice to the Members, the Manager may change the location of the Company's principal place of business.

Section 2.6 Qualification in Other Jurisdictions. The Manager shall cause the Company to be qualified, formed or registered under assumed or fictitious name statutes or similar laws in any jurisdiction in which the Company transacts business. The Manager, as an authorized person within the meaning of the Delaware Act, shall execute, deliver and file any certificates (and any amendments and/or restatements thereof) necessary for the Company to qualify to do business in a jurisdiction in which the Company may wish to conduct business.

ARTICLE 3
PURPOSE AND POWERS OF THE COMPANY

Section 3.1 Purpose. The Company is formed for the object and purpose of, and the nature of the business to be conducted and promoted by the Company is, engaging in any lawful act or activity for which limited liability companies may be formed under the Delaware Act and engaging in any and all activities necessary or incidental to the foregoing.

Section 3.2 *Powers of the Company*.

(a) The Company shall have the power and authority to take any and all actions necessary, appropriate, proper, advisable, incidental or convenient to or for the furtherance of the purpose set forth in Section 3.1, including, but not limited to, the power:

(i) to conduct its business, carry on its operations and have and exercise the powers granted to a limited liability company by the Delaware Act in any state, territory, district or possession of the United States, or in any foreign country that may be necessary, convenient or incidental to the accomplishment of the purpose of the Company;

(ii) to acquire by purchase, lease, contribution of property or otherwise, own, hold, operate, maintain, finance, improve, lease, sell, convey, mortgage, transfer, demolish or dispose of any real or personal property that may be necessary, convenient or incidental to the accomplishment of the purpose of the Company;

(iii) to enter into, perform and carry out contracts of any kind, including, without limitation, contracts with the Manager, any Member, any Affiliate thereof, or any agent of the Company necessary to, in connection with, convenient to, or incidental to the accomplishment of the purpose of the Company;

(iv) to purchase, take, receive, subscribe for or otherwise acquire, own, hold, vote, use, employ, sell, mortgage, lend, pledge, or otherwise dispose of, and otherwise use and deal in and with, shares or other interests in or obligations of domestic or foreign corporations, associations, general or limited partnerships, trusts, limited liability companies, or individuals or direct or indirect obligations of the United States or of any government, state, territory, governmental district or municipality or of any instrumentality of any of them;

(v) to lend money for its proper purpose, to invest and reinvest its funds, to take and hold real and personal property for the payment of funds so loaned or invested;

(vi) to sue and be sued, complain and defend, and participate in administrative or other proceedings, in its name;

(vii) to elect and designate one (1) or more managers of the Company in accordance with Section 6.1 hereof and to authorize any such Manager to appoint employees, officers and agents of the Company, and define their duties and fix their compensation;

(viii) to indemnify any Person in accordance with the Delaware Act;

(ix) to cease its activities and cancel its Certificate;

(x) to negotiate, enter into, renegotiate, extend, renew, terminate, modify, amend, waive, execute, acknowledge or take any other action with respect to any lease, contract or security agreement in respect of any assets of the Company;

(xi) to borrow money and issue evidences of indebtedness, and to secure the same by a mortgage, pledge or other line on the assets of the Company;

(xii) to pay, collect, compromise, litigate, arbitrate or otherwise adjust or settle any and all other claims or demands of or against the Company or to hold such proceeds against the payment of contingent liabilities; and

(xiii) to make, execute, acknowledge and file any and all documents or instruments necessary, convenient or incidental to the accomplishment of the purpose of the Company.

(b) The Members may, by a Majority Vote, authorize any Person (including, without limitation, the Manager) to enter into and perform any other obligation on behalf of the Company.

(c) The Company may merge with, or consolidate into, another Delaware limited liability company or other business entity (as defined in Section 18-209(a) of the Delaware Act) upon a Majority Vote.

ARTICLE 4
CAPITAL CONTRIBUTIONS, UNITS, CAPITAL ACCOUNTS AND ADVANCES

Section 4.1 *Capital Contributions*.

(a) Each Unit Holder has contributed or is deemed to have contributed to the capital of the Company certain assets.

(b) No Unit Holder shall be required to make any additional capital contribution to the Company. However, a Unit Holder may make additional capital contributions to the Company with the Manager's consent.

Section 4.2 *Units*. A Unit Holder's interest in the Company shall be represented by the "Unit" or "Units" held by such Unit Holder. Each Unit Holder's respective Units

shall be set forth on Schedule A attached hereto. Each Unit Holder hereby agrees that its interest in the Company and in its Units shall for all purposes be personal property. A Unit Holder shall have no interest in specific Company property.

Section 4.3 *Status of Capital Contributions*.

(a) Except as otherwise provided in this Agreement, the amount of a Unit Holder's Capital Contributions may be returned to it, in whole or in part, at any time, but only with the Manager's consent. Any such returns of Capital Contributions shall be made to all Unit Holders in proportion to the number of Units then held by each Unit Holder. Notwithstanding the foregoing, no return of a Unit Holder's Capital Contributions shall be made hereunder if such distribution would violate applicable state law. Under circumstances requiring a return of any Capital Contribution, no Unit Holder shall have the right to demand or receive property other than cash, except as may be specifically provided in this Agreement.

(b) No Unit Holder shall receive any interest, salary or drawing with respect to its Capital Contributions or its Capital Account or for services rendered on behalf of the Company or otherwise in its capacity as Unit Holder, except as otherwise specifically provided in this Agreement.

(c) Except as otherwise provided herein and by applicable state law, the Members shall be liable only to make their capital contributions pursuant to Section 4.1 hereof, and no Member shall be required to lend any funds to the Company or, after a Member's Capital Contributions have been fully paid pursuant to Section 4.1 hereof, to make any additional capital contributions to the Company. No Unit Holder shall have any personal liability for the repayment of any Capital Contribution of any other Member.

Section 4.4 *Capital Accounts*.

(a) An individual Capital Account shall be established and maintained for each Unit Holder. The initial amount of each Unit Holder's respective Capital Account shall be the aggregate capital account balances held by the Unit Holder in the interests contributed to the Company at the time of contribution. The original Capital Account established for any Unit Holder who acquires Units in the Company by virtue of an assignment in accordance with the terms of this Agreement shall be in the same amount as, and shall replace, the Capital Account of the assignor of such interest, and, for purposes of this Agreement, such Unit Holder shall be deemed to have made the Capital Contributions made by the assignor of such interest (or made by such assignor's predecessor in interest). To the extent such Unit Holder acquires less than all of the Units of the assignor, the original Capital Account of such Unit Holder and its Capital Contributions shall be in proportion to the Units it acquires, and the Capital Account of the assignor who retains Units in the Company, and the amount of its Capital Contributions, shall be reduced in proportion to the Units it retains.

(b) The Capital Account of each Unit Holder shall be maintained in accordance with the following provisions:

(i) to such Unit Holder's Capital Account there shall be credited such Unit Holder's Capital Contributions, such Unit Holder's distributive share of Profits and the amount of any Company liabilities that are assumed by such Unit Holder or that are secured by any Company assets distributed to such Unit Holder;

(ii) to such Unit Holder's Capital Account there shall be debited the amount of cash and the Gross Asset Value of any Company assets distributed to such Unit Holder pursuant to any provision of this Agreement, such Unit Holder's distributive share of Losses and the amount of any liabilities of such Unit Holder that are assumed by the Company or that are secured by any property contributed by such Unit Holder to the Company; and

(iii) in determining the amount of any liability for the purpose of clause (ii), there shall be taken into account §752(c) of the Code and any other applicable provisions of the Code and the Treasury Regulations.

Section 4.5 *Advances*. If any Unit Holder shall advance any funds to the Company in excess of its Capital Contributions, the amount of such advance shall neither increase its Capital Account nor entitle it to any increase in its share of the distributions of the Company. The amount of any such advance shall be a debt obligation of the Company to such Unit Holder and shall be repaid to it by the Company with interest at a rate equal to the lesser of (i) 10% and (ii) the maximum rate permitted by applicable law, and upon such other terms and conditions as shall be mutually determined by such Unit Holder and the Manager. Any such advance shall be payable and collectible only out of Company assets, and the other Unit Holders shall not be personally obligated to repay any part thereof. No Person who makes any nonrecourse loan to the Company shall have or acquire, as a result of making such loan, any direct or indirect interest in the profits, capital or property of the Company, other than as a creditor.

Section 4.6 *Certificates*. The Company may issue with the Manager's consent one or more certificates (each a "***Certificate***") in the name of such Member evidencing the number of Units issued to such Member. Upon the transfer of a Unit in accordance with the provisions of this Agreement, the Company shall issue replacement Certificates to the Unit Holder. The Manager shall maintain a register of all Units and Certificates held by Members and Unit Holders. All new and replacement Certificates shall contain a legend as follows:

The Units represented by this Certificate are subject to the terms of that certain Limited Liability Agreement of Caithness Shepherds Flat, LLC, dated as of June 29, 2006. Copies of such agreements are on file at the

Company's principal offices and, upon written request to the Manager of the Company, a copy thereof will be mailed or otherwise provided without charge within five (5) days of receipt of such request to appropriately interested persons.

Section 4.7 Lost, Stolen or Destroyed Certificates. The Company shall issue a new Certificate in place of any Certificate previously issued if the registered holder of the Certificate (i) makes proof by affidavit that a previously issued Certificate has been lost, stolen, defaced or destroyed, (ii) requests the issuance of a new Certificate before the Company has notice that the Units evidenced by such Certificate have been acquired by a purchaser for value in good faith and without notice of an adverse claim and (iii) if required by the Company, delivers to the Company against any claim that may be made on account of the alleged loss, destruction or theft of the Certificate. The Company shall be entitled to treat each registered holder of Units as a Member or Unit Holder of the Company and, accordingly, shall not be required to recognize any equitable or other claim or interest in or with respect to the Units on the part of any other Person, regardless of whether it has actual or other notice thereof.

ARTICLE 5
MEMBERS

Section 5.1 Powers of Members. The Members shall have the power to exercise any and all rights or powers granted to the Members pursuant to the express terms of this Agreement. The Members shall also have the power to authorize the Manager, by a Majority Vote, to possess and exercise any right or power not already vested in the Manager pursuant to Section 6.3 or any other provision of this Agreement. In addition to the foregoing, the Members shall have the power to exercise any and all other rights or powers of the Company and do all lawful acts and things as are not by the Delaware Act or this Agreement directed or required to be exercised or done by the Manager, *provided however*, that no Member shall have authority to bind the Company except to the extent and in the manner expressly provided in this Agreement.

Section 5.2 Reimbursements. The Company shall reimburse the Members for all ordinary and necessary out-of-pocket expenses incurred by the Members on behalf of the Company subject to the Manager's determination and prior written approval as to the type and amount of expenses that may be reimbursed to a Member, which determination and approval shall be made in its sole discretion and shall be binding and conclusive. Such reimbursement shall be treated as an expense of the Company that shall be deducted in computing the Net Cash Flow and shall not be deemed to constitute a distributive share of Profits or a distribution or return of capital to any Member.

Section 5.3 Partition. Each Member waives, until termination of the Company, any and all rights that it may have to maintain an action for partition of the Company's property.

Section 5.4 *Resignations; Retirements*. A Member may not resign from the Company without the written consent of the Manager. The Company may recover damages for breach of this Section 5.4 if any Member violates this Section 5.4 and may offset the Company's damages against any amount owed to a resigning Member for distributions.

ARTICLE 6
MANAGER AND OFFICERS

Section 6.1 *Designation of Manager*. The management of the Company's business shall be vested, to the extent provided in Section 6.3 hereof, in a Manager designated by a Majority Vote. The Manager may be but need not be a Member. Caithness shall be the initial Manager, and Caithness hereby accepts and agrees to be bound by the terms and conditions of this Agreement. In the event that Caithness ceases to be the Manager of the Company as provided in this Agreement, subject to the admission of an Additional Member in accordance with Section 13.1 hereof, a successor Manager shall be elected by a Majority Vote. Such successor Manager shall execute an instrument approved by a Majority Vote accepting and agreeing to the terms and conditions of this Agreement. The Manager may assign the duties and powers of this Agreement to a qualified affiliate of Caithness with the Company's consent, provided that such consent shall not be unreasonably withheld.

Section 6.2 *Manager as Agent*. The Manager, to the extent of its powers set forth in Section 6.3 hereof, is an agent of the Company for the purpose of the Company's business, and the actions of the Manager taken in accordance with such powers shall bind the Company.

Section 6.3 *Powers of the Manager*.

(a) Except for situations in which the approval by a Majority Vote is required by nonwaivable provisions of applicable law, and subject to the provisions of Section 6.3(b), the powers of the Company shall be exercised only by or under the authority of, and the business and affairs of the Company shall be managed solely under the direction of, the Manager, and the Manager shall make all decisions and take all actions for the Company not otherwise provided for in this Agreement, including, without limitation, the following:

(i) entering into, making, and performing contracts, agreements, and other undertakings binding the Company that may be necessary, appropriate, or advisable in furtherance of the purposes of the Company and making all decisions and waivers thereunder;

(ii) opening and maintaining bank and investment accounts and arrangements, drawing checks and other orders for the payment of money, and designating individuals with authority to sign or give instructions with respect to those accounts and arrangements;

(iii) maintaining in good order and insuring the assets of the Company;

(iv) collecting sums due the Company;

(v) to the extent that funds of the Company are available therefor, paying debts and obligations of the Company;

(vi) acquiring, utilizing for Company purposes, disposing of, pledging, granting a security interest in, or otherwise encumbering any asset of the Company;

(vii) borrowing money or otherwise committing the credit of the Company for Company activities and voluntary prepayments or extensions of debt, or guaranteeing any indebtedness;

(viii) selecting, removing, and changing the authority and responsibility of lawyers, accountants, and other advisers and consultants;

(ix) obtaining insurance for the Company;

(x) determining allocations of income, gain, loss, deduction and credit to each Member's Capital Account, and the amount, timing and making of distributions of Company cash and other property, in each case as provided in this Agreement;

(xi) forming other limited or general partnerships, joint ventures, limited liability companies, corporations or other relationships that the Manager deems appropriate and contributing to such other entities or ventures such assets of the Company as are necessary in connection therewith;

(xii) controlling other matters affecting the rights and obligations of the Company, including settlement of any litigation, incurring of legal expenses, and settling claims and suits;

(xiii) prior to distribution to the Members in accordance with Article 9, investing and reinvesting Company funds in a manner to be determined by the Manager in the exercise of its reasonable judgment;

(xiv) otherwise exercising management powers over the business and affairs of the Company; and

(xv) possessing and exercising any additional right or power granted to the Manager pursuant to the express terms of this Agreement or vested in the Manager by the Members pursuant to a Majority Vote.

(b) Notwithstanding the provisions of Section 6.3(a), the Company may not do any of the following without the approval of the Members by a Majority Vote:

(i) sell, lease, exchange or otherwise dispose of (other than by way of a pledge, mortgage, deed of trust or trust indenture) all or substantially all of the Company's property and assets (with or without good will), other than in the usual and regular course of the Company's business;

(ii) be a party to a merger or an acquisition; and

(iii) amend or restate this Agreement.

(c) In the event that the Manager is unsure of the application of any provision of this Agreement or any other agreement relating to the transactions contemplated hereby, the Manager may request and rely upon instructions of the Members (which instructions shall be adopted by the Members by a Majority Vote); *provided, however*, that if the Manager shall not have received instructions from the Members pursuant to its request within twenty (20) days after the date of such request, until instructed otherwise, the Manager may, but shall be under no duty to, take or refrain from taking such action as it shall deem advisable in the best interests of the Company and the Members.

Section 6.4 Fees.

(a) The Company shall pay annually to the Manager, as compensation for its services in the management and administration of the Company, a fee (the "***Management Fee***"), to be determined by majority vote until such time as the Manager ceases to be a manager of the Company or the Company is dissolved.

(b) The Management Fee shall be payable by the Company within thirty (30) days after demand therefor by the Manager, which demand shall be submitted by the Manager to all Members annually no later than sixty (60) days following December 1 of each year during the term of the Company.

Section 6.5 Reimbursement. In addition to the fees payable to the Manager pursuant to Section 6.4 hereof, the Company shall reimburse the Manager for all ordinary and necessary out-of-pocket expenses incurred by the Manager on behalf of the Company. Such reimbursement shall be treated as an expense of the Company that shall be deducted in computing the Net Cash Flow and shall not be deemed to constitute a distributive share of Profits or a distribution or return of capital to the Manager.

Section 6.6 *Removal of Manager*.

(a) The Manager may be removed with or without cause by a Majority Vote.

(b) Any removal of the Manager shall become effective on such date as may be specified by the Members voting in favor thereof. Should a Manager that is removed also be a Member, such Member shall continue to participate in the Company as a Member and shall share in the Profits, Losses and Net Cash Flow in the same ratios, as provided in Articles 8 and 9 hereof, as were applicable to such Member before its removal as Manager.

Section 6.7 *Resignation of Manager*. A Manager may resign from its position as a Manager at any time upon not less than twenty (20) days' prior written notice to all of the Members.

Section 6.8 *Officers*.

(a) The Manager may, from time to time, designate one or more Persons to be officers of the Company and shall initially designate James D. Bishop, Sr. as Chairman and Chief Executive Officer, James D. Bishop, Jr. as Vice Chairman, Leslie J. Gelber as President and Chief Operating Officer, Christopher McCallion as Executive Vice President and Chief Financial Officer, Kenneth Hoffman as Senior Vice President, Ross Ain as Senior Vice President, Barbara Bishop-Gollan as Senior Vice President, James R. Pagano as Senior Vice President - Development, David Casale as Vice President and Controller, John McNamara as Vice President - Finance, Timothy Prenger, Vice President - Engineering, Joseph Greco as Vice President – Western Region, and Gail Conboy as Assistant Secretary. No officer need be a resident of the State of Delaware, a Member or a Manager. Any officers so designated shall have such authority and perform such duties as the Manager may, from time to time, delegate to them, subject to the limitations of Section 6.3(b) of this Agreement. The Manager may assign titles to particular officers. Unless the Manager decides otherwise, if the title is one commonly used for officers of a business corporation formed under the General Corporation Law of the State of Delaware, the assignment of such title shall constitute the delegation to such officer of the authority and duties that are normally associated with that office, subject to (i) any specific delegation of authority and duties made to such officer by the Manager, or (ii) the limitations set forth in Section 6.3 hereof. Each officer shall hold office until his successor shall be duly designated and shall qualify or until his death or until he shall resign or shall have been removed in the manner hereinafter provided. Any number of offices may be held by the same Person. The salaries or other compensation, if any, of the officers and agents of the Company shall be fixed from time to time by the Manager.

(b) Any officer may resign as such at any time. Such resignation shall be made in writing and shall take effect at the time specified therein, or if no time be specified, at the time of its receipt by the Manager. The acceptance of a resignation shall not be necessary to make it effective, unless expressly so provided in the resignation. Any officer may be removed as such, either with or without cause, by the Manager. Designation of an officer shall not create any contract rights for an officer. Any vacancy occurring in any office of the Company (other than Manager) may be filled by the Manager.

ARTICLE 7
AMENDMENTS AND MEETINGS

Section 7.1 *Amendments*. Any amendment to this Agreement shall be adopted and be effective as an amendment hereto if it receives the affirmative vote of all of the Members, provided that such amendment be in writing and executed by all of the Members.

Section 7.2 *Meetings of the Members*.

(a) Meetings of the Members may be called by the Manager and shall be called by the Manager by a Majority Vote. The call shall state the location of the meeting and the nature of the business to be transacted. Notice of any such meeting shall be given to all Members not less than seven (7) days nor more than thirty (30) days prior to the date of such meeting. Members may vote in person or by proxy at such meeting. Whenever a vote, consent or approval of Members is permitted or required under the Agreement, such vote, consent or approval may be given at a meeting of Members or may be given in accordance with the procedure prescribed in Subsection (e) of this Section 7.2. Except as otherwise expressly provided in this Agreement, a Majority Vote of the Members shall be required to constitute the act of the Members.

(b) For the purpose of determining the Members entitled to vote on, or to vote at, any meeting of the Members or any adjournment thereof, the Manager or the Member requesting such meeting may fix, in advance, a date as the record date for any such determination. Such date shall not be more than thirty (30) days and not less than ten (10) days before any such meeting.

(c) Each Member may authorize any Person to act for it by proxy on all matters in which a Member is entitled to participate, including, without limitation, waiving notice of any meeting, or voting or participating at a meeting or providing written consent under subsection (e) hereof. Every proxy must be signed by the Member or its attorney-in-fact. No proxy shall be valid after the expiration of eleven (11) months from the date thereof unless otherwise provided in the proxy. Every proxy shall be revocable at the pleasure of the Member executing it.

(d) Each meeting of Members shall be conducted by the Manager or Member requesting such meeting or by such other Person that the Manager or Member requesting such meeting may designate.

(e) Except as otherwise expressly provided in this Agreement, the Company may take any action contemplated under this Agreement as approved by a Majority Vote.

ARTICLE 8
ALLOCATIONS

Section 8.1 *Profits and Losses*.

(a) Subject to the allocation rules of Section 8.2 hereof, Profits for any Fiscal Year shall be allocated among the Unit Holders in proportion to the number of Units held by each Unit Holder as set forth on Schedule A attached hereto.

(b) Subject to the allocation rules of Section 8.2 hereof, Losses for any Fiscal Year shall be allocated among the Unit Holders in proportion to the number of Units held by each Unit Holder as set forth on Schedule A attached hereto.

Section 8.2 *Allocation Rules*.

(a) In the event Members are admitted to the Company pursuant to this Agreement on different dates, the Profits (or Losses) allocated to the Unit Holders for each Fiscal Year during which Members are so admitted shall be allocated among the Unit Holders in proportion to the number of Units each holds from time to time during such Fiscal Year in accordance with §706 of the Code, using any convention permitted by law and selected by the Manager.

(b) For purposes of determining the Profits, Losses or any other items allocable to any period, Profits, Losses and any such other items shall be determined on a daily, monthly or other basis, as determined by the Manager using any method that is permissible under §706 of the Code and the Treasury Regulations thereunder.

(c) Except as otherwise provided in this Agreement, all items of Company income, gain, loss, deduction and any other allocations not otherwise provided for shall be divided among the Unit Holders in the same proportions as they share Profits and Losses for the Fiscal Year in question.

(d) The Members are aware of the income tax consequences of the allocations made by this Article 8 and hereby agree to be bound by the provisions of this Article 8 in reporting their shares of Company income and loss for income tax purposes.

Section 8.3 *Tax Allocations: Section 704(c) of the Code.*

(a) In accordance with §704(c) of the Code and the Treasury Regulations thereunder, income, gain, loss and deduction with respect to any property contributed to the capital of the Company shall, solely for income tax purposes, be allocated among the Unit Holders so as to take account of any variation between the adjusted basis of such property to the Company for federal income tax purposes and its initial Gross Asset Value (computed in accordance with Section 1.16 hereof).

(b) In the event the Gross Asset Value of any Company asset is adjusted pursuant to subsection (b) of the definition of "Gross Asset Value" contained in Section 1.16 hereof, subsequent allocations of income, gain, loss and deduction with respect to such asset shall take account of any variation between the adjusted basis of such asset for federal income tax purposes and its Gross Asset Value in the same manner as under §704(c) of the Code and the Treasury Regulations thereunder.

(c) Any elections or other decisions relating to allocations under this Section 8.3, including the selection of any allocation method permitted under proposed Treasury Regulation §1.704-1(c), shall be made by the Manager in any manner that reasonably reflects the purpose and intention of this Agreement. Allocations pursuant to this Section 8.3 are solely for purposes of federal, state and local taxes and shall not affect, or in any way be taken into account in computing, any Unit Holder's Capital Account or share of Profits, Losses, other items or distributions pursuant to any provision of this Agreement.

ARTICLE 9
DISTRIBUTIONS

Section 9.1 *Net Cash Flow*. Except as otherwise provided in Article 15 hereof, any distribution of the Net Cash Flow during any Fiscal Year shall be made to the Unit Holders in proportion to the number of Units held by each Unit Holder as set forth on Schedule A attached hereto.

Section 9.2 *Distribution Rules.*

(a) All distributions pursuant to Section 9.1 hereof shall be at such times and in such amounts as shall be determined by the Manager.

(b) All amounts withheld pursuant to the Code or any provision of any state or local tax law with respect to any payment, distribution or allocation to the Company or the Unit Holders shall be treated as amounts distributed to the Unit Holders pursuant to this Article 9 for all purposes of this Agreement. The Manager in its sole discretion, may but shall not be obligated to, withhold from distributions, or with respect to allocations, to Unit Holders and to pay over to any federal, state or local government any amounts required to be so withheld pursuant to the Code or any provision of any other federal, state or local law, and shall allocate such amounts to such Unit Holders with respect to which such amounts were withheld.

Section 9.3 *Limitation on Distribution*. Notwithstanding any provision to the contrary contained in this Agreement, the Company shall not make a distribution to any Unit Holder on account of its interest in the Company if such distribution would violate Section 18-607 of the Delaware Act or other applicable law.

ARTICLE 10
BOOKS AND RECORDS

Section 10.1 *Books, Records and Financial Statements*.

(a) At all times during the continuance of the Company, the Company shall maintain, at its principal place of business, separate books of account for the Company that shall show a true and accurate record of all costs and expenses incurred, all charges made, all credits made and received and all income derived in connection with the operation of the Company business in accordance with generally accepted accounting principles consistently applied, and, to the extent inconsistent therewith, in accordance with this Agreement. Such books of account, together with a certified copy of this Agreement and of the Certificate, shall at all times be maintained at the principal place of business of the Company and shall be open to inspection and examination at reasonable times by each Member and its duly authorized representative for any purpose reasonably related to such Member's interest in the Company. The books of account and the records of the Company shall be examined by and reported upon as of the end of each Fiscal Year by a firm of independent certified public accounts selected by the Manager. Any Member shall have the right to have a private audit of the Company books and records conducted at reasonable times and after reasonable advance notice to the Company for any purpose reasonably related to such Member's interest in the Company, but any such private audit shall be at the expense of the Member desiring it, and it shall not be paid for out of Company funds.

(b) The Manager shall prepare and maintain, or cause to be prepared and maintained, the books of account of the Company and the following documents shall be transmitted by the Manager to each Member at the times hereinafter set forth:

(i) Within one hundred fifty (150) days after the close of each Fiscal Year, the following financial statements:

(1) balance sheet of the Company as of the beginning and close of such Fiscal Year;

(2) statement of Company Profits and Losses for such Fiscal Year; and

(3) statement of such Member's Capital Account as of the close of such Fiscal Year, and changes therein during such Fiscal Year.

(ii) Within one hundred fifty (150) days after the close of each Fiscal Year, a statement indicating such Member's share of each item of Company income, gain, loss, deduction or credit for such Fiscal Year for income tax purposes.

(c) All information contained in any statement or other document distributed to any Member pursuant to subsection 10.1(b) shall be deemed accurate, binding and conclusive with respect to such Member unless written objection is made thereto by such Member to the Company within twenty (20) business days after the receipt of such statement or other document by such Member.

Section 10.2 *Accounting Method.* For both financial and tax reporting purposes and for purposes of determining Profits and Losses, the books and records of the Company shall be kept on the accrual method of accounting applied in a consistent manner and shall reflect all Company transactions and be appropriate and adequate for the Company's business.

ARTICLE 11
TAX MATTERS

Section 11.1 *Tax Matters Member.*

(a) Caithness is hereby designated as the initial "Tax Matters Member" of the Company for purposes of §6231(a)(7) of the Code and shall have the power to manage and control, on behalf of the Company, any administrative proceeding at the Company level with the Internal Revenue Service relating to the determination of any item of Company income, gain, loss, deduction or credit for federal income tax purposes.

(b) The Tax Matters Member shall, within ten (10) days of the receipt of any notice from the Internal Revenue Service in any administrative proceeding at the Company level relating to the determination of any Company item of income, gain, loss, deduction or credit, mail a copy of such notice to each Unit Holder.

(c) The Members, by a Majority Vote, may at any time hereafter designate a new Tax Matters Member; *provided, however*, that only a Member may be designated as the Tax Matters Member of the Company.

Section 11.2 *Right to Make Section 754 Election*. The Manager may, in its sole discretion, make or revoke, on behalf of the Company, an election in accordance with §754 of the Code, so as to adjust the basis of Company property in the case of a distribution of property within the meaning of §734 of the Code, and in the case of a transfer of a Company interest within the meaning of §743 of the Code. Each of the Unit Holders shall, upon request of the Manager, supply the information necessary to give effect to such an election.

ARTICLE 12
LIABILITY, EXCULPATION AND INDEMNIFICATION

Section 12.1 *Liability*.

(a) Except as otherwise provided by the Delaware Act, the debts, obligations and liabilities of the Company, whether arising in contract, tort or otherwise, shall be solely the debts, obligations and liabilities of the Company, and no Covered Person shall be obligated personally for any such debt, obligation or liability of the Company solely by reason of being a Covered Person.

(b) Except as otherwise expressly required by law, a Member, in its capacity as such, shall have no liability in excess of (a) the amount of its Capital Contributions, (b) its share of any assets and undistributed profits of the Company, (c) its obligation to make other payments expressly provided for in this Agreement, and (d) the amount of any distributions wrongfully distributed to it.

Section 12.2 *Exculpation*.

(a) No Covered Person shall be liable to the Company or any other Covered Person for any loss, damage or claim incurred by reason of any act or omission performed or omitted by such Covered Person in good faith on behalf of the Company and in a manner reasonably believed to be within the scope of authority conferred on such Covered Person by this Agreement, except that a Covered Person shall be liable for any such loss, damage or claim incurred by reason of such Covered Person's gross negligence, bad faith or willful misconduct.

(b) A Covered Person shall be fully protected in relying in good faith upon the records of the Company and upon such information, opinions, reports or statements presented to the Company by any Person as to matters the Covered Person reasonably believes are within such other Person's professional or expert competence and who has been selected with reasonable care by or on behalf of the Company, including information, opinions, reports or statements as to the value and amount of the assets, liabilities, Profits, Losses or Net Cash Flow or any other facts pertinent to the existence and amount of assets from which distributions or Members might properly be paid.

Section 12.3 *Fiduciary Duty*.

(a) To the extent that, at law or in equity, a Covered Person has duties (including fiduciary duties) and liabilities relating thereto to the Company or to any other Covered Person, a Covered Person acting under this Agreement shall not be liable to the Company or to any other Covered Person for its good faith reliance on the provisions of this Agreement. The provisions of this Agreement, to the extent that they restrict the duties and liabilities of a Covered Person otherwise existing at law or in equity, are agreed by the parties hereto to replace such other duties and liabilities of such Covered Person.

(b) Unless otherwise expressly provided herein, whenever a conflict of interest exists or arises between Covered Persons or whenever this Agreement or any other agreement contemplated herein or therein provides that a Covered Person shall act in a manner that is, or provides terms that are, fair and reasonable to the Company or any Member, the Covered Person shall resolve such conflict of interest, taking such action or providing such terms, considering in each case the relative interest of each party (including its own interest) to such conflict, agreement, transaction or situation and the benefits and burdens relating to such interests, any customary or accepted industry practices, and any applicable generally accepted accounting practices or principles. In the absence of bad faith by the Covered Person, the resolution, action or term so made, taken or provided by the Covered Person shall not constitute a breach of this Agreement or any other agreement contemplated herein or of any duty or obligation of the Covered Person at law or in equity or otherwise.

(c) Whenever in this Agreement a Covered Person is permitted or required to make a decision (i) in its "discretion" or under a grant of similar authority or latitude, the Covered Person shall be entitled to consider only such interests and factors as it desires, including its own interests, and shall have no duty or obligation to give any consideration to any interest of or factors affecting the Company or any other Person, or (ii) in its "good faith" or under another express standard, the Covered Person shall act under such express standard and shall not be subject to any other or different standard imposed by this Agreement or other applicable law.

Section 12.4 *Indemnification*. To the fullest extent permitted by applicable law, a Covered Person shall be entitled to indemnification from the Company for any loss, damage or claim incurred by such Covered Person by reason of any act or omission

performed or omitted by such Covered Person in good faith on behalf of the Company and in a manner reasonably believed to be within the scope of authority conferred on such Covered Person by this Agreement, except that no Covered Person shall be entitled to be indemnified in respect of any loss, damage or claim incurred by such Covered Person by reason of gross negligence or willful misconduct with respect to such acts or omissions; *provided, however*, that any indemnity under this Section 12.4 shall be provided out of and to the extent of Company assets only, and no Covered Person shall have any personal liability on account thereof.

Section 12.5 *Expenses*. To the fullest extent permitted by applicable law, expenses (including legal fees) incurred by a Covered Person in defending any claim, demand, action, suit or proceeding shall, from time to time, be advanced by the Company prior to the final disposition of such claim, demand, action, suit or proceeding upon receipt by the Company of an undertaking by or on behalf of the Covered Person to repay such amount if it shall be determined that the Covered Person is not entitled to be indemnified as authorized in Section 12.4 hereof.

Section 12.6 *Outside Businesses*. Any Member, Manager or Affiliate thereof may engage in or possess an interest in other business ventures of any nature or description, independently or with others, similar or dissimilar to the business of the Company, and the Company, the Members and the Manager shall have no rights by virtue of this Agreement in and to such independent ventures or the income or profits derived therefrom, and the pursuit of any such venture, even if competitive with the business of the Company, shall not be deemed wrongful or improper. No Member, Manager or Affiliate thereof shall be obligated to present any particular investment opportunity to the Company even if such opportunity is of a character that, if presented to the Company, could be taken by the Company, and any Member, Manager or Affiliate thereof shall have the right to take for its own account (individually or as a partner or fiduciary) or to recommend to others any such particular investment opportunity.

ARTICLE 13
ADDITIONAL MEMBERS AND UNITS

Section 13.1 *Additional Units*. With the Manager's consent, the Company may raise additional capital by offering and selling, or causing to be offered and sold, additional limited liability company interests in the Company ("***Additional Units***") to any Person in such amounts and on such terms as the Members may determine. Each Person who subscribes for any of the Additional Units shall be admitted as an additional member of the Company (each, an "***Additional Member***" and collectively, the "***Additional Members***") at the time such Person (i) executes this Agreement or a counterpart of this Agreement and (ii) is named as a Member on Schedule A hereto. The legal fees and expenses associated with such admission shall be borne by the Company.

Section 13.2 *Allocations*. Additional Units shall not be entitled to any retroactive allocation of the Company's income, gains, losses, deductions, credits or other items; provided that, subject to the restrictions of §706(d) of the Code, Additional Units shall be entitled to their respective share of the Company's income, gains, losses, deductions, credits and other items arising under contracts entered into before the effective date of the issuance of any Additional Units to the extent that such income, gains, losses, deductions, credits and other items arise after such effective date. To the extent consistent with §706(d) of the Code and Treasury Regulations promulgated thereunder, the Company's books may be closed at the time Additional Units are issued (as though the Company's tax year had ended) or the Company may credit to the Additional Units *pro rata* allocations of the Company's income, gains, losses, deductions, credits and items for that portion of the Company's Fiscal Year after the effective date of the issuance of the Additional Units.

ARTICLE 14
ASSIGNABILITY

(a) *Assignability of Units; Restrictions on Transfers*. Except pursuant to the written consent of the Manager, no Member directly or indirectly shall sell, assign, transfer, pledge, hypothecate, mortgage, encumber, exchange, give or otherwise dispose of (collectively, a "***Transfer***") any of its Units or any economic, voting or other interest (collectively, an "***interest***") in the Company. Notwithstanding anything to the contrary in Section 18-702(a) of the Delaware Act, so long as the Manager is the assignor and the sole Member, an assignee of an interest in the Company may participate in the management of the business and affairs of the Company pursuant to the written approval of the Manager.

Section 14.2 *Indemnification*. In the case of a Transfer or attempted Transfer of any Unit or any interest therein in violation of this Agreement, the Parties engaging or attempting to engage in such assignment shall be liable to indemnify and hold harmless the Company and the other Members from all costs, liabilities and damages that any of such indemnified Persons may incur (including, without limitation, incremental tax liability and lawyers' fees and expenses) as a result of such assignment or attempted assignment and efforts to enforce the indemnity granted hereby.

ARTICLE 15
DISSOLUTION, LIQUIDATION AND TERMINATION

Section 15.1 *Dissolution*. (a) The Company shall not be dissolved by the admission of Additional Members in accordance with the terms of this Agreement.

(b) The Company shall be dissolved and its affairs shall be wound up pursuant to Section 18-801 of the Delaware Act.

Section 15.2 *Notice of Dissolution*. Upon the dissolution of the Company, the Person or Persons approved by a Majority Vote to carry out the winding up of the Company (the "***Liquidating Trustee***") shall promptly notify the Members of such dissolution.

Section 15.3 *Liquidation*. Upon dissolution of the Company, the Liquidating Trustee shall immediately commence to wind up the Company's affairs; *provided, however*, that a reasonable time shall be allowed for the orderly liquidation of the assets of the Company and the satisfaction of liabilities to creditors so as to enable the Members to minimize the normal losses attendant upon a liquidation. The Unit Holders shall continue to share Profits and Losses during liquidation in the same proportions, as specified in Article 8 hereof, as before liquidation. Each Member shall be furnished with a statement prepared by the Company's certified public accountants that shall set forth the assets and liabilities of the Company as of the date of dissolution. The proceeds of liquidation shall be distributed, as realized, in the following order and priority:

(a) to creditors of the Company, including Unit Holders who are creditors, to the extent otherwise permitted by law, in satisfaction of the liabilities of the Company (whether by payment or the making of reasonable provision for payment thereof), other than liabilities for distributions to Unit Holders; and

(b) to distribute to the Unit Holders the remaining proceeds of liquidation in accordance with their Capital Account balances, after giving effect to all contributions, distributions and allocations for all periods.

Section 15.4 *Termination*. The Company shall terminate when all of the assets of the Company, after payment of or due provision for all debts, liabilities and obligations of the Company, shall have been distributed to the Unit Holders in the manner provided for in this Article 15, and the Certificate shall have been canceled in the manner required by the Delaware Act.

Section 15.5 *Claims of the Members*. The Members shall look solely to the Company's assets for the return of their Capital Contributions, and if the assets of the Company remaining after payment of or due provision for all debts, liabilities and obligations of the Company are insufficient to return such Capital Contributions, the Members shall have no recourse against the Company or any other Covered Person.

ARTICLE 16
ARBITRATION

Section 16.1 *Dispute Resolution*. To the fullest extent permitted by the Delaware Act and other applicable law, any controversy or claim arising out of or relating to this Agreement, or any breach thereof, shall be settled by arbitration in accordance and to the extent permitted by the Uniform Arbitration Act (*10 Del. C. §5701, et seq.*) (the "***Delaware Arbitration Act***") and, to the extent not inconsistent therewith, the

Commercial Arbitration Rules of the American Arbitration Association ("***AAA***"), as amended and in effect on the date that demand for arbitration is filed with the AAA. Each party to the arbitration shall select one (1) arbitrator. The arbitrators' ruling shall be binding and conclusive upon the parties hereto to the fullest extent permitted by law. Any arbitration shall occur in Wilmington, Delaware, and judgment upon the award rendered may be entered in any court having jurisdiction thereof. The arbitrators shall be governed by and shall apply the substantive law of the State of Delaware in making their award. The expenses of the arbitration shall be borne equally by the parties to the arbitration, provided that each party shall pay for and bear the cost of its own experts, evidence and legal counsel.

ARTICLE 17
MISCELLANEOUS

Section 17.1 *Notices*. All such notices provided for in this Agreement shall be in writing, duly signed by the party giving such notice, and shall be delivered, telecopied or mailed by registered or certified mail, as follows:

(a) if to the Company, in care of the Manager at the Company's mailing address set forth on Schedule A attached hereto;

(b) if to the Manager, at its mailing address set forth on Schedule A attached hereto; or

(c) if to any Member, at the address set forth opposite its name on Schedule A attached hereto, or at such other address as such Member may hereafter designate by written notice to the Company.

(d) Notices shall be effective as follows: if delivered by courier or by hand, on the date of delivery or, if such date is not a business day, on the business day immediately following; if mailed, on the third (3rd) day following the date of mailing or, if such day is not a business day, on the business day immediately following; if sent by telecopier, on the date of sending or, if such date is not a business day, on the business day immediately following, *provided* that with respect to notices sent by telecopier, the burden of proof of receipt shall be on the sender.

Section 17.2 *Failure to Pursue Remedies*. The failure of any party to seek redress for violation of, or to insist upon the strict performance of, any provision of this Agreement shall not prevent a subsequent act, which would have originally constituted a violation, from having the effect of an original violation.

Section 17.3 *Cumulative Remedies*. The rights and remedies provided by this Agreement are cumulative and the use of any one right or remedy by any party shall not preclude or waive its right to use any or all other remedies. Such rights and remedies are given in addition to any other rights the parties may have by law, statute, ordinance or otherwise.

Section 17.4 *Binding Effect*. This Agreement shall be binding upon and inure to the benefit of all of the parties and, to the extent permitted by this Agreement, their successors, legal representatives and assigns.

Section 17.5 *Interpretation*. Throughout this Agreement, nouns, pronouns, and verbs shall be construed as masculine, feminine, neuter, singular or plural, wherever shall be applicable. All references herein to "Articles," "Sections" and paragraphs shall refer to corresponding provisions of this Agreement. The heading and subheadings in this Agreement are included for convenience and identification only and are in no way intended to describe, interpret, define or limit the scope, extent or intent of this Agreement or any provision hereof.

Section 17.6 *Severability*. The invalidity or unenforceability of any particular provision of this Agreement shall not affect the other provisions hereof, and this Agreement shall be construed in all respects as if such invalid or unenforceable provision were omitted.

Section 17.7 *Counterparts*. This Agreement may be executed in any number of counterparts with the same effect as if all parties hereto had signed the same document. All counterparts shall be construed together and shall constitute one instrument.

Section 17.8 *Integration*. This Agreement constitutes the entire agreement among the parties hereto pertaining to the subject matter hereof and supersedes all prior agreements and understandings pertaining thereto.

Section 17.9 *Governing Law*. This Agreement and the rights of the parties hereunder shall be interpreted in accordance with the laws of the State of Delaware, and all rights and remedies shall be governed by such laws without regard to principles of conflict of laws.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above stated.

MEMBER:

CAITHNESS ENERGY, L.L.C.

By: _____

Christopher McCallion
Executive Vice President
& Chief Financial Officer

SCHEDULE A

Name of Member: Caithness Energy, L.L.C.

Address of Member: 565 Fifth Avenue 29th floor, New York, New York 10017

Number of Units Held by Member: 100

Name of Manager: Caithness Energy, L.L.C.

Address of Manager: 565 Fifth Avenue 29th floor, New York, New York 10017

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

50 years 1954-2004

April 19, 2004

Patrick & Henderson, Inc.
1965 Airport Drive
Bakersfield, California 93308

Attn: Mr. Allan Henderson, P.E.

RE: REPORT OF PRELIMINARY GEOTECHNICAL ENGINEERING STUDY; SHEPHERDS RIDGE WIND PROJECT, MORROW COUNTY, OREGON

Shannon & Wilson, Inc. is pleased to present our preliminary geotechnical engineering study for the proposed Shepherds Ridge Wind Project in Morrow County, Oregon. The study was conducted in accordance with our proposal dated January 20, 2004.

This report provides six test boring logs, laboratory test results, and recommended soil and rock strength values for use in your tower foundation design. We recommend additional studies for the entire project.

We appreciate the opportunity to work with you on this project. Should you have comments or questions regarding this report, or if we can be of additional service to you on another phase of this work, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Burrie, P.E.
Branch Manager

DJB:LJR/djb

04-19-2004/22-1-02081-001Gtr.Preliminary Study Report/cvm

22-1-02081-001

303 WELLSIAN WAY · P.O. BOX 967
RICHLAND, WASHINGTON 99352
509·946·6309 FAX 509·946·6580
TDD: 1-800-833-6388
www.shannonwilson.com

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PRELIMINARY GEOTECHNICAL ENGINEERING STUDY
SHEPHERDS RIDGE WIND PROJECT
MORROW COUNTY, OREGON

1.0 INTRODUCTION

This data report presents the results of our preliminary geotechnical engineering study conducted at the proposed Shepherds Ridge Wind Project in Morrow County, Oregon. The project is located southeast of Arlington, Oregon, just east of the Morrow County- Gilliam County line (Figure 1). Our preliminary field observations and laboratory testing results, a brief description of the subsurface conditions, and preliminary soil and rock strength properties for use in your foundation design are included in this report.

2.0 SITE AND PROJECT DESCRIPTION

The Shepherds Ridge Wind Project is located on a series of northwest-southeast trending ridges in western Morrow County, Oregon. The turbine locations are summarized in the following table and shown in Figure 2.

Development Corridor	Tower Numbers	Location		
		Section (s)	Township	Range
Line A	A1-A12	31; 6	2N; 1N	23E
Line B	B1-B13	5,6,7 & 8	1N	23E
Line C	C1-C12	31; 5 & 6	2N; 1N	23E
Line D	D1-D12	19,20,29 & 30	2N	23E
Line E	E1-E12	28,29,32 & 34	2N	23E

3.0 FIELD EXPLORATIONS

The preliminary field exploration program included exploratory borings at six selected tower sites. Exploratory borings were drilled using hollow-stem auger equipment to refusal in the basalt bedrock or 35 feet below the surface elevation. Disturbed and relatively undisturbed samples were obtained as the drilling progressed. The approximate exploratory boring locations are shown on Figure 2.

Exploratory borings and test holes locations were identified based on Global Positioning Satellite (GPS) coordinates provided by Patrick & Henderson, Inc. A Shannon & Wilson, Inc. engineer

staked the boring locations using a hand-held GPS unit, which is generally accurate within 3 to 5 meters. A list of boring coordinates is located in Appendix A.

Environmental West Exploration, Inc. provided the exploratory drilling under subcontract with Shannon & Wilson, Inc. Our engineer observed the drilling and prepared a log of each boring. Boring logs are presented in Appendix B.

The borings were advanced using a Foremost-Mobile B-80, truck-mounted drill rig equipped with hollow-stem auger tools. Disturbed samples were obtained at 5-foot intervals in conjunction with the Standard Penetration Test (ASTM D 1586). The Standard Penetration Test (SPT) consists of driving a 2-inch outside diameter split-spoon sampler a distance of 18 inches into the soil beneath the bottom of the casing with a 140 pound hammer free-falling a distance of 30 inches. The number of blows required to advance the split-spoon through each 6-inch increment is recorded. The SPT resistance, or N-value, is defined as the number of blows required to drive the sample from 6 to 18 inches below the casing. The SPT N-value is reported as the number of blows per 1 foot of penetration. When 50 blows were required for 6 inches or less of penetration, the test was stopped, and the number of blows and the corresponding penetration were recorded. The SPT N-value provides an indication of the relative density or consistency of the soil and is plotted on the boring logs located in Appendix B.

The SPT N-values provide a means for evaluating the relative density or compactness of cohesionless (granular) soils and the relative consistency or stiffness of cohesive (fine-grained) soils. The terminology used to describe the relative density or compactness of the soils is listed in the following table.

SOIL DENSITY AND CONSISTENCY TERMINOLOGY			
Cohesionless (granular) Soils		**Cohesive (clayey) Soils**	
Relative Density	**Penetration Resistance (blows per foot)**	**Relative Consistency**	**Penetration Resistance (blows per foot)**
Very Loose	Under 4	Very Soft	Under 2
Loose	4 – 10	Soft	2 – 4
Medium Dense	10 – 30	Medium Stiff	4 – 8
Dense	30 – 50	Stiff	8 – 15
Very Dense	Over 50	Very Stiff	15 – 30
		Hard	Over 30

The split spoon sampler used during the penetration testing recovers a disturbed sample of soil, which is useful for identification and classification purposes. The samples were field classified and recorded on the logs by our field representative. The samples were sealed in plastic bags and returned to our office for laboratory testing. Thin wall samplers (Shelby tubes) were used to obtain

relatively undisturbed samples of the fine-grained soils. Shelby tubes were capped and sealed in the field to protect the samples from disturbance during shipping. Laboratory testing was conducted in our Seattle, Washington laboratory.

We estimate the strata boundaries in the field based on the drilling progress and from samples obtained in conjunction with the SPT and Shelby tubes. The subsurface conditions are known only at the boring locations on the date explored and should be considered approximate. Actual subsurface conditions between borings may vary.

4.0 SUBSURFACE PROFILE

The following table summarizes the subsurface profile encountered at each boring.

Boring No.	**E10**	**E3**	**D11**	**D8**	**A10**	**B7**
Soil Description	**Depth, feet**					
Loose Tan Silt (loess)	0-23				0-6	
Med. Dense to Dense Silt (loess)		0-24	0-25	0-6		0-6.5
Caliche (cemented silt w/ rock fragments)	23-27	27-27	25-27	6-8	6-10.5	6.5-18.75
Weathered Basalt	27-35	27-33	27-36.5	8-15	10.5-15	
Basalt				15	15	

Groundwater was not observed in the explorations.

5.0 LABORATORY TESTING

We submitted representative soil samples to our laboratory for index and engineering properties testing. The test results are summarized in the following table. Graphic representations of the test results are presented in Appendix C.

Boring No.	**Depth, ft.**	**Description**	**In situ Moisture, %**	**% Passing No. 200 Sieve**	**Shear Angle, θ**
A-10	10.5	Silty Sand w/ Gravel	18.1	10.7	
D-11	13.7	Silt with Sand	5.0	95.7	32
E-10	12.5	Fine sandy Silt	7.9	94.5	
E-3	5.6	Fine sandy Silt	6.0	82.4	32

6.0 RECOMMENDED DESIGN PARAMETERS

Based on the field explorations, laboratory testing, and our experience on similar projects in the area, we recommend using the following design parameters.

Rock Materials			
Unconfined Compressive Strength, psi		Shear Angle, θ	Average Unit Weight, pcf
4000		45	150
Caliche Materials			
Unconfined Compressive Strength, psi		Shear Angle, θ	Average Unit Weight, pcf
2000		38	110
Soil Materials			
Allowable Bearing Pressure, psf	Shear Angle	Passive Earth Pressure, psf/ft	Average In Situ Unit Weight, pcf
1500	32	270	83

6.1 UBC Seismic Design Criteria

Based on the site geology and the soil conditions encountered, we recommend the following Uniform Building Code (UBC) seismic design criteria.

Seismic Zone	2B
Zone Factor (Z)	0.20
Soil Profile (Table 16-J)	S_B (Rock)
Seismic Coefficient Ca (Table 16-Q)	0.20
Seismic Coefficient Cv (Table 16-R)	0.20
Near-Source Factor Na	1.0
Near-Source Factor Nv	1.0

7. 0 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based upon site conditions, as they presently exist. We further assume that the site explorations are representative of the subsurface conditions throughout the site; i.e., site conditions are not significantly different from those disclosed by the field exploration and observations.

If subsurface conditions different from those encountered in the field exploration are observed or appear to be present beneath the excavations during construction, we should be advised at once so that we can review these conditions and reconsider our recommendations, where necessary.

If there is a substantial lapse of time between the submission of this report and the start of construction at the site, if conditions have changed because of natural forces or construction at the site, or if the design or loading configurations change, we recommend that we review this report to determine the applicability of the conclusions and recommendations concerning the time lapse or changed conditions contained in this report.

This report was prepared for the use of Patrick & Henderson, Inc. and the Shepherds Ridge Wind Project design team, for the design and construction of the wind turbine foundations in Morrow County, Oregon. This report was made for a specific set of proposed structures and locations on the site. Variations from the structure types or locations discussed in this report should be analyzed by Shannon & Wilson to assess the potential geotechnical impacts of those variations on the foundation recommendations included in this report.

As an integral part of this report, we have prepared the attached "Important Information About Your Geotechnical Engineering Report," (Appendix D) to help you more clearly understand its use and limitations.

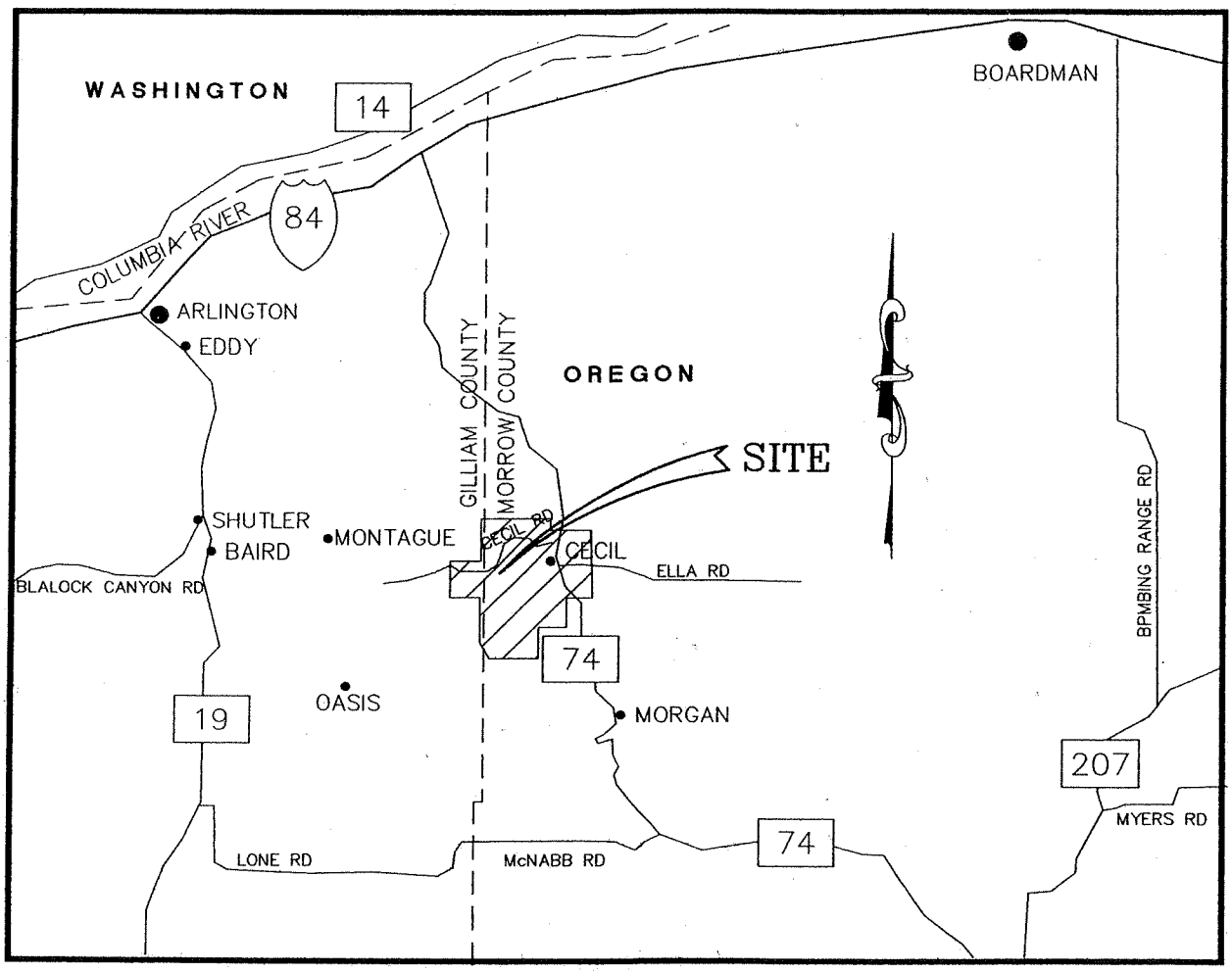
SHANNON & WILSON, INC.

REGISTERED PROFESSIONAL ENGINEER 14,357 OREGON MAY 30, 1989 DEE J. BURRIE

4/19/04

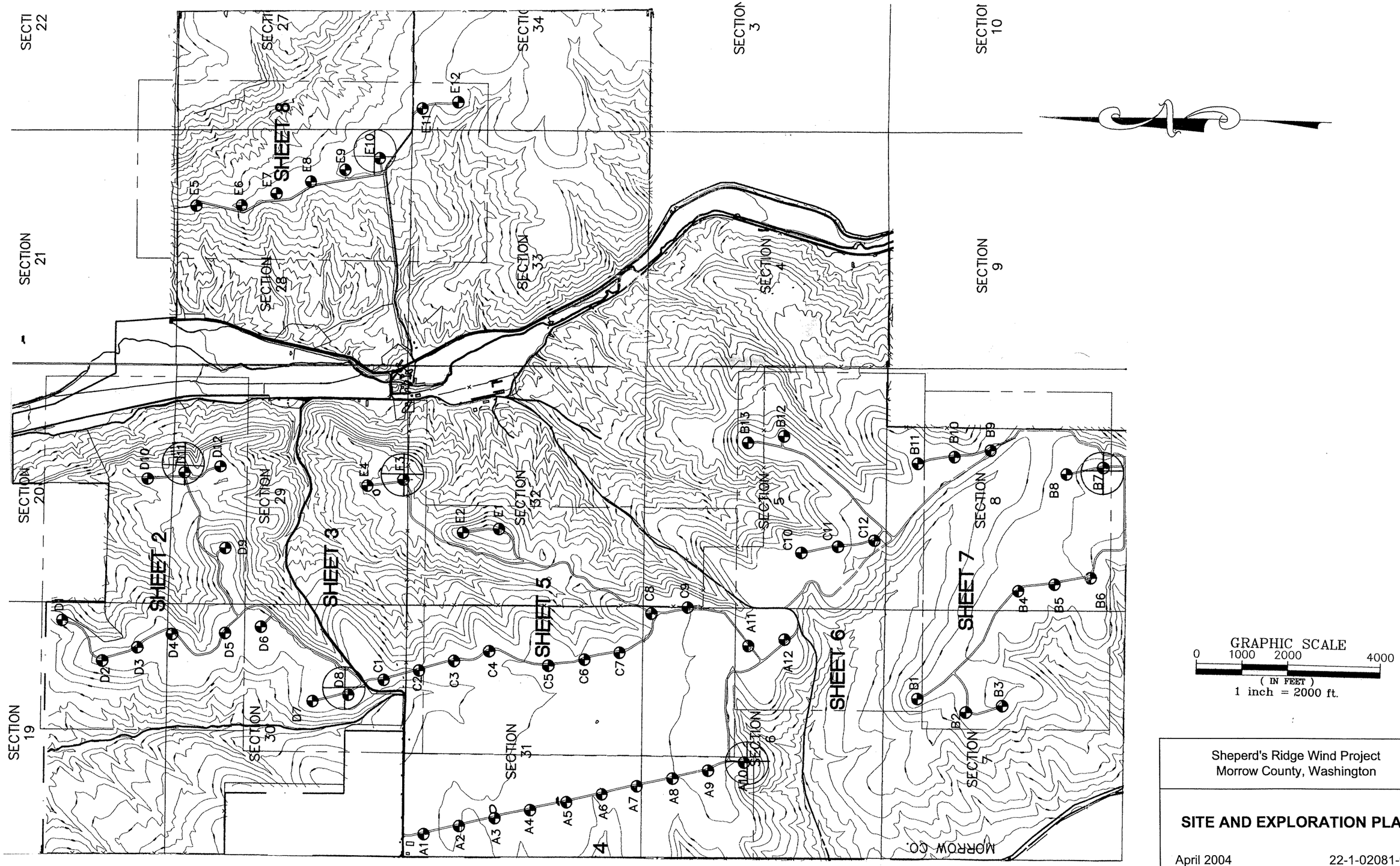
Dee J. Burrie, P.E.
Vice President

DJB:LJR/djb



VICINITY MAP
NOT TO SCALE

Sheperd's Ridge Wind Project **Morrow County, Oregon**	
VICINITY MAP	
April 2004	22-1-02081-001
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. 1**



Base map provided by Patrick & Henderson, Inc.

Sheperd's Ridge Wind Project
Morrow County, Washington

SITE AND EXPLORATION PLAN

April 2004 | 22-1-02081-001

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FIG. 2

APPENDIX A

BORING COORDINATES FOR SIX BORING LOCATIONS

BORING LOCATION COORDINATES
UTM 27

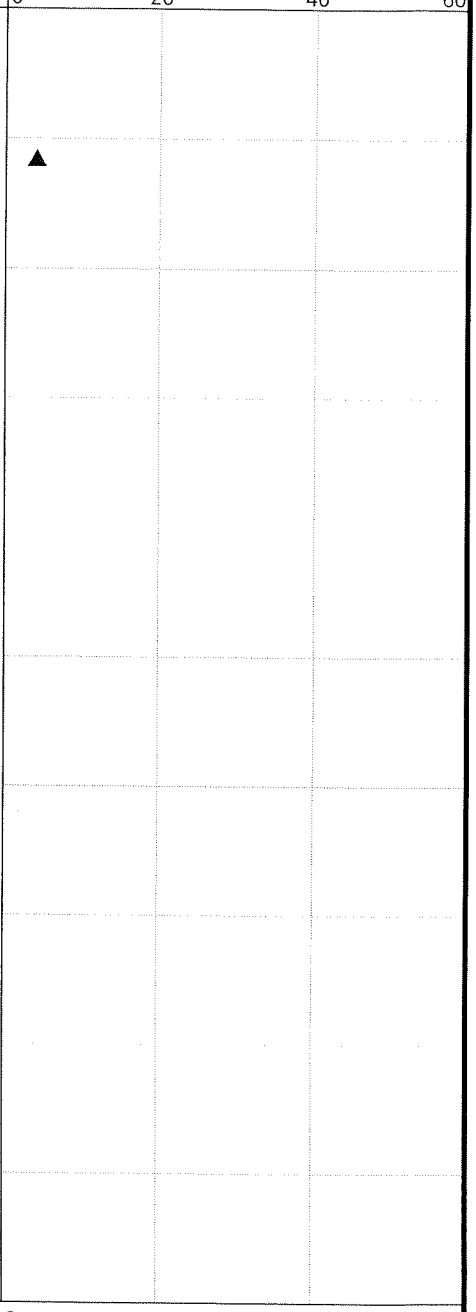
Turbine #	*Northing*	*Easting*	*Estimated Ground Elevation*
A10	5053566.44253	734826.28285	326
B7	5051254.55344	736880.95264	344
D8	5056247.15175	735162.72876	315
D11	5057419.85991	736598.04578	270
E3	5055942.61145	736610.60762	275
E10	5056192.73574	738768.04613	275

APPENDIX B

EXPLORATORY BORING LOGS

SOIL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.
Loose, tan SILT (ML); damp to dry.				Not Encountered	5
White/tan, trace to slightly fine gravelly SILT (ML); dry	6.0		S-1		10
Very dense, light brown, gravelly silt to silty GRAVEL (GM); gravel is subrounded basalt.	10.5		S-2, S-3		15
Bottom of Boring Completed 02/20/2004	15.0		S-4		20, 25, 30, 35, 40, 45

Standard Penetration Resistance (140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered
Split Spoon
1" Plastic Sheath

● % Water Content
Plastic Limit |—●—| Liquid Limit
Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING A-10

April 2004 | 22-1-02081-001

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FIG. B-1

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.	Standard Penetration Resistance (140 lb. weight, 30-inch drop) ▲ Blows per foot (0 – 20 – 40 – 60)
Medium dense, tane SILT (ML), damp to dry, (Loess).						
			S-1		5	▲
Very dense, white/brown to brown, slightly silty to silty GRAVEL (GM); gravel is subrounded basalt.	6.5			Not Encountered		
			S-2		10	
			S-3		15	
Bottom of Boring Completed 02/20/2004	18.8				20	
					25	
					30	
					35	
					40	
					45	

LEGEND

* Sample Not Recovered

Split Spoon

0 – 20 – 40 – 60

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING B-7

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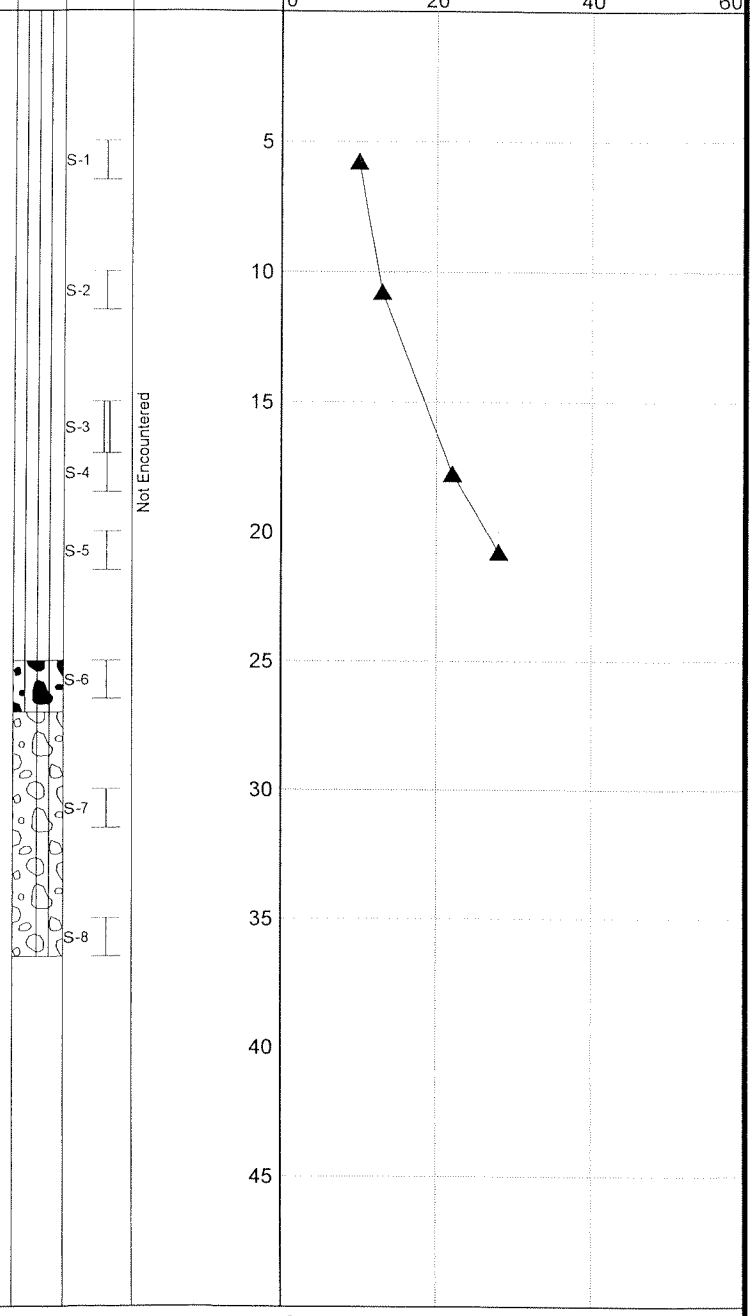
FIG. B-2

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.
Medium dense to dense, tan SILT (ML); dry (Loess).	
Very dense, white and tan, silty GRAVEL (GM).	25.0
Very dense, brown, slightly sitly GRAVEL (GP-GM); gravel is basalt.	27.0
Bottom of Boring Completed 02/19/2004	36.5



LEGEND

- * Sample Not Recovered
- Split Spoon
- 1" Plastic Sheath

0 20 40 60

● % Water Content

Plastic Limit |—●—| Liquid Limit
Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING D-11

April 2004 22-1-02081-001

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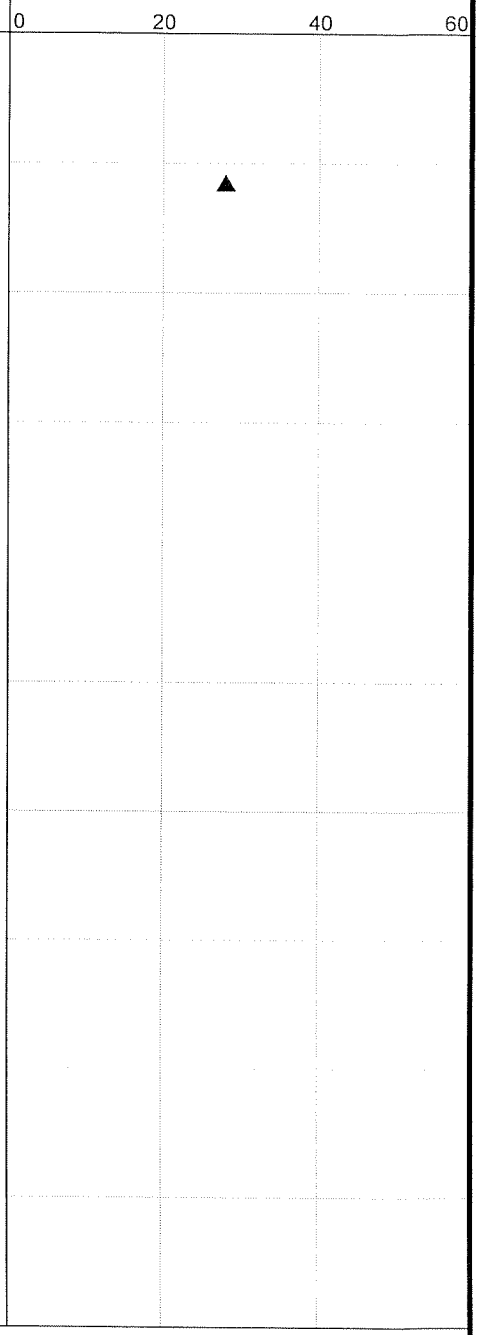
FIG. B-3

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.	Symbol	Samples	Ground Water	Depth, Ft.
Medium dense, tan SILT (ML); damp (Loess).					
	6.0		S-1	Not Encountered	5
Medium dense, white gravelly SILT (ML), dry.					
	8.0				
Very dense, dark brown, silty GRAVEL (GM); gravel is basalt.					10
			S-2		
	11.5				
Very dense, brown, slightly silty GRAVEL (GP-GM); gravel is basalt.					
	15.0		S-3		15
Bottom of Boring Completed 02/20/2004					20
					25
					30
					35
					40
					45

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot



LEGEND

* Sample Not Recovered

Split Spoon

● % Water Content

Plastic Limit ├──●──┤ Liquid Limit
Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING D-8

April 2004 22-1-02081-001

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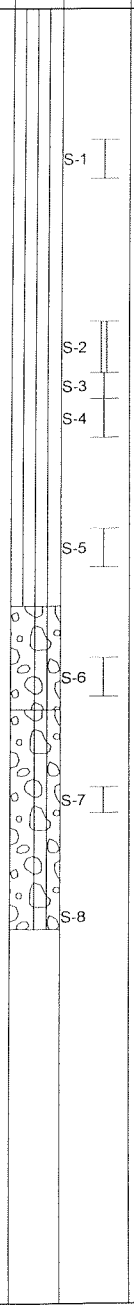
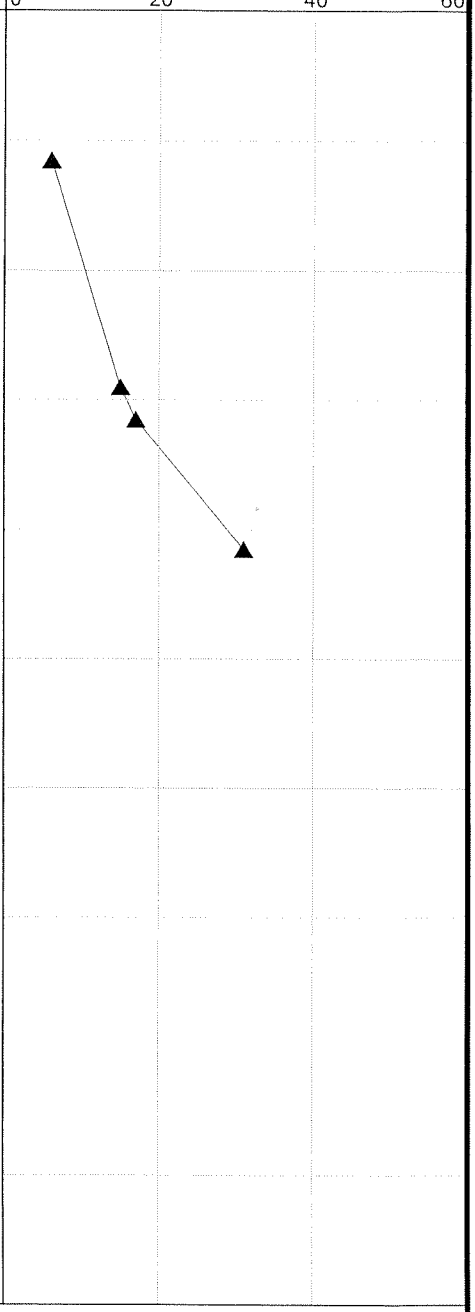
FIG. B-4

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.
Loose to dense, tan SILT (ML); dry (Loess).	
Very dense, grayish-white, slightly silty GRAVEL (GP-GM); gravel is subrounded basalt with white coatings.	23.0
Very dense, slightly silty GRAVEL (GP-GM); gravel is subangular basalt.	27.0
Bottom of Boring Completed 02/19/2004	35.5





LEGEND

- * Sample Not Recovered
- Split Spoon
- 1" Plastic Sheath

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING E-10

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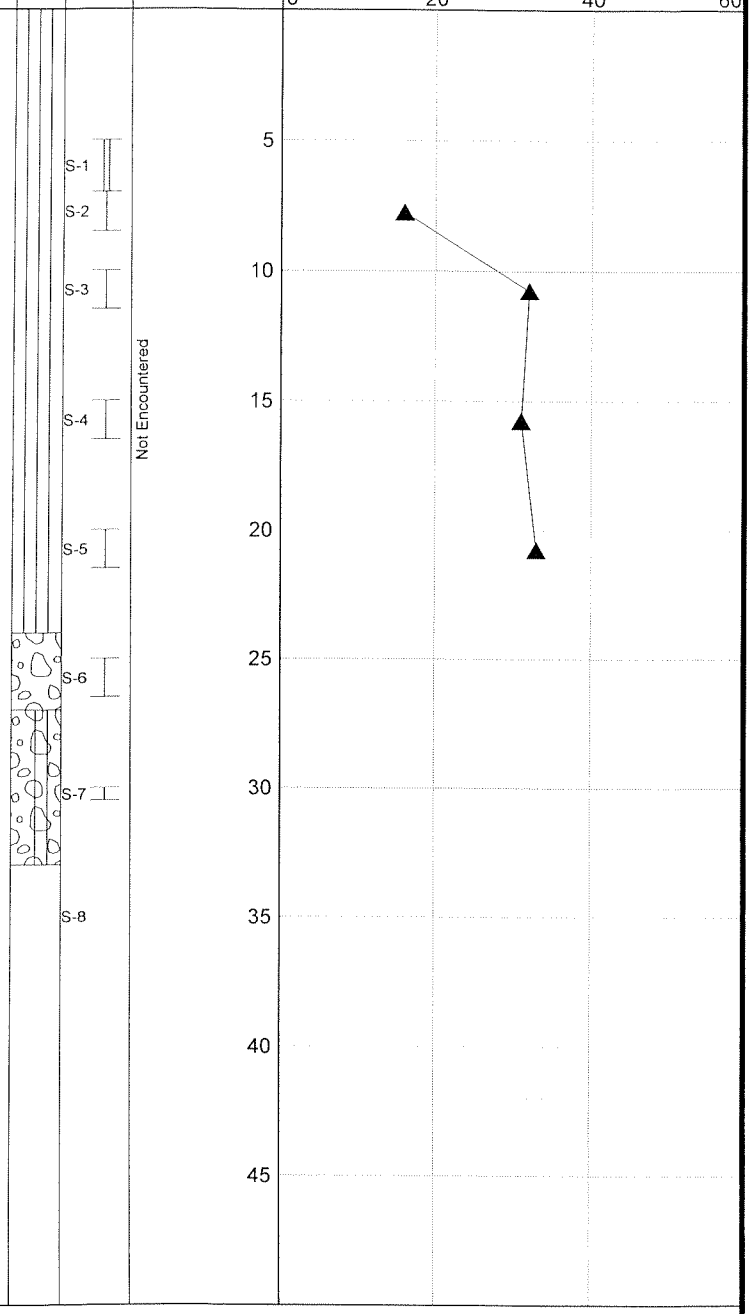
FIG. B-5

MASTER LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

SOIL DESCRIPTION	Depth, Ft.
Medium dense to dense, tan SILT (ML); dry; moist about 3 feet, (Loess).	
Very dense, tan and white, GRAVEL (GP); dry.	24.0
Very dense, white/black, lightly silty GRAVEL (GP-GM); gravel is subangular.	27.0
Bottom of Boring Completed 02/19/2004	33.0



LEGEND

* Sample Not Recovered

1" Plastic Sheath

Split Spoon

● % Water Content

Plastic Limit |—●—| Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

Shepherd's Ridge Wind Project
Morrow County, Oregon

LOG OF BORING E-3

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FIG. B-6

MASTER_LOG2 22-1-02081-001.GPJ SHAN WIL.GDT 4/19/04 Log: SLM Rev: DJB Typ: CVM

UNIFIED SOIL CLASSIFICATION SYSTEM
(From ASTM D 2488-93 & 2487-93)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL ②	TYPICAL DESCRIPTION
Coarse-Grained Soils *(more than 50% retained on No. 200 sieve)* *[use Dual Symbols for 5 - 12% Fines (i.e. GP-GM)]* ①	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Clean Gravels ① *(less than 5% fines)*	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		Gravels with ① Fines *(more than 12% fines)*	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Clean sands ① *(less than 5% fines)*	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly Graded Sand, Gravelly Sands, Little or No Fines
		Sands with ① Fines *(more than 12% fines)*	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Silt Mixtures
Fine-Grained Soils *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML	Inorganic Silts of Low to Medium Plasticity, Rock Flour, or Clayey Silts With Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
		Organic	OL	Organic Silts and Organic Silty Clays of Low Plasticity
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	CH	Inorganic Clays of Medium to High Plasticity, Sandy Fat Clay, Gravelly Fat Clay
			MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sands or Silty Soils, Elastic Silt
		Organic	OH	Organic Clays of Medium to High Plasticity, Organic Silts
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	Peat, Humus, Swamp Soils with High Organic Content (See D 4427-92)

NOTES

1. Dual Symbols (symbols separated by a hyphen, i.e., SP-SM, slightly silty fine SAND) are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

2. Borderline symbols (symbols separated by a slash, i.e., CL/ML, silty CLAY/clayey SILT; GW/SW, sandy GRAVEL/gravelly SAND) indicate that the soil may fall into one of two possible basic groups.

Sheperd's Ridge Wind Project
Morrow County, Oregon

SOIL CLASSIFICATION AND LOG KEY

April 2004 22-1-02081-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B-7
Sheet 2 of 2

Shannon & Wilson, Inc. (S&W), uses a soil classification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following page. Soil descriptions are based on visual-manual procedures (ASTM D 2488-93) unless otherwise noted.

S&W CLASSIFICATION OF SOIL CONSTITUENTS

- MAJOR constituents compose more than 50 percent, by weight, of the soil. Major constituents are capitalized (SAND).
- Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (slightly silty SAND).
- Trace constituents compose 0 to 5 percent of the soil (slightly silty SAND, trace of gravel).

MOISTURE CONTENT DEFINITIONS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

ABBREVIATIONS

ATD	At Time of Drilling
Elev.	Elevation
ft	feet
HSA	Hollow Stem Auger
ID	Inside Diameter
in	inches
lbs	pounds
Mon.	Monument cover
N	Blows for last two 6-inch increments
NA	Not Applicable or Not Available
OD	Outside Diameter
OVA	Organic Vapor Analyzer
PID	Photoionization Detector
ppm	parts per million
PVC	Polyvinyl Chloride
SS	Split Spoon sampler
SPT	Standard Penetration Test
USC	Unified Soil Classification
WLI	Water Level Indicator

GRAIN SIZE DEFINITIONS

DESCRIPTION	SIEVE SIZE
FINES	< #200 (0.8 mm)
SAND*	
▪ Fine	#200 - #40 (0.4 mm)
▪ Medium	#40 - #10 (2 mm)
▪ Coarse	#10 - #4 (5 mm)
GRAVEL*	
▪ Fine	#4 - $\frac{3}{4}$ inch
▪ Coarse	$\frac{3}{4}$ - 3 inches
COBBLES	3 - 12 inches
BOULDERS	> 12 inches

* Unless otherwise noted, sand and gravel, when present, range from fine to coarse in grain size.

RELATIVE DENSITY / CONSISTENCY

COARSE-GRAINED SOILS		FINE-GRAINED/COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
0 - 4	Very loose	<2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
Over 50	Very dense	15 - 30	Very stiff
		Over 30	Hard

WELL AND OTHER SYMBOLS

Cement/Concrete	Asphalt or PVC Cap
Bentonite Grout	Cobbles
Bentonite Seal	Fill
Slough	Ash
Silica Sand	Bedrock
2" I.D. PVC Screen (0.020-inch Slot)	Gravel

Sheperd's Ridge Wind Project
Morrow County, Oregon

SOIL CLASSIFICATION AND LOG KEY

April 2004 22-1-02081-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B-7
Sheet 1 of 2

APPENDIX C

LABORATORY TEST RESULTS

DIRECT SHEAR TEST NO. 1
SUMMARY OF TEST DATA

Boring D-11
Sample S-3
Depth, ft. 13

Tested By / Date JFL 3-2-04
Calc. By / Date JFL 3-3-04
Check By / Date _____

CLASSIFICATION:
Brown SILT, trace of fine sand and clay; ML

SAMPLE DATA:
Spec. Grav. (est.) : 2.70
Specimen : COMPACTED

SPECIMEN DATA:

	Before Test
Height, inches :	1.240
Diameter, inches :	4.510
Wet Density, pcf :	85.7
Dry Density, pcf :	81.4
Initial Water Content, % :	5.3
Final Water Content, % :	5.2
Hanger + Lever Tare, kg :	36.60
Load on Hanger, kg :	.00
Load on Lever, kg :	6.40
Normal Stress, tsf :	1.00
Shear Defl. Const., in/div :	.0004
Shear Load Const., kg/div :	.328
Normal Defl. Const., in/div :	.001

Elapsed Time min	Shear Defl. Read. div	Normal Defl. Read. div	Shear Load Read. div	Shear Displ. inches	Normal Displ. inches	Shear Strain %	Shear Stress tsf
1.0	.0	.0	.0	.000	.0000	.0	.00
2.0	1.0	.1	29.0	.000	.0001	.0	.09
3.0	3.0	.1	54.0	.001	.0001	.0	.18
4.0	8.0	.2	73.0	.003	.0001	.1	.24
5.0	12.0	.3	79.5	.005	.0002	.1	.26
6.0	23.0	.6	92.0	.009	.0003	.2	.30
7.0	40.0	1.1	105.0	.016	.0006	.4	.34
8.0	60.0	2.0	120.5	.024	.0010	.5	.39
9.0	95.0	3.1	137.5	.038	.0016	.8	.45
10.0	115.0	3.8	144.5	.046	.0019	1.0	.47
11.0	130.0	4.1	141.0	.052	.0021	1.2	.46
12.0	140.0	4.3	138.5	.056	.0022	1.2	.45
13.0	150.0	4.4	136.0	.060	.0022	1.3	.44
14.0	160.0	4.5	139.0	.064	.0023	1.4	.45
15.0	170.0	4.5	136.5	.068	.0023	1.5	.44
16.0	185.0	4.6	136.0	.074	.0023	1.6	.44
17.0	200.0	4.6	138.5	.080	.0023	1.8	.45
18.0	215.0	4.7	140.0	.086	.0024	1.9	.46
19.0	230.0	4.7	140.0	.092	.0024	2.0	.46
20.0	260.0	4.8	144.0	.104	.0024	2.3	.47
21.0	285.0	5.1	156.0	.114	.0026	2.5	.51
22.0	350.0	6.6	173.0	.140	.0033	3.1	.56
23.0	430.0	8.1	188.0	.172	.0041	3.8	.61
24.0	550.0	9.1	204.5	.220	.0046	4.9	.67
25.0	640.0	9.5	214.0	.256	.0048	5.7	.70
26.0	775.0	9.7	223.0	.310	.0049	6.9	.73
27.0	870.0	9.7	226.0	.348	.0049	7.7	.74
28.0	980.0	9.5	226.5	.392	.0048	8.7	.74
29.0	1200.0	9.1	226.5	.480	.0046	10.6	.74
30.0	1250.0	9.0	226.5	.500	.0045	11.1	.74

Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORING D-11, S-3

March 2004 22-1-02081-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

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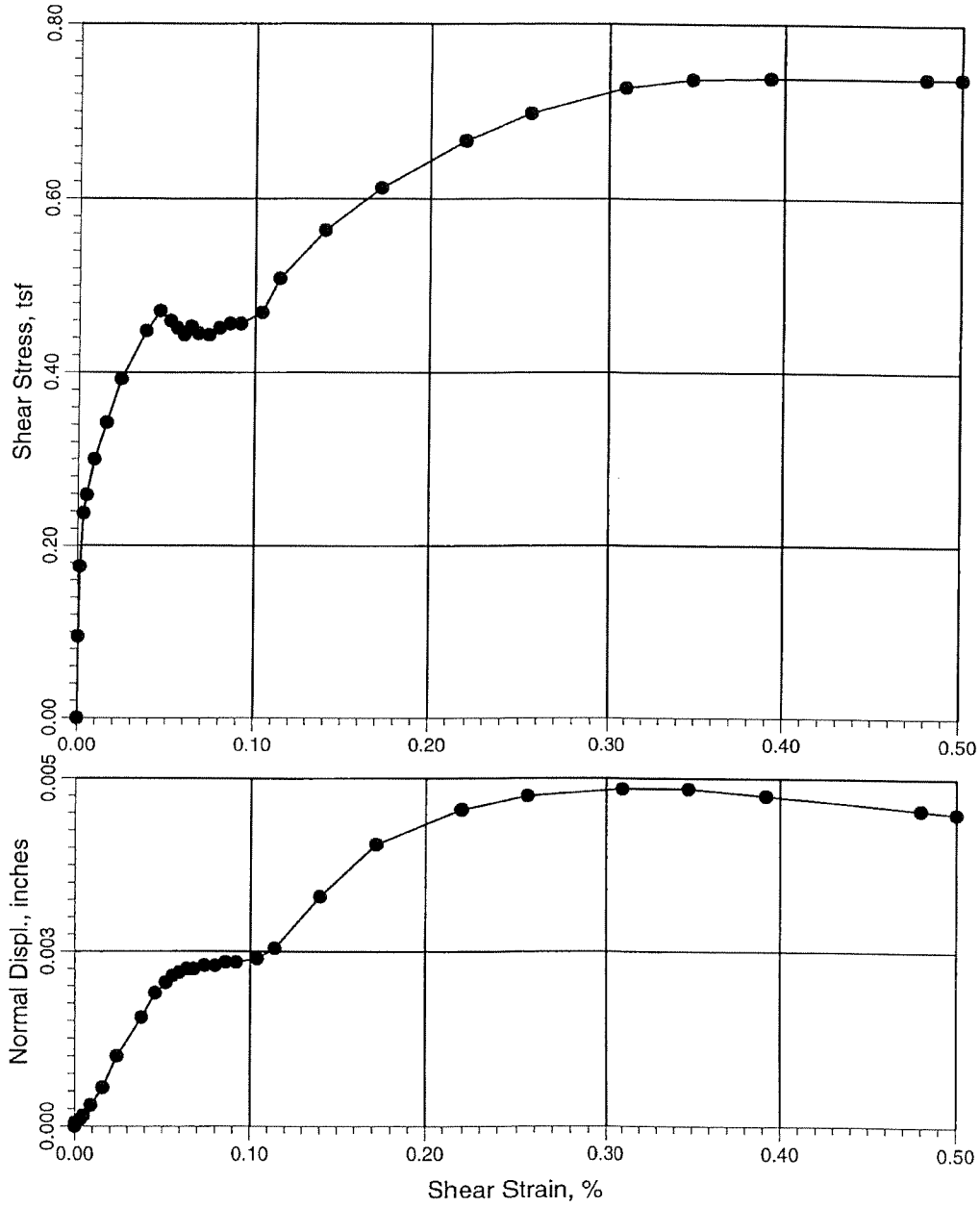
DIRECT SHEAR TEST NO. 1
STRESS AND NORMAL DISPLACEMENT VS STRAIN

Boring	D-11	Tested By / Date	JFL 3-2-04
Sample	S-3	Calc. By / Date	JFL 3-3-04
Depth, ft.	13	Check By / Date	



Normal Stress, tsf = 1.00

Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORING D-11, S-3

March 2004 22-1-02081-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

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DIRECT SHEAR TEST NO. 2
SUMMARY OF TEST DATA

Boring	E-3	Tested By / Date	JFL 3-3-04
Sample	S-1	Calc. By / Date	JFL 3-4-04
Depth, ft.	5	Check By / Date	

CLASSIFICATION:
Brown, fine sandy SILT; ML

SAMPLE DATA:
Spec. Grav. (est.) : 2.70
Specimen : COMPACTED

SPECIMEN DATA:

	Before Test
Height, inches :	1.240
Diameter, inches :	4.510
Wet Density, pcf :	85.7
Dry Density, pcf :	81.1
Initial Water Content, % :	5.6
Final Water Content, % :	5.6
Hanger + Lever Tare, kg :	36.60
Load on Hanger, kg :	.00
Load on Lever, kg :	16.40
Normal Stress, tsf :	1.99
Shear Defl. Const., in/div :	.0004
Shear Load Const., kg/div :	.328
Normal Defl. Const., in/div :	.001

Elapsed Time min	Shear Defl. Read. div	Normal Defl. Read. div	Shear Load Read. div	Shear Displ. inches	Normal Displ. inches	Shear Strain %	Shear Stress tsf
1.0	.0	.0	.0	.000	.0000	.0	.00
2.0	1.0	.1	51.0	.000	.0001	.0	.17
3.0	4.0	.5	76.0	.002	.0003	.0	.25
4.0	9.0	1.3	94.0	.004	.0007	.1	.31
5.0	19.0	2.7	115.0	.008	.0014	.2	.37
6.0	30.0	4.0	129.5	.012	.0020	.3	.42
7.0	50.0	6.2	148.5	.020	.0031	.4	.48
8.0	70.0	8.1	168.0	.028	.0041	.6	.55
9.0	110.0	11.5	194.5	.044	.0058	1.0	.63
10.0	135.0	13.4	212.0	.054	.0067	1.2	.69
11.0	165.0	15.5	232.0	.066	.0078	1.5	.76
12.0	200.0	17.6	251.5	.080	.0088	1.8	.82
13.0	240.0	19.9	267.5	.096	.0100	2.1	.87
14.0	260.0	20.6	272.0	.104	.0103	2.3	.89
15.0	280.0	21.2	275.0	.112	.0106	2.5	.90
16.0	290.0	21.4	270.0	.116	.0107	2.6	.88
17.0	310.0	21.6	267.0	.124	.0108	2.7	.87
18.0	345.0	22.0	267.0	.138	.0110	3.1	.87
19.0	360.0	22.1	263.0	.144	.0111	3.2	.86
20.0	390.0	22.4	288.0	.156	.0112	3.5	.94
21.0	450.0	24.8	314.5	.180	.0124	4.0	1.03
22.0	490.0	26.3	328.0	.196	.0132	4.3	1.07
23.0	550.0	28.1	343.5	.220	.0141	4.9	1.12
24.0	630.0	30.5	362.0	.252	.0153	5.6	1.18
25.0	710.0	32.5	376.5	.284	.0163	6.3	1.23
26.0	810.0	34.5	391.0	.324	.0173	7.2	1.27
27.0	900.0	35.6	400.0	.360	.0178	8.0	1.30
28.0	1000.0	36.7	407.0	.400	.0184	8.9	1.33
29.0	1100.0	37.6	414.5	.440	.0188	9.8	1.35
30.0	1235.0	38.7	422.0	.494	.0194	11.0	1.38

Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORING E-3, S-1

March 2004 22-1-02081-001

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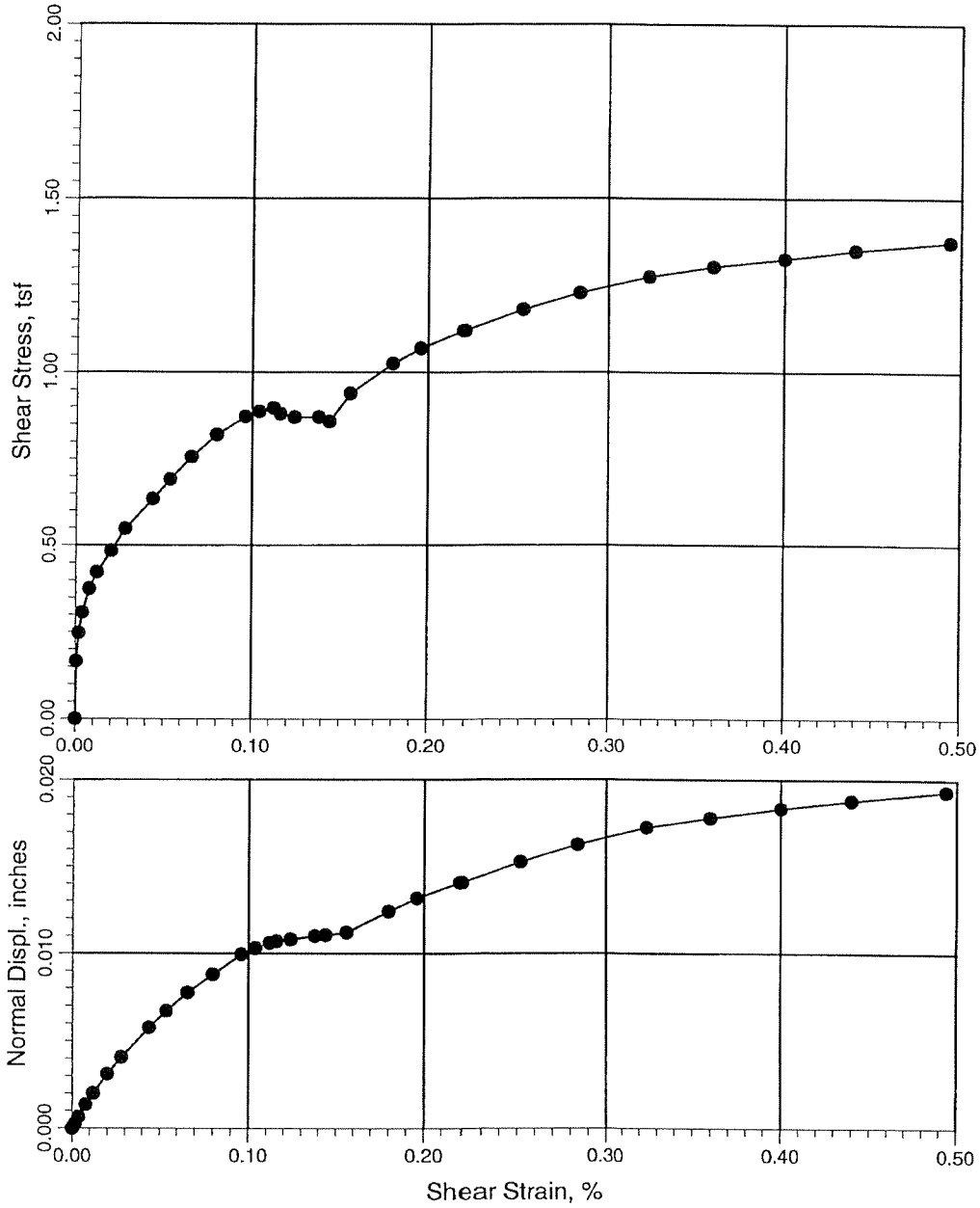
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

i:\Groups\Lab\LabPrgm\Projects\22-02081\ESS1TWOTSF.DSH :: 3/5/2004 9:11:36 AM

DIRECT SHEAR TEST NO. 2
STRESS AND NORMAL DISPLACEMENT VS STRAIN

Boring	E-3	Tested	By / Date JFL	3-3-04
Sample	S-1	Calc.	By / Date JFL	3-4-04
Depth, ft.	5	Check	By / Date	



Normal Stress, tsf = 1.99

Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORING E-3, S-1

March 2004 22-1-02081-001

SHANNON & WILSON, INC.
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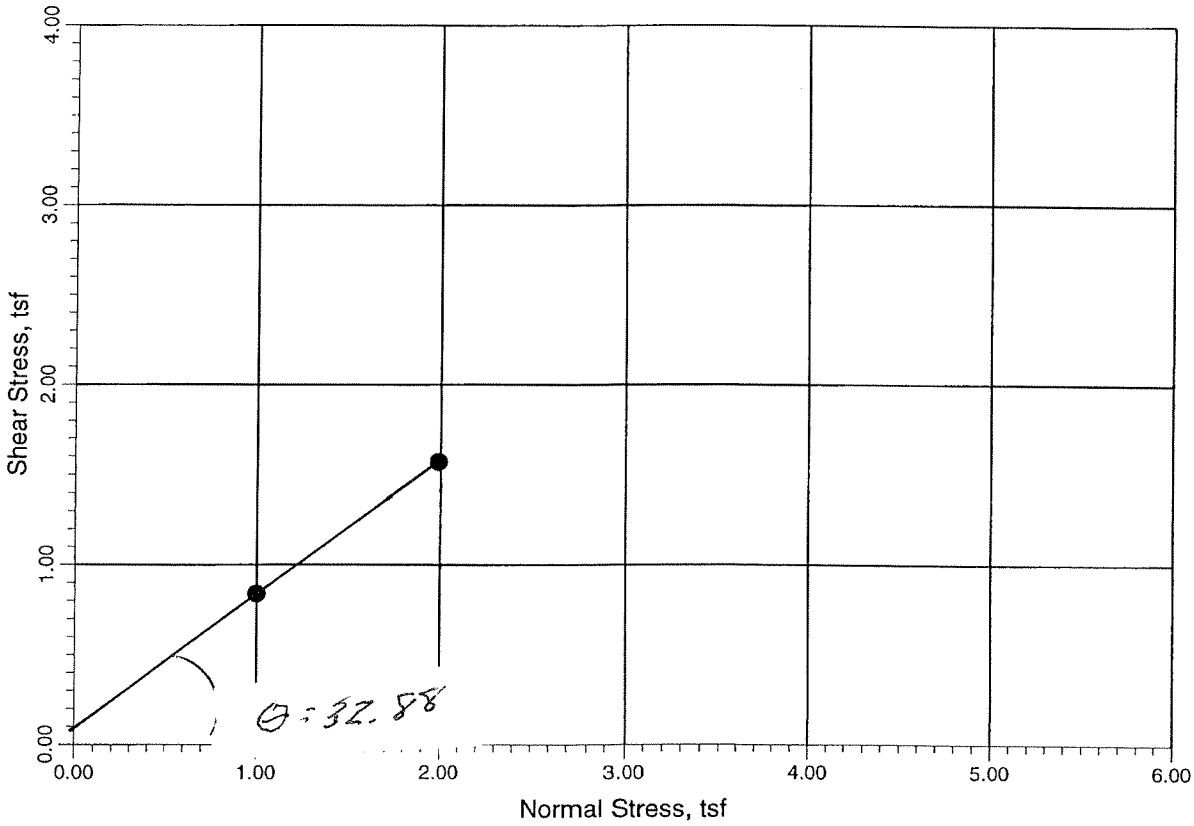
FIG. 4

i:\Groups\Lab\LabPrgm\Projects\22-02081\E3S1TWOTSF.DSH :: 3/5/2004 9:11:52 AM

DIRECT SHEAR TEST, PEAK STRESS
MOHR DIAGRAM

Test ID:	1	2
Boring:	D-11	E-3
Sample:	S-3	S-1
Depth, ft:	13	5
Normal Stress, tsf:	1.00	1.99
Peak Stress, tsf:	.84	1.57

Failure Criteria: Peak Stress



I:\Groups\Lab\LabPrgm\Projects\22-02081\D11S3E3S1.MHR :: 9/9/2004 11:37:01 AM

Shephards Ridge Wind Energy Project
Cecil, Oregon

DIRECT SHEAR TEST
BORINGS D-11, S-13 AND E-3, S-3

March 2004 | 22-1-02081-001

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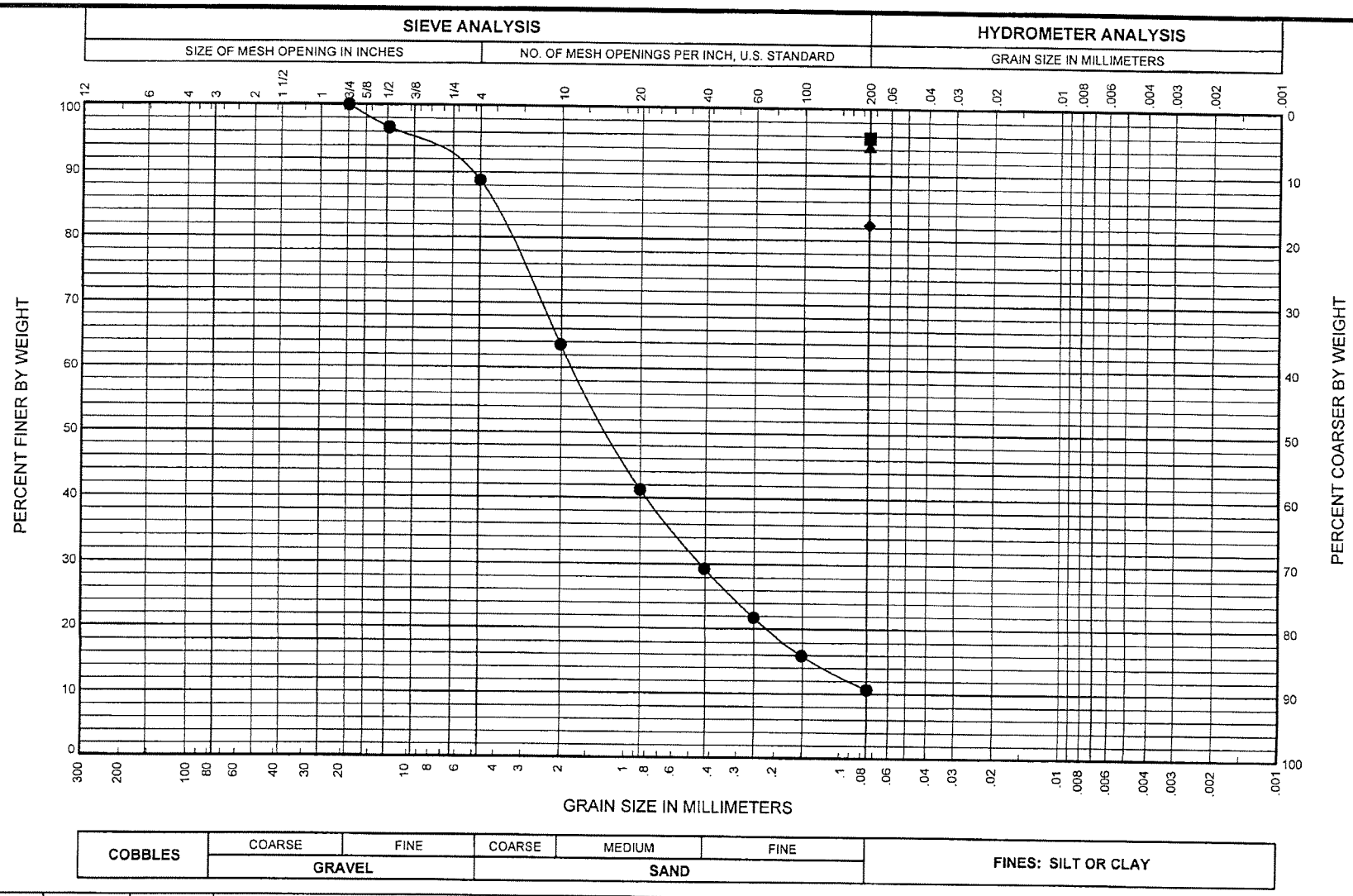
FIG. 5



BORING AND SAMPLE NO.	DEPTH (feet)	U.S.C.S. SYMBOL	SAMPLE DESCRIPTION	FINES %	NAT. W.C. %	LL %	PL %	PI %
● A-10, S-2	10.5	SW-SM	Brown, slightly silty SAND with slightly gravel size weathered rock	10.7	18.1			
■ D-11, S-3	13.7	ML	Brown SILT, trace of fine sand and clay	95.7	5.0			
▲ E-10, S-2	12.5	ML	Brown, slightly fine sandy SILT, trace of clay	94.5	7.9			
◆ E-3, S-1	5.6	ML	Brown, fine sandy SILT	82.4	6.0			

Shepherds Ridge Wind Energy Project
Cecil, Oregon

GRAIN SIZE DISTRIBUTION

March 2004 22-1-02081-001

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Geotechnical and Environmental Consultants

FIG.

FIG.

GSAMAIN1 22-02081.GPJ SHAN WIL.GDT 3/5/04

APPENDIX D

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your

report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the

ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

Wildlife Assessment for the Shepherds Flat Wind Farm

Prepared for:
LifeLine Renewable Energy, Inc.

Prepared by:
Rick Welch, Environmental Scientist
Lana Schleder, Environmental Scientist
Energy Northwest Environmental Services

November 2006

Overview

This report summarizes approximately two years of environmental monitoring data collected at the proposed Shepherds Flat Wind Farm, and includes results from surveys of avian use, raptor nesting, breeding birds, Washington ground squirrels and burrowing owls. The subject property includes approximately 32,100 acres located in north-central Oregon between the city of Arlington and Willow Creek (LifeLine 2006). The project is comprised of two distinct areas: the northern property (NP), a shrub-steppe habitat influenced by nearly 100 years of sheep grazing activity (Link *et al.*, 2003); and the southern property (SP), characterized by dry-land wheat farming practices.

No endangered avian species were encountered and only one observation of a threatened species occurred during the course of the study. There were no indications of Washington ground squirrels and only a few observations of burrowing owls were recorded in the project area. For species with special status listings, only Swainson's hawks, ferruginous hawks, and long-billed curlews were found in significant numbers and/or at locations that warranted some concern. Raptor nesting surveys identified only ten active nests within close proximity of proposed turbine locations. Richness of avian species and mean use estimates were low, similar to those found at other wind energy conversion facilities in the region. Overall, raptor use was similar to that observed at the Buffalo Ridge Minnesota and Foote Creek Rim Wyoming facilities, where raptor mortality has been low.

Adverse avian impacts from construction or operation of the Shepherds Flat Wind Farm are expected to be low, as is generally the case for modern wind energy conversion facilities. Concerns regarding potential construction impacts on breeding birds in the NP study area, including two special status species, can be lessened considerably by avoiding construction during the breeding season.

Methods

Avian Surveys

Northwest Wildlife Consultants (NWC) was responsible for the initial program design and locations of plots 1 – 25, and performed the fall 2002 and initial winter 2002 (early November) surveys. Energy Northwest Environmental Services conducted all subsequent surveys from winter 2002 (late December) through fall 2004, assigned locations for plots 26 – 46, and was responsible for all data interpretation. The methods implemented by NWC were used throughout the study period for consistency purposes.

Fixed-point circular plots, each with a viewing area approximately 800 m in radius, were used to assess avian use within the project area (Figure 1). Observations were performed during daylight hours, with each plot surveyed for 20 minutes. The number of observations, mean use estimates (number of birds/20 minute survey) and frequency of occurrence estimates (how often a species was observed during a 20 minute survey, expressed as % of surveys) within 800 m were calculated by species and season. Observations outside of the 800 meter viewing area were used to compile the total species list for the project area and for discussions related to notable events and species with special status rankings.

Observations were initiated in September 2002 at twenty-five survey plots, numbered 1 through 25. Several reconfigurations of the project, including the acquisition of adjacent properties (particularly in the SP area), resulted in the establishment of several sets of additional plots, three in December 2002 (plots 26 – 28), three in March 2003 (38 – 40), and six in August of 2004 (41 – 46). With the exception of plots 41 through 46, which were surveyed for one season (fall 2004), the monitoring period for each set of survey plots was approximately one year in duration. Thus, the majority of the project area was surveyed between September 2002 and August 2003 (Table 1).

Initially, areas of the current Shepherds Flat project were considered as separate wind projects. One project, Shepherds Ridge Wind Farm, was permitted at the county level. Shepherds Ridge included several survey plots located in the SP area. A wildlife assessment of the Shepherds Ridge project was completed in November 2003 (Welch 2003). The information from that study has been incorporated into this report.

To facilitate comparison of seasonal use estimates from this study with results from other wind projects, seasons are defined as follows:

Fall	August 16 – October 31
Winter	November 1 – March 15
Spring	March 16 – May 15
Summer	May 16 – August 15

In fall 2002, weekly surveys commenced September 6 and continued through October 28. Information obtained from observations at plots 1 – 25 was used for assessing this period. A total of 216 surveys were performed during 9 visits.

Winter surveys were performed weekly for the first two weeks in November 2002, and then every other week beginning December 22, 2002 and ending March 5, 2003. Property boundary adjustments in late-November resulted in the elimination of one plot (8), the relocation and re-labeling of two plots (6 and 7, changed to 6A and 7A), and the establishment of three additional plots (26, 27, and 28). Data from plots 1 – 28 were used to assess the winter period. A total of 204 surveys were performed during site visits varying from two at plots 6 – 8, six at plots 6A, 7A, and 26 – 28, and eight at all remaining plots.

Spring surveys were performed on a weekly basis, beginning March 19 and ending May 15, 2003. The acquisition of new property resulted in the establishment of three additional plots (38 – 40) prior to initiation of the spring study period. Data from plots 1 – 28 and 38 – 40 were used to assess the spring period. A total of 232 surveys were performed during eight visits.

In summer 2003, surveys were performed every other week from May 22 through August 13. Data from plots 1 – 28 and 38 – 40 were used to assess the summer period. A total of 203 surveys were performed during seven visits.

Observations at plots 26 – 28 and 38 – 40 continued until mid-March 2004. A total of 60 surveys were performed during ten visits in fall 2003, and 58 surveys during ten visits in winter 2003-2004.

In fall 2004, surveys were performed on a weekly basis from August 19 through October 28. Data from plots 41 – 46 were used to assess this period. A total of 66 surveys were performed during eleven site visits.

Data from the point-count surveys collected over the two-year monitoring period were combined into seasonal data, and interpreted from an entire project perspective as well as from an individual study area (NP and SP) perspective. Information obtained from observations at plot 5 was not included in the analysis of point-count data because the site is not representative of the habitat type associated with turbine strings (valley bottom riparian vs. ridge top dry-land wheat) and its viewing area did not encompass any of the proposed turbine locations. Survey data from plot 5 were used to assess the total number of species observed within the general project area.

For data analysis, species were organized into six major groups, including: passerines, raptors (including vultures and owls), waterbirds, waterfowl, upland game birds, and doves.

Other assessments

Foot and vehicle raptor nest surveys of the Shepherds Flat study area were performed on April 16 and 17 and May 28 and 29, 2003. The project site and a buffer zone of approximately two miles were included in the survey. Habitat and/or structures suitable for nesting, including cliff areas, trees, and power poles, were examined. Areas assessed in 2003 were re-visited during the late-winter and spring periods in 2004 while performing point-count surveys.

Foot surveys were performed near proposed turbine string locations within areas of suitable habitat, including hillsides and field edges, for evidence of activity associated with burrowing owls and Washington ground squirrels. These surveys were performed in conjunction with avian plot surveys. The period of focused observation was from March through mid-June in 2003 and March through mid-May in 2004. Field notes of observations both on and off survey plots were recorded while assessing the project area from December 2002 through October 2004. These notes included avian and mammalian observations.

A breeding bird survey was performed by William and Nancy LaFramboise in 2003. They surveyed Eight-mile Canyon, beginning at its confluence with Willow Creek and running south/south-west for approximately six miles, ending near the intersection with Four-mile Canyon Road. The purpose of the survey was to provide additional information on the avian community, specifically breeding passerines, in the vicinity of the project. Most of the habitats associated with the canyon are not representative of the areas designated for turbine placement. This is particularly true in the SP area, where turbine placement is primarily in wheat fields. The canyon is represented by riparian areas, substantial stands of sage brush, cliff areas, and scattered pockets of juniper trees. Twenty stations, positioned at 0.3-mile intervals, were each monitored for 10 minutes using point-count techniques. Two surveys were performed, one in May and one in June.

Results

General Avian Observations

For the entire study period, 80 species of birds were documented in the Shepherds Flat study area while performing avian surveys and other wildlife related monitoring activities (Table 2). Eighteen of the 80 species were not observed during point-count surveys, but were recorded while performing breeding bird surveys, raptor nesting surveys, burrowing owl/ground squirrel surveys, in-transit observations, and observations associated with plot 5. No species listed as endangered at the federal or state level were observed in the project area. One species listed as threatened at both the federal and state level, the bald eagle, was recorded from one point-count survey performed in the NP study area. Several species with special status listings were observed within the project area, and include: long-billed curlew (federal species of concern, state sensitive), ferruginous hawk (federal species of concern, state sensitive), Swainson's hawk (state sensitive), western burrowing owl (federal species of concern, state sensitive), loggerhead shrike (state sensitive), sage sparrow (state sensitive), sandhill crane (state sensitive), Lewis' woodpecker (state sensitive), grasshopper sparrow (state sensitive), willow flycatcher (state sensitive), and bank swallow (state sensitive). All of the special status species, with the exception of the grasshopper sparrow, were observed during point-count surveys.

Point-count Surveys

A total of 9,415 individual bird sightings were recorded from 1039 20-minute point-count surveys conducted from September 6, 2002 through October 28, 2004. Sixty-two species were documented across the entire Shepherds Flat project area. Fall had the greatest number of species observed (41), followed by spring (40), summer (32), and winter (30). The NP study area produced 54 species out of 4984 individual observations from 652 surveys. The SP study area produced 43 species out of 4431 observations from 387

surveys. The NP study area had the greatest number of species for a specific season, with 32 species documented in both fall and spring (Table 3).

The mean number of bird species observed per survey (species richness) was highest in the spring (2.59 species/survey) followed by fall (1.74), summer (1.73), and winter (1.53). The highest and lowest species richness/study area occurred in the NP study area in spring (2.69 species/survey) and winter (1.36 species/survey), respectively.

For the entire Shepherds Flat project, avian use was highest in the winter (15.03 birds/survey) followed by fall (9.53), spring (5.66), and summer (4.45). The highest and lowest use occurred in the SP area in winter (25.53 birds/survey) and summer (3.51 birds/survey), respectively.

Passerines had the highest use of all bird groups during all seasons for the entire project, and also had the highest use in the NP and SP study areas (Table 4). Passerine use was highest in the winter and lowest in summer for both the overall project and the SP study area. For the NP study area, passerine use was highest in the fall and lowest in the summer. Overall raptor use was highest in the fall and lowest in the winter, as was the case for the SP study area. The NP study area had the highest raptor use estimates in the summer and lowest in the winter. Raptor use was higher in the SP area than in the NP area during all seasons. Waterbird use was highest in the winter and lowest in the summer, both overall and for the NP study area. Waterbird use in the SP study area was highest in the spring and lowest in the fall and winter. The NP area had higher waterbird use than the SP area for all seasons, with considerably higher use estimates in the fall, winter, and summer. Waterfowl use was highest in the winter across the entire project and lowest in the summer. The NP and SP study areas produced the highest waterfowl use in the winter. The lowest waterfowl use for the NP and SP areas occurred in the summer and fall, respectively. Waterfowl use was considerably higher in the SP study area than the NP study area. Upland game-bird use was highest in the winter and lowest in the summer, both overall and for the SP area. The NP area had highest use for this group in the fall. Doves were most numerous in the fall and least numerous in the winter across the entire project as well as for the NP and SP study areas. Dove use was higher in the SP study area than in the NP study area.

Fall: For the entire project, passerines were the most abundant avian group (7.97 birds/survey), followed by waterbirds (0.73), and raptors (0.55). Passerines made up 83.6% of the avian use, followed by waterbirds at 7.7% and raptors at 5.8%. Passerines were observed during 83.6% of the surveys, followed by raptors at 29.5% and waterbirds, upland game birds, and doves at 2.6% (Table 4). Horned lark (4.14 birds/survey), unidentified passerine (0.99), American pipit (0.61), western meadowlark (0.51), and Eurasian starling (0.28) were the five small bird species with the highest fall use (Table 5). Killdeer (0.72), common raven (0.64), Swainson's hawk (0.18), Canada goose (0.15), and black-billed magpie (0.10) were the five large bird species with the highest fall use. Horned lark made up 43.4% of the total avian use, and were observed during 65.8% of the surveys. For raptors, Swainson's hawk made up 1.8% of the total avian use, and were observed during 5.3% of the surveys. Killdeer comprised 7.6% of the avian use, and were observed during 2.0% of the surveys. For the NP and SP study areas, the same pattern was generally observed with passerines producing the highest use, percent composition, and frequency of occurrence. Horned lark (3.23), unidentified passerine (1.19), and American pipit (1.15) had the highest use for small bird species in the NP area (Table 6). The observations for American pipit in the NP area accounted for 100% of the use estimates for this species across the entire Shepherds Flat project area. For large bird species, the NP area was similar to the overall project in that killdeer and common raven had the highest avian use. Common raven and Swainson's hawk had the highest use for large bird species in the SP area (Table 7). Swainson's hawk made up 46.1% of the use estimates for raptors in the SP area and 98.3% of the total observations of this species for the entire project. Four of the top five use estimates for large birds in the SP area were raptors.

Winter: Passerines (8.71 birds/survey), waterfowl (3.95), and waterbird (1.92) were the three most abundant avian groups for the NP and SP study areas combined. Passerines made up 58.0% of the avian use, with waterfowl and waterbird at 26.3% and 12.8%, respectively. Passerines were observed in 79.0% of the surveys, with raptors at 24.8% and waterfowl at 7.6%. Horned lark (6.39), unidentified passerine

(0.55), house finch (0.43), western meadowlark (0.19), and American goldfinch (0.16) were the five small bird species with the highest winter use. Canada goose (3.91), killdeer (1.92), common raven (0.64), rough-legged hawk (0.08), and black-billed magpie (0.08) were the five large bird species with the highest use for this period. Horned lark made up 42.5% of the total winter use and were observed during 59.9% of the surveys. Canada goose and killdeer made up 26.0% and 12.8% of the use and were observed during 6.5% and 1.1% of the surveys, respectively. Small bird use in the NP area was dominated by horned lark (2.64), followed by house finch (0.64) and unidentified passerine (0.44). Large bird use was represented by killdeer (2.96) and Canada goose (1.07). Killdeer in the NP area accounted for 31.7% of the total avian use for this area and 100% of the observations for this species across the entire Shepherds Flat project area. Golden eagle (0.06), red-tailed hawk (0.04), and northern harrier (0.04) were the three raptor species with the highest use in the NP area. In the SP study area, horned lark (13.32) comprised 86.5% of the passerine use and 52.2% of the total avian use for this area. Canada goose (9.16) made up 98.9% of the waterfowl use and 35.9% of the total use for this area, as well as comprising 82.2% of the observations for this species across the entire Shepherds Flat project. Canada goose observations were characterized by a few flocks containing large numbers of individuals, which is reflected in the low frequency of occurrence (7.6%). Raptor use was dominated by rough-legged hawk (0.21), which is 39.6% of the total use for this avian group in the SP area.

Spring: For the entire Shepherds Flat project, passerines (3.88 birds/survey), waterbird (1.20), and raptor (0.44) were the three avian groups with the highest use. Passerines made up 68.4% of the total avian use and were observed in 94.8% of the surveys. Waterbirds and raptors comprised 21.2% and 7.8% of the use estimates and were observed during 42.7% and 33.6% of the surveys, respectively. Horned lark (2.10), western meadowlark (0.87), cliff swallow (0.09), Brewer's blackbird (0.07), and red-winged blackbird (0.07) were the five small bird species with the highest use. Long-billed curlew (0.77), common raven (0.36), unidentified gull (0.22), sandhill crane (0.13), and northern harrier (0.10) were the five large bird species with the highest spring use. Horned lark and western meadowlark made up 37.1% and 15.4% of the use estimates and were observed during 73.7% and 52.2% of the surveys, respectively. For large birds, long-billed curlew comprised 64.2% of the use estimates for waterbird and 13.6% of the total avian use. Long-billed curlews were observed during 40.5% of the surveys. Unidentified gull and sandhill crane ranked in the top five for use in the large bird category but were only observed during 2.2% and 0.9% of the surveys, respectively. For raptors, northern harrier (0.10) and Swainson's hawk (0.10) had the highest use estimates, each comprising 22.7% of the total use for this group and were observed during 9.5% and 7.3% of the surveys, respectively. For the NP and SP study areas, horned larks and western meadowlarks dominated the use estimates for small birds. Large bird use in the NP area was dominated by long-billed curlew (1.06), which made up 84.8% of the total use for waterbirds in this area. Observations of long-billed curlew in the NP area accounted for 95.0 % of the total observations for this species across the entire Shepherds Flat project. For the SP area, unidentified gull (0.60) and sandhill crane (0.36) had the highest use for large birds, together accounting for 88.9% of the use estimates for waterbirds. Additionally, unidentified gull and sandhill crane observations in the SP area comprised 82.7% and 83.9% of the total observations for these species across the entire Shepherds Flat project area. Swainson's hawk (0.19) and rough-legged hawk (0.15) were the two raptor species with the highest use in the SP area. California quail (0.19) accounted for 100% of the use estimates for upland game-bird in the SP area as well as the entire project area.

Summer: Passerines (3.43 birds/survey), raptors (0.49), and waterbirds (0.48) were the three bird groups with the highest use for the entire Shepherds Flat project. Passerines made up 77.0% of the total avian use, with raptors and waterbirds comprising 11.0% and 10.7%, respectively. Passerines, raptors, and waterbirds were observed during 79.8%, 32.0%, and 14.8% of the surveys, respectively. Horned lark (2.16), western meadowlark (0.38), bank swallow (0.13), western kingbird (0.08), and red-winged blackbird (0.06) were the five small bird species with the highest use. Long-billed curlew (0.37), common raven (0.35), red-tailed hawk (0.13), Swainson's hawk (0.10), and ring-billed gull (0.09) were the five large bird species with the highest summer use. Horned larks made up 63.0% of the use for passerines and 48.5% of the total avian use. Long-billed curlews comprised 77.1% of the waterbird use and were observed during 11.8% of the surveys. Combined, red-tailed hawks and Swainson's hawks made up 46.9% of the use estimates for raptors and were observed during 9.9% and 6.4% of the surveys,

respectively. Horned larks were the most abundant species in both the NP and SP study areas. For small bird use, horned larks were followed by western meadowlarks (0.49) and bank swallows (0.14) in the NP area, and by red-winged blackbirds (0.18) and western meadowlarks (0.13) in the SP area. Long-billed curlew (0.47) and common raven (0.41) had the highest use for large bird species in the NP area. Observations of long-billed curlew in the NP area accounted for 88.0% of the total observations for this species across the entire Shepherds Flat project. Red-tailed hawk (0.22) and Swainson's hawk (0.22) were the two raptor species with the highest use in the SP area. Together, these two species made up 62.0% of the total use for this avian group in the SP area.

Other Surveys

Suitable nesting habitat is scarce in the project area, and is limited primarily to scattered clusters of juniper trees in the Eight-mile Canyon/Horn Butte area, small isolated cliff faces in Eight-mile Canyon and adjacent to the Columbia River, wood and metal power pole structures, and a few large trees associated with human dwellings. Nesting activity was low in the project area, with only ten active and five inactive nest sites identified. For active nest sites, seven were identified in the NP area and three in the SP area. In the NP area, there were three active red-tailed hawk nests, two of which were within 0.5 miles of the nearest proposed turbine string (one NW of the project boundary near plot 16, one within the project boundary near plot 25). The other red-tailed hawk nest was located in the Willow Creek valley, approximately one mile from the nearest proposed turbine. One ferruginous hawk nest was identified near plot 23 in the Horn Butte area, approximately 0.75 miles from the nearest proposed turbine. Two great-horned owl nests were identified, one located in the Horn Butte area and the other in the bottom of Eightmile Canyon. Both nests are approximately 0.5 miles from the nearest proposed turbine locations. One golden eagle nest was identified in a metal power pole structure near Willow Creek and Rhea Road. This nest is approximately 0.75 miles from the nearest proposed turbine string. Other nests in the NP area include two common raven nests in power pole structures near plots 14 and 25, and a few black-billed magpie nests constructed in juniper trees in the Horn Butte area. The three active nests in the SP area were occupied by red-tailed hawks. Two of the nests were located in the Willow Creek valley, with the nearest nest approximately 0.3 miles east of the nearest proposed turbine string. The other nest was located in Fourmile Canyon and was approximately 0.5 miles west of the nearest proposed turbine string. One common raven nest was identified approximately 5.5 miles south of the project along Fourmile Canyon Road.

No indications of Washington ground squirrels were found in the area of the proposed facility during the spring periods of focused observation, nor were any indications found during the balance of the study. Surveys of habitat suitable for burrowing owls showed no evidence of activity associated with this species during the breeding season. There were, however, three observations of burrowing owls recorded in the project area, two in mid-August 2003 and one in early September 2003.

One observation of a white-tailed jackrabbit (a state sensitive species) was recorded near plot 23 in August 2003 while performing avian point-count surveys. Black-tailed jackrabbits were observed on multiple occasions throughout the study area. Other mammalian observations included antelope, mule deer, coyote, yellow-bellied marmot, and badger. Antelope were observed primarily in the NP study area, with the majority of the sightings on Hurlburt Flat. Many coyote observations were recorded throughout the project area, with several sightings associated with sheep grazing activity. Mule deer were also observed throughout the project area, primarily in the Horn Butte and Eightmile Canyon areas. Yellow-bellied marmots were associated with rock outcroppings on Hurlburt Flat and near plot 28. One badger observation was recorded near plot 7A. Evidence of agricultural pests, such as pocket gophers, was also encountered.

Discussion

General Observations and Comparisons to other sites

For the entire Shepherds Flat project, overall avian use was higher in the SP area (agricultural landscape) than the NP area (native landscape). This is directly attributable to high winter use estimates recorded in the SP area. Excluding winter, seasonal use estimates in the NP and SP study areas were very similar to one another, and were actually slightly higher in the NP area. The higher winter use estimates are due primarily to the large flocks of horned larks and Canada geese recorded in the SP area during this period. The use of grain fie lds by large flocks of waterfowl, particularly Canada geese, is a common occurrence in the region during the winter. The general pattern of seasonal use estimates recorded at Shepherds Flat, with winter having the highest use and summer the lowest, has been observed at other wind projects in the region (e.g. Nine Canyon and Zintel Canyon, WEST 2002 and Erickson *et al*. 2001).

Passerine use was dominated by horned larks during all seasons and in both study areas. Western meadowlarks generally followed, only occasionally surpassed on a seasonal and study area basis by a few other species, including the American pipit, house finch, American goldfinch, Brewer's blackbird, and red-winged blackbird. With the exception of horned larks and western meadowlarks, the other species were typically observed on only a few occasions and in relatively large flocks. The same general trend in passerine use has been observed at other wind projects in the region, including Nine Canyon and Zintel Canyon.

Waterfowl use of the project was basically confined to the winter period and was almost exclusively limited to observations of Canada geese. Waterfowl use recorded during the other seasons was very low. With the exception of long-billed curlews, waterbird use in the area was characterized by a few observations of relatively large flocks of killdeer, sandhill crane, and various gull species. The majority of the observations of killdeer and sandhill crane were likely associated with fall and spring migration.

Mean raptor use estimates for Shepherds Flat Wind Farm were compared to raptor use estimates from several wind projects in and outside of the Pacific Northwest (Erickson *et al.* 2002). Overall raptor use at Shepherds Flat was similar to Buffalo Ridge Reference Area and Foote Creek Rim UV for fall and summer periods, Nine Canyon for winter, and Klondike and Foote Creek Rim UV for spring (Table 8). Raptor use in the NP area was compared to use estimates from projects located within predominately native landscapes. Overall, use was most similar to the Foote Creek Rim Morton's Pass Reference and Simpson's Ridge areas. The SP area was compared to use estimates from projects located within agricultural landscapes and appears to be most similar to the Buffalo Ridge projects. Regionally, fall, spring, and summer use was higher in the SP area than at Condon, Klondike, and Nine Canyon. Winter use in the SP area was higher than Condon and Nine Canyon, but very similar to Klondike, Zintel Canyon, and Stateline/Vansycle.

Raptors were observed more often in the SP area than in the NP area, with differences associated with individual species. Swainson's hawks, rough-legged hawks, and to a lesser extent red-tailed hawks, preferred the agricultural landscapes associated with the SP study area. Golden eagles, ferruginous hawks, and northern harriers were more often observed at plots located in the native landscapes of the NP study area. Behavior patterns and prey preferences specific to individual species probably help explain these results. Americ an kestrels were distributed fairly evenly throughout the project area.

Plots of flight paths of raptors indicate a fairly uniform distribution in the NP area whereas the SP study area had the majority of observations associated with the edges or rims of the ridges. The topography in the project area creates more ridge soaring opportunities in the SP area than in the NP area, where it is generally limited to the west/southwest facing slopes in the Eight-mile canyon and Horn Butte areas. Greater than three-quarters of the raptor observations in the SP area were associated with the ridge edge or rim and the majority of these had flight paths that were parallel to the ridge edge, and thus parallel to the proposed turbine strings. Approximately 75% of the raptor observations in the SP area and 50% in the

NP area have flight paths considered to have a low probability of intersecting proposed turbine strings. Concerns regarding the proposed placement of one turbine near plot 7A, brought to light in the Shepherds Ridge report (Welch 2003), were addressed by a follow-up study performed in 2004 (Welch 2004). The results of the follow-up study indicated that the proposed location of the turbine would not have an adverse impact on raptors.

Special Status Species

Bald eagles are known to winter along the Columbia River and were observed on a few occasions en-route from the Tri-cities to the project site, primarily between Boardman and Arlington. Only one observation of this species was recorded within the project area from point-count surveys (including 262 surveys performed during the winter period), in-transit observations, and other wildlife assessments. Ferruginous hawks were primarily observed near Horn Butte in the NP study area. Juniper trees in this area provide some nesting opportunities for this species, and one documented nest site is located near plot 23. Although there are no turbines proposed in the immediate area of plot 23, access to turbines proposed near plot 40 to the southwest and plots 22 and 24 to the north may pass through this area. Swainson's hawks were observed more often during the fall period and primarily in the SP study area. This species is known to form large migrating flocks and a few observations in the project area confirm this finding. Approximately 25 Swainson's hawks were observed during one survey at plot 43 in August of 2004, working behind a tractor tilling a wheat field. Although no nest sites were recorded for this species, the number of observations in spring and summer suggests that this species does nest in the vicinity of the project. Burrowing owls were observed on only three occasions in the project area, and only one of the observations was associated with a survey plot. None of the observations occurred during the breeding season as all were recorded during late August and early September. These possibly represented migrants passing through the area.

The majority of the observations of long-billed curlews occurred at plots located in the NP study area and, more specifically, at plots located on Hurlburt Flats. This area appears to provide adequate breeding opportunities for this species, as behaviors typical of nesting adults were recorded throughout the spring and early summer periods. There were only two observations of sandhill cranes recorded in the project area – both were in the spring and probably represent passing migrants. One flock contained 26 individuals and was recorded in the SP area.

Loggerhead shrikes were observed on twelve occasions during point-count surveys. Several observations were also recorded while traveling between survey plots. All observations were associated with landscapes containing some degree of sage brush habitat. One loggerhead shrike family (adults and several juveniles) was observed in Eight-mile Canyon while conducting raptor nesting surveys. One observation of a sage sparrow was recorded at plot 19 in June of 2003, and one observation of a grasshopper sparrow was recorded while in-transit near plot 21 in July of the same year. Both of these areas are located immediately adjacent to Eight-mile Canyon, which contains habitat suitable for these two species. Two Lewis' woodpeckers were observed while performing a survey at plot 39 in May of 2003. One other observation was recorded in the Horn Butte area while performing raptor nesting surveys. The observations may represent the migration of this species through the project area. One willow flycatcher observation was recorded in the Horn Butte area while performing raptor nesting surveys. Suitable habitat for this species is scarce in the project area, and occurs only in isolated pockets in Eight-mile Canyon and along Willow Creek. The majority of bank swallow observations were recorded while performing surveys at plot 5 in late spring and summer periods. Plot 5 represents habitat more suitable to this species as it is located in the bottom of the valley next to Willow Creek. A few observations were also recorded during the summer period at survey plots located primarily in the Hurlburt Flat area.

The one observation of a white-tailed jackrabbit recorded near plot 23 represents the only sighting for this species in the project area for the entire study period. Suitable habitat for this species is found primarily in the Horn Butte and Eight-mile Canyon area. Impact from the project on this species is expected to be minimal as there are only a few turbines proposed to be located in areas identified as being somewhat

suitable for this species, represented by turbines proposed near plot 22 and west of plot 23. Impacts would be primarily associated with minor disturbances caused by increased traffic from construction vehicles gaining access to these sites.

Other special status species that were not observed during the course of the study but have the potential to occur in or near the project area include: peregrine falcon (state endangered), American white pelican (state sensitive), greater sage grouse (federal species of concern, state sensitive) Washington ground squirrel (federal candidate, state endangered), and northern sagebrush lizard (federal species of concern, state sensitive).

Conclusions

Results of avian use studies indicate relatively low use and diversity in the Shepherds Flat Wind Farm project area. Only 62 species were identified during a two-year study, and mean number of species observed per survey was low for all seasons. Wind facility-related risks to threatened or endangered species appears to be extremely low in the Shepherds Flat area, as no endangered species were encountered and only one observation of a threatened species was recorded during the entire study period. Eleven species with special status listings were observed in the project area, with Swainson's hawks, ferruginous hawks, and long-billed curlews the only species that occurred in sufficient numbers and/or at locations that warranted some concern. Other special status species occurred in such low numbers and/or were observed in areas not designated for turbine placement that wind facility-related risks appear to be very low.

Impacts associated with construction activities appear to be very low in the SP study area as nearly all turbines, including access/service roads, are proposed to be located in tilled fields. The most likely impacts to wildlife will be from disturbances related to increased traffic on area roads from construction vehicles. Construction activities in the NP study area will result in some habitat loss. The scale of the loss is small, as the proportion of project land required by the footprint of access roads and turbine pads is small in relation to the total area. The impact on wildlife from the loss of habitat is thus expected to be negligible. In the NP area, construction-related impacts to the avian community as a whole are expected to be low. There is, however, an increased risk to some avian species, including two special status species, if construction occurs during the breeding season. Horned larks, western meadowlarks, and long-billed curlews recorded their highest use estimates during the breeding season, and their breeding activity occurs in habitat proposed for turbine placement. This is particularly true for long-billed curlews in the Hurlburt Flat area. Potential impacts from construction include disruption of breeding behavior, nest abandonment or destruction, and injury or direct mortality. Impacts to breeding raptors will be primarily from disturbances caused by construction activity, and may include avoidance of the immediate area and/or nest abandonment. In particular, ferruginous hawks in the Horn Butte area may be at risk if construction vehicles use this area to gain access to nearby proposed turbine strings. Impacts to these breeding species could be prevented, or at the least substantially reduced, by performing construction activities in the NP area during the non-breeding period.

Operational impacts, including mortality, for passerines at Shepherds Flat are expected to be low based on the relatively low mean use estimate for this group. Waterfowl use in the project area is low and is primarily limited to a few large flocks of Canada geese using the area during the winter period. Waterbird use in the project area is also low, with the highest use estimate associated with long-billed curlews. Operational impacts on waterfowl and waterbirds has been low at most existing wind plants located in both agricultural and native landscapes, and is expected to be low at Shepherds Flat as well (Erickson *et al.* 2002). Raptor use estimates at Shepherds Flat are similar to raptor use estimates for the Buffalo Ridge wind project in Minnesota and the Foote Creek Rim wind project in Wyoming. Raptor mortality at all new generation wind plants with use estimates similar to Shepherds Flat has been low (Erickson *et al.* 2002). Shepherds Flat, with estimated raptor use of 0.46, is in the middle of the raptor use range of 0.27 – 0.61 at five nearby wind energy facilities (Table 9). No raptor mortality has been reported at three of these

sites. Additionally, there were no raptor mortalities at the Fossil Gulch wind plant in Idaho, where mean raptor use estimates in the adjacent Bell Rapids area were considerably higher than the raptor use estimates recorded at Shepherds Flat (Pilz & Co 2005 and Welch 2005).

Low nesting density, and the scarcity of nesting structures in and near the project site, suggest low potential for raptor breeding mortality. The potential for an adverse impact from the project on burrowing owls and Washington ground squirrels appears to be very low as well, as focused foot surveys and two years of avian surveys revealed only a few observations of burrowing owls and no activity associated with ground squirrels. From these avian use studies, raptor nesting surveys and surveys of special status species, we conclude that adverse impacts from the construction and operation of the Shepherds Flat Wind Farm on the avian community and on special status species would be low.

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Tables

Table 1: Date range of surveys and the number of surveys per plot by season.

Plots	Date Range	Number of Surveys per Plot						
		Fall 02	Winter 02 – 03	Spring 03	Summer 03	Fall 03	Winter 03 - 04	Fall 03 - 04
1 – 5	09/02 – 08/03	9	8	8	7			
6 – 7	09/02 – 11/02	9	2					
6A – 7A	11/02 – 08/03		6	8	7			
8	09/02 – 11/02	9	2					
9 – 25	09/02 – 08/03	9	8	8	7			
26 – 28	12/02 – 03/04		6	8	7	10	10	
38 – 40	03/03 – 03/04			8	7	10	10	
41 – 46	08/04 – 10/04							11

Table 2: Avian species observed during point-count, breeding bird and other surveys and assessments of the project area

Common Name	Scientific Name	Point-count Surveys NP	SP	P5	BB Surveys	Other Surveys
Passerines						
horned lark	*Eremophila alpestris*	x	x	x	x	x
western meadowlark	*Sturnella neglecta*	x	x	x	x	x
loggerhead shrike	*Lanius ludovicianus*	x	x	x	x	x
black-billed magpie	*Pica hudsonia*	x	x	x	x	x
Brewer's blackbird	*Euphagus cyanocephalus*	x	x	x	x	x
red-winged blackbird	*Agelaius phoeniceus*	x	x	x	x	x
common raven	*Corvus corax*	x	x	x	x	x
barn swallow	*Hirundo rustica*	x	x	x	x	x
bank swallow	*Riparia riparia*	x	x	x	x	x
cliff swallow	*Petrochelidon pyrrhonota*	x	x	x	x	x
white-crowned sparrow	*Zonotrichia leucophrys*	x	x	x		x
lark sparrow	*Chondestes grammacus*	x	x	x	x	x
golden-crowned sparrow	*Zonotrichia atricapilla*		x			
savannah sparrow	*Passerculus sandwichensis*	X	x			x
house sparrow	*Passer domesticus*	X		x		x
sage sparrow	*Amphispiza belli*	X				x
song sparrow	*Melospiza melodia*	X		x	x	x
western kingbird	*Tyrannus verticalis*	X	x	x	x	x
Say's phoebe	*Sayornis saya*	X	x		x	x
American robin	*Turdus migratorius*	X	x	x	x	x
American goldfinch	*Carduelis tristis*	X	x	x		x
house finch	*Carpodacus mexicanus*	X	x	x		x
sage thrasher	*Oreoscoptes montanus*		x			
European starling	*Sturnus vulgaris*	X	x	x	x	x
northern flicker	*Colaptes auratus*	X	x			x
rock wren	*Salpinctes obsoletus*	X			x	x
American pipit	*Anthus rubescens*	X				
lark bunting	*Calamospiza melanocorys*	X				
common nighthawk	*Chordeiles minor*	X			x	x
Townsend's solitaire	*Myadestes townsendi*	X				
mountain bluebird	*Sialia currucoides*	X				x
Lewis' woodpecker	*Melanerpes lewis*		x			x
Bullock's oriole	*Icterus bullockii*		x		x	
golden-crowned kinglet	*Regulus satrapa*			x		
yellow rumped warbler	*Dendroica coronata*			x	x	x
Wilson's warbler	*Wilsonia pusilla*			x		
winter wren	*Troglodytes troglodytes*					x
grasshopper sparrow	*Ammodramus savannarum*					x
calliope hummingbird	*Stellula calliope*				x	x
willow flycatcher	*Empidonax traillii*					x
brown-headed cowbird	*Molothrus ater*				x	x
northern rough-winged swallow	*Stelgidopteryx serripennis*				x	x
chipping sparrow	*Spizella passerina*				x	
western tanager	*Piranga ludoviciana*				x	
American crow	*Corvus brachyrhynchos*					x

Common Name	Scientific Name	Point-count Surveys NP	SP	P5	BB Surveys	Other Surveys
Raptor						
sharp-shinned hawk	*Accipter striatus*	X				
ferruginous hawk	*Buteo regalis*	X	x		x	x
Swainson's hawk	*Buteo swainsoni*	X	x	x	x	x
red-tailed hawk	*Buteo jamaicensis*	X	x	x	x	x
rough-legged hawk	*Buteo lagopus*	X	x	x		x
bald eagle	*Haliaeetus leucocephalus*	X				x
golden eagle	*Aquila chrysaetos*	X	x	x	x	x
American kestrel	*Falco sparverius*	X	x	x	x	x
northern harrier	*Circus cyaneus*	X	x	x	x	x
prairie falcon	*Falco mexicanus*	X	x			x
turkey vulture	*Cathartes aura*	X	x			x
merlin	*Falco columbarius*		x			x
great horned owl	*Bubo virginianus*	X				x
burrowing owl	*Athene cunicularia*	X				x
long-eared owl	*Asio otus*					x
osprey	*Pandion haliaetus*					x
Waterbird						
great blue heron	*Ardea herodias*	X		x		x
long-billed curlew	*Numenius americanus*	X	x		x	x
sandhill crane	*Grus canadensis*	X	x	x		x
ring-billed gull	*Larus delawarensis*	X		x		x
California gull	*Larus californicus*	X				x
killdeer	*Charadrius vociferus*	X		x	x	x
belted kingfisher	*Ceryle alcyon*	X				
great egret	*Ardea alba*				x	x
Virginia rail	*Rallus limicola*				x	
western gull	*Larus occidentalis*			x		x
Waterfowl						
redhead	*Aythya americana*			x		x
mallard	*Anas platyrhynchos*		x	x	X	x
Canada goose	*Branta canadensis*	X	x			x
Upland Gamebird						
California quail	*Callipepla californica*	X	x	x	X	x
ringnecked pheasant	*Phasianus colchicus*	X		x	X	x
chukar	*Alectoris chukar*	X	x		X	x
gray partridge	*Perdix perdix*		x			x
Dove						
morning dove	*Zenaida macroura*	X	x	x	X	x
rock dove	*Columba livia*		x	x		x
Total	**80**	**54**	**43**	**39**	**40**	**67**

NP = northern study area
SP = southern study area
P5 = plot No. 5

BB = breeding bird surveys
Other = incidental/in transit, raptor nesting surveys, ground squirrel/ burrowing owl surveys

Table 3. Number of surveys, number of observations, mean use, number of species and number of species per survey by season and area.

Site	Season	# Surveys	# Obs[1]	Use[2]	Species[3]	Species/survey[4]
Shepherd's Flat (NP + SP)	Fall	342	3259	9.529	41	1.74
	Winter	262	3938	15.031	30	1.53
	Spring	232	1314	5.664	40	2.59
	Summer	203	904	4.453	32	1.73
NP Study Area	Fall	182	1805	9.918	32	1.71
	Winter	170	1589	9.347	24	1.36
	Spring	160	907	5.669	32	2.69
	Summer	140	683	4.879	26	1.76
SP Study Area	Fall	160	1454	9.088	29	1.78
	Winter	92	2349	25.533	21	1.84
	Spring	72	407	5.653	28	2.35
	Summer	63	221	3.508	21	1.67

1: total number of individuals observed
2: mean number of birds observed per 20 minute survey
3: number of different species observed
4: mean of the number of species observed in each 20 minute survey

Table 4: Mean use, percent composition and percent frequency of occurrence for avian groups by season and area.

	Fall			Winter			Spring			Summer			All Seasons		
Species/Group	**Use[1]**	**Comp[2]**	**Freq[3]**	**Use**	**Comp**	**Freq**	**Use**	**Comp**	**Freq**	**Use**	**Comp**	**Freq**	**Use**	**Comp**	**Freq**
Shepherd's Flat (NP + SP)															
Passerines	7.968	83.6	83.6	8.714	58.0	79.0	3.875	68.4	94.8	3.429	77.0	79.8	6.355	70.1	84.2
Raptor	0.553	5.8	29.5	0.321	2.1	24.8	0.444	7.8	33.6	0.488	11.0	32.0	0.457	5.0	29.7
Waterbird	0.734	7.7	2.6	1.920	12.8	1.1	1.198	21.2	42.7	0.478	10.7	14.8	1.087	12.0	13.6
Waterfowl	0.146	1.5	0.6	3.947	26.3	7.6	0.043	0.8	1.7	0.010	0.2	0.5	1.055	11.6	2.6
Upland Gamebird	0.044	0.5	2.6	0.095	0.6	1.5	0.065	1.1	1.7	0.000	0.0	0.0	0.053	0.6	1.6
Dove	0.085	0.9	2.6	0.034	0.2	1.1	0.039	0.7	2.6	0.049	1.1	3.4	0.055	0.6	2.4
NP Study Area															
Passerines	7.824	78.9	80.2	5.094	54.5	76.5	4.075	71.9	98.1	3.850	78.9	78.6	5.339	69.8	83.3
Raptor	0.335	3.4	24.7	0.206	2.2	17.6	0.313	5.5	26.9	0.386	7.9	27.1	0.307	4.0	23.9
Waterbird	1.379	13.9	4.9	2.959	31.7	1.8	1.250	22.1	55.6	0.621	12.7	17.9	1.597	20.9	19.3
Waterfowl	0.275	2.8	1.1	1.071	11.5	5.9	0.013	0.2	0.6	0.000	0.0	0.0	0.359	4.7	2.0
Upland Gamebird	0.071	0.7	4.4	0.012	0.1	0.6	0.006	0.1	0.6	0.000	0.0	0.0	0.025	0.3	1.5
Dove	0.033	0.3	2.2	0.006	0.1	0.6	0.013	0.2	1.3	0.021	0.4	2.1	0.018	0.2	1.5
SP Study Area															
Passerines	8.131	89.5	87.5	15.402	60.3	83.7	3.431	60.7	87.5	2.492	71.0	82.5	8.067	70.5	85.8
Raptor	0.800	8.8	35.0	0.533	2.1	38.0	0.736	13.0	48.6	0.714	20.4	42.9	0.711	6.2	39.5
Waterbird	0.000	0.0	0.0	0.000	0.0	0.0	1.083	19.2	13.9	0.159	4.5	7.9	0.227	2.0	3.9
Waterfowl	0.000	0.0	0.0	9.261	36.3	10.9	0.111	2.0	4.2	0.032	0.9	1.6	2.227	19.5	3.6
Upland Gamebird	0.013	0.1	0.6	0.250	1.0	3.3	0.194	3.4	2.8	0.000	0.0	0.0	0.101	0.9	1.6
Dove	0.144	1.6	3.1	0.087	0.3	2.2	0.097	1.7	5.6	0.111	3.2	6.3	0.116	1.0	3.9

1: mean number of birds observed per 20 minute survey
2: mean use of the group divided by the total mean use of all groups
3: percent of surveys in which a member of the group was observed

Table 5: Number of observations, mean use, number of surveys in which observed and percent frequency of occurrence by species and season for total project area.

	Fall (342 surveys)				Winter (262 surveys)				Spring (232 surveys)				Summer (203 surveys)			
Species/Group	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq
Passerines																
Horned lark	1414	4.135	225	65.8	1674	6.389	157	59.9	487	2.099	171	73.7	439	2.163	122	60.1
Western meadowlark	175	0.512	58	17.0	49	0.187	33	12.6	202	0.871	121	52.2	77	0.379	45	22.2
loggerhead shrike	4	0.012	3	0.9	0	0.000	0	0.0	5	0.022	5	2.2	3	0.015	2	1.0
unidentified shrike	2	0.006	2	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Black-billed magpie	33	0.096	19	5.6	22	0.084	14	5.3	3	0.013	3	1.3	7	0.034	4	2.0
Brewer's blackbird	89	0.260	3	0.9	0	0.000	0	0.0	17	0.073	6	2.6	7	0.034	2	1.0
red-winged blackbird	0	0.000	0	0.0	0	0.000	0	0.0	15	0.065	5	2.2	12	0.059	3	1.5
Common raven	219	0.640	88	25.7	167	0.637	72	27.5	84	0.362	54	23.3	70	0.345	29	14.3
Barn swallow	15	0.044	3	0.9	0	0.000	0	0.0	1	0.004	1	0.4	3	0.015	3	1.5
Bank swallow	1	0.003	1	0.3	0	0.000	0	0.0	2	0.009	1	0.4	27	0.133	14	6.9
Cliff swallow	0	0.000	0	0.0	0	0.000	0	0.0	21	0.091	8	3.4	4	0.020	2	1.0
unidentified swallow	2	0.006	1	0.3	0	0.000	0	0.0	2	0.009	1	0.4	3	0.015	2	1.0
unidentified passerine	340	0.994	35	10.2	145	0.553	10	3.8	9	0.039	7	3.0	8	0.039	5	2.5
White-crowned sparrow	29	0.085	5	1.5	5	0.019	1	0.4	8	0.034	2	0.9	0	0.000	0	0.0
unidentified sparrow	2	0.006	1	0.3	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Lark sparrow	1	0.003	1	0.3	0	0.000	0	0.0	1	0.004	1	0.4	8	0.039	4	2.0
Golden-crowned sparrow	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
savannah sparrow	5	0.015	3	0.9	0	0.000	0	0.0	8	0.034	6	2.6	0	0.000	0	0.0
house sparrow	0	0.000	0	0.0	0	0.000	0	0.0	6	0.026	2	0.9	0	0.000	0	0.0
Sage sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
Song sparrow	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Western kingbird	1	0.003	1	0.3	0	0.000	0	0.0	11	0.047	4	1.7	17	0.084	11	5.4
say's phoebe	10	0.029	10	2.9	1	0.004	1	0.4	2	0.009	2	0.9	0	0.000	0	0.0
unidentified flycatcher	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american robin	0	0.000	0	0.0	3	0.011	2	0.8	6	0.026	2	0.9	0	0.000	0	0.0
american goldfinch	50	0.146	6	1.8	43	0.164	4	1.5	0	0.000	0	0.0	0	0.000	0	0.0
house finch	7	0.020	2	0.6	113	0.431	3	1.1	4	0.017	1	0.4	0	0.000	0	0.0
unidentified finch	5	0.015	1	0.3	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Sage thrasher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	3	0.015	1	0.5
Eurasian starling	96	0.281	5	1.5	37	0.141	5	1.9	3	0.013	1	0.4	1	0.005	1	0.5
Northern flicker	4	0.012	3	0.9	3	0.011	3	1.1	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (342 surveys)				Winter (262 surveys)				Spring (232 surveys)				Summer (203 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq
Rock wren	7	0.020	7	2.0	0	0.000	0	0.0	0	0.000	0	0.0	5	0.025	3	1.5
american pipit	209	0.611	3	0.9	11	0.042	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Lark bunting	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Common nighthawk	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
townsend's solitaire	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
mountain bluebird	0	0.000	0	0.0	6	0.023	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Lewis' woodpecker	0	0.000	0	0.0	0	0.000	0	0.0	2	0.009	1	0.4	0	0.000	0	0.0
Bullock's oriole	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Raptor																
sharp-shinned hawk	2	0.006	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Ferruginous hawk	1	0.003	1	0.3	0	0.000	0	0.0	10	0.043	8	3.4	9	0.044	6	3.0
swainson's hawk	60	0.175	18	5.3	0	0.000	0	0.0	23	0.099	17	7.3	21	0.103	13	6.4
Red-tailed hawk	31	0.091	27	7.9	13	0.050	11	4.2	12	0.052	11	4.7	26	0.128	20	9.9
Rough-legged hawk	19	0.056	14	4.1	22	0.084	20	7.6	14	0.060	13	5.6	0	0.000	0	0.0
Bald eagle	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
golden eagle	13	0.038	12	3.5	11	0.042	11	4.2	11	0.047	11	4.7	1	0.005	1	0.5
american kestrel	26	0.076	22	6.4	12	0.046	12	4.6	3	0.013	3	1.3	12	0.059	8	3.9
Northern harrier	16	0.047	14	4.1	14	0.053	12	4.6	24	0.103	22	9.5	14	0.069	14	6.9
Prairie falcon	5	0.015	5	1.5	5	0.019	5	1.9	0	0.000	0	0.0	0	0.000	0	0.0
unidentified buteo	11	0.032	10	2.9	6	0.023	5	1.9	4	0.017	4	1.7	13	0.064	11	5.4
Turkey vulture	0	0.000	0	0.0	0	0.000	0	0.0	1	0.004	1	0.4	1	0.005	1	0.5
unidentified accipiter	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Merlin	3	0.009	2	0.6	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0
great horned owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
burrowing owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.005	1	0.5
unidentified falcon	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Waterbird																
great blue heron	0	0.000	0	0.0	0	0.000	0	0.0	1	0.004	1	0.4	0	0.000	0	0.0
Long-billed curlew	0	0.000	0	0.0	0	0.000	0	0.0	179	0.772	94	40.5	75	0.369	24	11.8
Sandhill crane	0	0.000	0	0.0	0	0.000	0	0.0	31	0.134	2	0.9	0	0.000	0	0.0
Ring-billed gull	0	0.000	0	0.0	0	0.000	0	0.0	3	0.013	1	0.4	18	0.089	5	2.5
California gull	0	0.000	0	0.0	0	0.000	0	0.0	7	0.030	1	0.4	0	0.000	0	0.0
unidentified gull	0	0.000	0	0.0	0	0.000	0	0.0	52	0.224	5	2.2	3	0.015	3	1.5
Killdeer	247	0.722	7	2.0	503	1.920	3	1.1	5	0.022	4	1.7	1	0.005	1	0.5
belted kingfisher	1	0.003	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified shorebird	3	0.009	1	0.3	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (342 surveys)				Winter (262 surveys)				Spring (232 surveys)				Summer (203 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq	# Obs	Use	Srvys Obs	Freq
Waterfowl																
Mallard	0	0.000	0	0.0	9	0.034	3	1.1	8	0.034	3	1.3	2	0.010	1	0.5
canada goose	50	0.146	2	0.6	1025	3.912	17	6.5	2	0.009	1	0.4	0	0.000	0	0.0
Upland Gamebird																
California quail	9	0.026	5	1.5	3	0.011	2	0.8	14	0.060	2	0.9	0	0.000	0	0.0
ringnecked pheasant	4	0.012	4	1.2	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Chukar	2	0.006	1	0.3	11	0.042	1	0.4	1	0.004	1	0.4	0	0.000	0	0.0
gray partridge	0	0.000	0	0.0	11	0.042	1	0.4	0	0.000	0	0.0	0	0.000	0	0.0
Dove																
Morning dove	8	0.023	5	1.5	2	0.008	2	0.8	9	0.039	6	2.6	4	0.020	4	2.0
rock dove	21	0.061	4	1.2	7	0.027	1	0.4	0	0.000	0	0.0	6	0.030	3	1.5
Total	**3259**	**9.529**			**3938**	**15.031**			**1314**	**5.664**			**904**	**4.453**		

1: number of individual birds observed per 20 minute survey
2: mean number of birds observed per survey
3: number of surveys in which a member of the species was observed
4: percent of surveys in which a member of the species was observed

Table 6: Number of observations, mean use, number of surveys in which observed and frequency of occurrence by species and season for northern (native landscape) project area.

	Fall (182 surveys)				Winter (170 surveys)				Spring (160 surveys)				Summer (140 surveys)			
Species/Group	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Passerines																
Horned lark	588	3.231	106	58.2	449	2.641	91	53.5	339	2.119	121	75.6	340	2.429	82	58.6
Western meadowlark	146	0.802	43	23.6	36	0.212	22	12.9	162	1.013	91	56.9	69	0.493	38	27.1
loggerhead shrike	2	0.011	2	1.1	0	0.000	0	0.0	2	0.013	2	1.3	3	0.021	2	1.4
unidentified shrike	2	0.011	2	1.1	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
black-billed magpie	23	0.126	13	7.1	15	0.088	11	6.5	2	0.013	2	1.3	7	0.050	4	2.9
brewer's blackbird	22	0.121	1	0.5	0	0.000	0	0.0	15	0.094	4	2.5	0	0.000	0	0.0
red-winged blackbird	0	0.000	0	0.0	0	0.000	0	0.0	10	0.063	2	1.3	1	0.007	1	0.7
Common raven	97	0.533	40	22.0	108	0.635	45	26.5	78	0.488	48	30.0	58	0.414	19	13.6
barn swallow	2	0.011	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	2	0.014	2	1.4
bank swallow	0	0.000	0	0.0	0	0.000	0	0.0	2	0.013	1	0.6	20	0.143	8	5.7
cliff swallow	0	0.000	0	0.0	0	0.000	0	0.0	5	0.031	3	1.9	3	0.021	1	0.7
unidentified swallow	2	0.011	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	2	0.014	1	0.7
unidentified passerine	217	1.192	17	9.3	74	0.435	5	2.9	7	0.044	5	3.1	3	0.021	3	2.1
white-crowned sparrow	27	0.148	4	2.2	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified sparrow	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
lark sparrow	0	0.000	0	0.0	0	0.000	0	0.0	1	0.006	1	0.6	8	0.057	4	2.9
Golden-crowned sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
savannah sparrow	2	0.011	2	1.1	0	0.000	0	0.0	8	0.050	6	3.8	0	0.000	0	0.0
House sparrow	0	0.000	0	0.0	0	0.000	0	0.0	6	0.038	2	1.3	0	0.000	0	0.0
sage sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
song sparrow	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Western kingbird	0	0.000	0	0.0	0	0.000	0	0.0	10	0.063	3	1.9	15	0.107	10	7.1
say's phoebe	7	0.038	7	3.8	1	0.006	1	0.6	1	0.006	1	0.6	0	0.000	0	0.0
unidentified flycatcher	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american robin	0	0.000	0	0.0	3	0.018	2	1.2	0	0.000	0	0.0	0	0.000	0	0.0
american goldfinch	28	0.154	4	2.2	13	0.076	2	1.2	0	0.000	0	0.0	0	0.000	0	0.0
House finch	6	0.033	1	0.5	108	0.635	2	1.2	4	0.025	1	0.6	0	0.000	0	0.0
unidentified finch	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
sage thrasher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Eurasian starling	30	0.165	2	1.1	37	0.218	5	2.9	0	0.000	0	0.0	1	0.007	1	0.7
Northern flicker	3	0.016	2	1.1	3	0.018	3	1.8	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (182 surveys) # Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	Winter (170 surveys) # Obs	Use	Srvys Obs	% Freq	Spring (160 surveys) # Obs	Use	Srvys Obs	% Freq	Summer (140 surveys) # Obs	Use	Srvys Obs	% Freq
rock wren	7	0.038	7	3.8	0	0.000	0	0.0	0	0.000	0	0.0	5	0.036	3	2.1
american pipit	209	1.148	3	1.6	11	0.065	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
lark bunting	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
common nighthawk	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
townsend's solitaire	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
mountain bluebird	0	0.000	0	0.0	6	0.035	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
Lewis' woodpecker	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Bullock's oriole	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Raptor																
sharp-shinned hawk	2	0.011	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Ferruginous hawk	1	0.005	1	0.5	0	0.000	0	0.0	7	0.044	5	3.1	7	0.050	4	2.9
swainson's hawk	1	0.005	1	0.5	0	0.000	0	0.0	9	0.056	7	4.4	7	0.050	6	4.3
red-tailed hawk	9	0.049	9	4.9	7	0.041	5	2.9	6	0.038	6	3.8	12	0.086	10	7.1
rough-legged hawk	6	0.033	4	2.2	3	0.018	3	1.8	3	0.019	3	1.9	0	0.000	0	0.0
bald eagle	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
golden eagle	11	0.060	10	5.5	10	0.059	10	5.9	7	0.044	7	4.4	0	0.000	0	0.0
american kestrel	15	0.082	12	6.6	3	0.018	3	1.8	1	0.006	1	0.6	8	0.057	7	5.0
northern harrier	9	0.049	7	3.8	7	0.041	6	3.5	15	0.094	14	8.8	11	0.079	11	7.9
prairie falcon	2	0.011	2	1.1	2	0.012	2	1.2	0	0.000	0	0.0	0	0.000	0	0.0
unidentified buteo	4	0.022	4	2.2	2	0.012	2	1.2	1	0.006	1	0.6	7	0.050	5	3.6
turkey vulture	0	0.000	0	0.0	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0
unidentified accipiter	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Merlin	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
great horned owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
burrowing owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.007	1	0.7
unidentified falcon	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Waterbird																
great blue heron	0	0.000	0	0.0	0	0.000	0	0.0	1	0.006	1	0.6	0	0.000	0	0.0
long-billed curlew	0	0.000	0	0.0	0	0.000	0	0.0	170	1.063	87	54.4	66	0.471	20	14.3
Sandhill crane	0	0.000	0	0.0	0	0.000	0	0.0	5	0.031	1	0.6	0	0.000	0	0.0
ring-billed gull	0	0.000	0	0.0	0	0.000	0	0.0	3	0.019	1	0.6	18	0.129	5	3.6
california gull	0	0.000	0	0.0	0	0.000	0	0.0	7	0.044	1	0.6	0	0.000	0	0.0
unidentified gull	0	0.000	0	0.0	0	0.000	0	0.0	9	0.056	3	1.9	2	0.014	2	1.4
Killdeer	247	1.357	7	3.8	503	2.959	3	1.8	5	0.031	4	2.5	1	0.007	1	0.7
belted kingfisher	1	0.005	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified shorebird	3	0.016	1	0.5	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (182 surveys)				Winter (170 surveys)				Spring (160 surveys)				Summer (140 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Waterfowl																
Mallard	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Canada goose	50	0.275	2	1.1	182	1.071	10	5.9	2	0.013	1	0.6	0	0.000	0	0.0
Upland Gamebird																
california quail	7	0.038	4	2.2	2	0.012	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0
Ringnecked pheasant	4	0.022	4	2.2	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Chukar	2	0.011	1	0.5	0	0.000	0	0.0	1	0.006		0.0	0	0.000	0	0.0
gray partridge	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Dove																
morning dove	6	0.033	4	2.2	1	0.006	1	0.6	2	0.013	2	1.3	3	0.021	3	2.1
rock dove	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Total	**1805**	**9.918**			**1589**	**9.347**			**907**	**5.669**			**683**	**4.879**		

1: number of individual birds observed per 20 minute survey
2: mean number of birds observed per survey
3: number of surveys in which a member of the species was observed
4: percent of surveys in which a member of the species was observed

Table 7: Number of observations, mean use, number of surveys in which observed and frequency of occurrence by species and season for southern (agricultural) area.

	Fall (160 surveys)				Winter (92 surveys)				Spring (72 surveys)				Summer (63 surveys)			
Species/Group	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Passerines																
Horned lark	826	5.163	119	74.4	1225	13.315	66	71.7	148	2.056	50	69.4	99	1.571	40	63.5
Western meadowlark	29	0.181	15	9.4	13	0.141	11	12.0	40	0.556	30	41.7	8	0.127	7	11.1
loggerhead shrike	2	0.013	1	0.6	0	0.000	0	0.0	3	0.042	3	4.2	0	0.000	0	0.0
unidentified shrike	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Black-billed magpie	10	0.063	6	3.8	7	0.076	3	3.3	1	0.014	1	1.4	0	0.000	0	0.0
brewer's blackbird	67	0.419	2	1.3	0	0.000	0	0.0	2	0.028	2	2.8	7	0.111	2	3.2
red-winged blackbird	0	0.000	0	0.0	0	0.000	0	0.0	5	0.069	3	4.2	11	0.175	2	3.2
Common raven	122	0.763	48	30.0	59	0.641	27	29.3	6	0.083	6	8.3	12	0.190	10	15.9
Barn swallow	13	0.081	2	1.3	0	0.000	0	0.0	1	0.014	1	1.4	1	0.016	1	1.6
Bank swallow	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	7	0.111	6	9.5
cliff swallow	0	0.000	0	0.0	0	0.000	0	0.0	16	0.222	5	6.9	1	0.016	1	1.6
unidentified swallow	0	0.000	0	0.0	0	0.000	0	0.0	2	0.028	1	1.4	1	0.016	1	1.6
unidentified passerine	123	0.769	18	11.3	71	0.772	5	5.4	2	0.028	2	2.8	5	0.079	2	3.2
White-crowned sparrow	2	0.013	1	0.6	5	0.054	1	1.1	8	0.111	2	2.8	0	0.000	0	0.0
unidentified sparrow	2	0.013	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
lark sparrow	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Golden-crowned sparrow	0	0.000	0	0.0	1	0.011	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
savannah sparrow	3	0.019	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
House sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Sage sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Song sparrow	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Western kingbird	1	0.006	1	0.6	0	0.000	0	0.0	1	0.014	1	1.4	2	0.032	1	1.6
say's phoebe	3	0.019	3	1.9	0	0.000	0	0.0	1	0.014	1	1.4	0	0.000	0	0.0
unidentified flycatcher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american robin	0	0.000	0	0.0	0	0.000	0	0.0	6	0.083	2	2.8	0	0.000	0	0.0
american goldfinch	22	0.138	2	1.3	30	0.326	2	2.2	0	0.000	0	0.0	0	0.000	0	0.0
House finch	1	0.006	1	0.6	5	0.054	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
unidentified finch	5	0.031	1	0.6	1	0.011	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
Sage thrasher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	3	0.048	1	1.6
Eurasian starling	66	0.413	3	1.9	0	0.000	0	0.0	3	0.042	1	1.4	0	0.000	0	0.0
Northern flicker	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (160 surveys) # Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	Winter (92 surveys) # Obs	Use	Srvys Obs	% Freq	Spring (72 surveys) # Obs	Use	Srvys Obs	% Freq	Summer (63 surveys) # Obs	Use	Srvys Obs	% Freq
rock wren	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
american pipit	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
lark bunting	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Common nighthawk	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
townsend's solitaire	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
mountain bluebird	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Lewis' woodpecker	0	0.000	0	0.0	0	0.000	0	0.0	2	0.028	1	1.4	0	0.000	0	0.0
Bullock's oriole	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Raptor																
Sharp-shinned hawk	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Ferruginous hawk	0	0.000	0	0.0	0	0.000	0	0.0	3	0.042	3	4.2	2	0.032	2	3.2
swainson's hawk	59	0.369	17	10.6	0	0.000	0	0.0	14	0.194	10	13.9	14	0.222	7	11.1
red-tailed hawk	22	0.138	18	11.3	6	0.065	6	6.5	6	0.083	5	6.9	14	0.222	10	15.9
Rough-legged hawk	13	0.081	10	6.3	19	0.207	17	18.5	11	0.153	10	13.9	0	0.000	0	0.0
bald eagle	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
golden eagle	2	0.013	2	1.3	1	0.011	1	1.1	4	0.056	4	5.6	1	0.016	1	1.6
american kestrel	11	0.069	10	6.3	9	0.098	9	9.8	2	0.028	2	2.8	4	0.063	1	1.6
Northern harrier	7	0.044	7	4.4	7	0.076	6	6.5	9	0.125	8	11.1	3	0.048	3	4.8
Prairie falcon	3	0.019	3	1.9	3	0.033	3	3.3	0	0.000	0	0.0	0	0.000	0	0.0
unidentified buteo	7	0.044	6	3.8	4	0.043	3	3.3	3	0.042	3	4.2	6	0.095	6	9.5
Turkey vulture	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	1	0.016	1	1.6
unidentified accipiter	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Merlin	3	0.019	2	1.3	0	0.000	0	0.0	1	0.014	1	1.4	0	0.000	0	0.0
great horned owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
burrowing owl	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified falcon	1	0.006	1	0.6	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Waterbird																
great blue heron	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
long-billed curlew	0	0.000	0	0.0	0	0.000	0	0.0	9	0.125	7	9.7	9	0.143	4	6.3
sandhill crane	0	0.000	0	0.0	0	0.000	0	0.0	26	0.361	1	1.4	0	0.000	0	0.0
ring-billed gull	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
California gull	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified gull	0	0.000	0	0.0	0	0.000	0	0.0	43	0.597	2	2.8	1	0.016	1	1.6
Killdeer	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
belted kingfisher	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
unidentified shorebird	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0

Species/Group	Fall (160 surveys)				Winter (92 surveys)				Spring (72 surveys)				Summer (63 surveys)			
	# Obs[1]	Use[2]	Srvys Obs[3]	Freq[4]	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq	# Obs	Use	Srvys Obs	% Freq
Waterfowl																
Mallard	0	0.000	0	0.0	9	0.098	3	3.3	8	0.111	3	4.2	2	0.032	1	1.6
Canada goose	0	0.000	0	0.0	843	9.163	7	7.6	0	0.000	0	0.0	0	0.000	0	0.0
Upland Gamebird																
California quail	2	0.013	1	0.6	1	0.011	1	1.1	14	0.194	2	2.8	0	0.000	0	0.0
Ringnecked pheasant	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0	0	0.000	0	0.0
Chukar	0	0.000	0	0.0	11	0.120	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
Gray partridge	0	0.000	0	0.0	11	0.120	1	1.1	0	0.000	0	0.0	0	0.000	0	0.0
Dove																
morning dove	2	0.013	1	0.6	1	0.011	1	1.1	7	0.097	4	5.6	1	0.016	1	1.6
Rock dove	21	0.131	4	2.5	7	0.076	1	1.1	0	0.000	0	0.0	6	0.095	3	4.8
Total	**1454**	**9.088**			**2349**	**25.533**			**407**	**5.653**			**221**	**3.508**		

1: number of individual birds observed per 20 minute survey
2: mean number of birds observed per survey
3: number of surveys in which a member of the species was observed
4: percent of surveys in which a member of the species was observed

Table 8: Seasonal pre- and post-construction avian use estimates at modern wind facilities.

	Mean Raptor Use [1]				
Project	**Spring**	**Summer**	**Fall**	**Winter**	**Average**
Shepherds Flat (OR)	0.444	0.488	0.553	0.321	0.457
Nine Canyon (WA)	0.354	0.199	0.156	0.312	0.258
Zintel Canyon (WA)	0.194	0.299	0.700	0.507	0.443
Stateline/Vansycle (OR/WA)	0.524	0.333	0.260	0.494	0.410
Foote Creek Rim, Foote Creek Rim (WY)	0.735	0.702	0.839	0.238	0.562
Foote Creek Rim, Foote Creek Rim UV (WY)	0.464	0.518	0.608	0.224	0.417
Foote Creek Rim, Morton's Pass reference (WY)	0.480	0.329	0.287	0.153	0.279
Foote Creek Rim, Simpson's Ridge (WY)	0.373	0.280	0.261	0.123	0.233
Buffalo Ridge, Phase I (MN)	0.636	0.431	0.761	0.133	0.424
Buffalo Ridge, Phase II (MN)	0.841	0.694	0.827	0.100	0.523
Buffalo Ridge, Phase III (MN)	0.638	0.537	0.845	0.181	0.484
Condon (OR)	0.528	0.325	0.293	0.453	0.400
Klondike I (OR)	0.468	0.389	0.386	0.566	0.468
	Mean Waterfowl/Water Bird Use				
Project	**Spring**	**Summer**	**Fall**	**Winter**	**Average**
Shepherds Flat (OR)	1.241	0.488	0.880	5.867	2.142
Nine Canyon (WA)	0.417	0.043	0.017	0.907	0.424
Zintel Canyon (WA)	0.056	0.042	0.422	34.850	13.186
Stateline/Vansycle (OR/WA)	0.350	0.083	0.000	0.000	0.079
Foote Creek Rim, Foote Creek Rim (WY)	0.416	0.224	0.056	0.224	0.221
Foote Creek Rim, Foote Creek Rim UV (WY)	0.858	0.032	0.000	0.002	0.151
Foote Creek Rim, Morton's Pass reference (WY)	0.036	0.049	0.007	0.041	0.035
Foote Creek Rim, Simpson's Ridge (WY)	0.600	0.978	0.901	0.043	0.549
Buffalo Ridge, Phase I (MN)	7.298	0.303	5.839	10.300	6.371
Buffalo Ridge, Phase II (MN)	8.086	1.997	10.129	4.681	5.713
Buffalo Ridge, Phase III (MN)	6.165	0.942	8.979	0.583	3.352
Condon (OR)	0.014	0.000	0.029	0.000	0.008
Klondike I (OR)	0.000	0.019	0.357	30.125	11.376

1: mean number of birds observed per 20 minute survey

Data other than that for Shepherds Flat were taken from Erickson *et al*. 2002. Use data are given for 20 minute surveys at 800 meters.

Table 9: Avian use and avian mortality at modern wind facilities in the region of the Shepherds Flat project

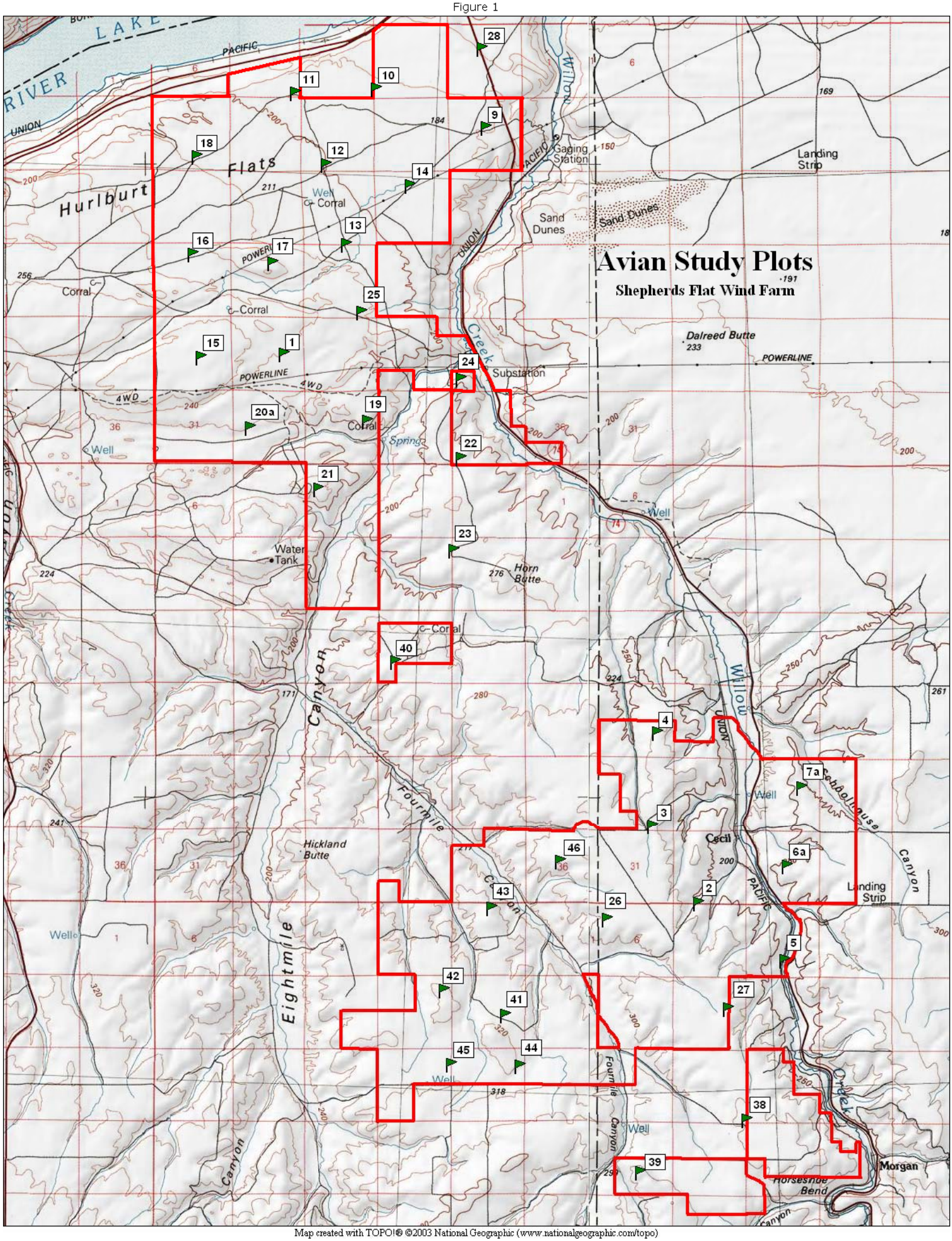
	All birds	
Project	**Use**	**Mortality**
Shepherds Flat (OR)	9.06	na
Vansycle, OR	7.06	0.63
Stateline, OR	8.77	1.93
Combine Hills, OR	4.11	2.56
Nine Canyon (WA)	6.28	3.59
Klondike I	9.34	1.42
	Raptors	
Project	**Use**	**Mortality**
Shepherds Flat (OR)	0.46	na
Vansycle, OR	0.51	0
Stateline, OR	0.41	0.053
Combine Hills, OR	0.61	0
Nine Canyon (WA)	0.27	0.065
Klondike I (OR)	0.42	0

1: mean number of birds observed per 20 minute survey

Data other than that for Shepherds Flat were taken from Young *et al*. 2006. Use data are given for 20 minute surveys at 800 meters.

Figure 1 appears on the next page

Figure 1



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Date: March 18, 2004
To: Patricia Pilz, Lifeline Renewable Energy, Inc.
From: Rick Welch, Energy Northwest
Subject: Impact determination of tower A01-01 (E5)

Reference: Wildlife Assessment for the Shepherds Ridge Wind Farm, December 2003.

This memorandum provides the results of a study performed to address the proposed location of turbine A01-01 (identified on the most recent maps as E5) and the potential risk to raptor species using this area. Turbine A01-01 represents the northern-most tower of a turbine string extending along a north/south running ridgeline that separates Schoolhouse Canyon from the Willow Creek valley. The ridgeline ends on a point of land overlooking the mouth of Schoolhouse Canyon, approximately 700 meters N/NW of turbine A01-01. Baseline avian use studies indicated that some raptors cut across the ridge to gain access to Schoolhouse Canyon, and that their flight path might be in close proximity to the proposed turbine. Also discussed in the baseline study was the fact that the observation point from which the baseline data were obtained (plot 7A) was sufficiently removed from the location of A01-01 that raptor activity in this area was difficult to define. These findings warranted further investigation prior to final turbine siting. The current study was designed to more accurately identify raptor flight patterns in the vicinity of the proposed turbine to assess if impacts to raptors might occur from constructing the turbine at the currently designated location.

Surveys of raptor activity were performed on March 5, 9, and 17, 2004, from an observation point established at the proposed location of turbine A01-01. Two observers performed continuous monitoring of raptor movement from sunrise to 1100 hours on each survey day, totaling twenty-seven man-hours of observation time. Weather information, including precipitation, cloud cover, wind direction, wind speed, visibility, and temperature, were recorded for each survey period. Time, species identification, number of individuals, distance from observation point when initially observed, closest distance, flight height (initial, minimum, and maximum), and description of behavior were recorded for each observation. In addition, flight patterns of each observation were plotted on a topographic map of the survey area.

A total of forty-seven observations, representing five raptor species, were recorded during the three surveys, with thirteen, eighteen, and sixteen observations being recorded on March 5, 9, and 17, respectively. The five species were golden eagle, red-tailed hawk, rough-legged hawk, northern harrier, and merlin. Forty-three observations (91.5%) had flight paths considered to be at no risk with regards to turbine A01-01 and the remaining turbines comprising the string progressing to the south. Of these forty-three observations, the majority had flight paths that were parallel to the ridge edge. Four observations (8.5%) displayed flight paths cutting across the ridge. Two were located north (250 meters and 300 meters) of the proposed location of A01-01, and two to the south (both 300 meters). The two observations recorded north of A01-01 would also be considered at

no risk due to their location outside the influence of A01-01 and the rest of the turbine string. The two observations recorded south of A01-01 are outside of the influence A01-01 but had flight paths intersecting the turbine string. These could be considered at some risk if they did not alter their path to avoid a turbine.

Results from the current study indicate that the majority of raptor activity in the vicinity of turbine A01-01 is parallel to the ridge, and thus parallel to the proposed turbine string as well. This was also a finding of the baseline study. In addition, the low percentage of raptors observed crossing the ridge suggests a major route or flyway does not exist at this location. Based on these results, we conclude that the proposed location of turbine A01-01 would not adversely impact raptor species using this area.

Wildlife Assessment for the Shepherds Ridge Wind Farm

Prepared for:
LifeLine Renewable Energy, Inc.

Prepared by:
Rick Welch, Environmental Scientist
Energy Northwest Environmental Services

December 2003

Overview

This report summarizes one year of environmental monitoring data collected at Shepherds Ridge Wind Farm, including results of avian use studies, raptor nesting surveys, and ground squirrel and burrowing owl surveys. The subject property (as defined in Reference 1) includes approximately 7,750 acres located near Cecil, in Morrow County, Oregon.

No threatened or endangered avian species were observed during the course of the study, nor were any indications of either burrowing owls or ground squirrels found. Of sensitive avian species, only Swainson's hawks were found in significant numbers. Raptor nesting surveys identified only three active nests within close proximity of the proposed turbine locations. Richness of avian species and mean use estimates were low, similar to those found at other wind conversion facilities in the region. Passerine use was generally lower and raptor use generally higher than observed at other regional facilities. Overall, raptor use was similar to that observed at the Buffallo Ridge Minnesota facility, where only one raptor mortality was found during a four year study.

Adverse avian impacts from construction or operation of the Shepherds Ridge Wind Farm are expected to be low, as generally seen in modern wind conversion facilities. Only one of the proposed turbine locations presents what may be an unusual risk for raptors, which could be ameliorated by turbine micrositing with raptor use in mind.

Methods

Avian Surveys

Northwest Wildlife Consultants (NWC) was responsible for the initial program design as well as performance of the fall study. The methods implemented by NWC were used throughout the study period for consistency purposes. Energy Northwest Environmental Services performed the winter, spring, and summer studies and was responsible for all data interpretation.

Fixed-point circular plots, each with a viewing area approximately 800 m in radius, were used to assess avian use within the project area. Observations were performed during daylight hours, with each plot surveyed for 20 minutes. The number of observations, mean use estimates (number of birds/20 minute survey) and frequency of occurrence estimates (how often a species was observed during a 20 minute survey, expressed as % of surveys) within 800 m were calculated by species and season

Observations were initiated in September 2002 at seven survey plots numbered 2 through 8. Property boundary adjustments following conclusion of the fall study resulted in the deletion of one plot (8) and relocation and re-labeling of two plots (6 and 7, changed to 6A and 7A). Two additional plots (26 and 27) were established prior to the initiation of the winter study to provide coverage for expansion of the project onto the Heidemen property. Information obtained from observations at plot 5 is not included in this analysis because plot 5 was not representative of the habitat type associated with the turbine strings (valley bottom riparian vs. ridge top dry-land wheat) and its viewing area did not encompass any of the turbine locations.

To facilitate comparison of seasonal use estimates from this study with results from other wind projects, designation of seasons are defined as follows:

Fall	August 16 – October 31
Winter	November 1 – March 15
Spring	March 16 – May 15
Summer	May 16 – August 15

In the fall, weekly surveys commenced September 6 and ran through October 28, 2002. Information obtained from observations at plots 2, 3, 4, 6, 7, and 8 was used for assessing this period. A total of 54 surveys were performed during 9 visits. Winter surveys were conducted every other week beginning December 22, 2002 and ending March 5, 2003. Data from plots 2, 3, 4, 6A, 7A, 26, and 27 (Attachment 1) were used to assess the winter period. A total of 42 surveys were performed during 6 visits. Spring surveys were performed on a weekly basis, beginning March 19 and ending May 14, 2003. Data from plots 2, 3, 4, 6A, 7A, 26, and 27 were used to assess the spring period. A total of 56 surveys were performed during 8 visits. In summer, surveys were conducted every other week May 21 through August 14. Data from plots 2, 3, 4, 6A, 7A, 26, and 27 were used to assess the summer period. A total of 49 surveys were performed during 7 visits.

Other assessments

Foot and vehicle raptor nest surveys of the Shepherds Ridge study area were performed on April 17 and May 29, 2003. The project site and a buffer zone of approximately two miles were included in the survey. Habitat and/or structures suitable for nesting, including cliff areas, trees, and power poles, were examined.

Foot surveys were performed near proposed turbine string locations within areas of suitable habitat, including hillsides and field edges, for evidence of activity associated with burrowing owls and ground squirrels. These surveys were performed in conjunction with avian plot surveys. The period of focused observation was from early March through mid-June 2003. Field notes of observations both on and off survey plots were recorded from December 2002 through August 2003. These notes included avian and mammalian observations.

Results

A total of 1344 individual bird sightings were recorded from 201 20-minute point-count surveys conducted from September 6, 2002 through August 14, 2003. Thirty-four species were documented (Table 1). Spring had the highest number of species observed (24), followed by fall (19), summer (18) and winter (12). No threatened or endangered species were observed at any of the study plots. Special status species observed within the study plots include ferruginous hawk, Swainson's hawk, golden eagle, loggerhead shrike, long-billed curlew, and greater sandhill crane.

The mean number of bird species observed per survey (species richness) was highest in the spring (2.4 species/survey), followed by fall (2.2), summer (1.6), and winter (1.3). Avian use was highest in the fall (11 birds/survey), followed by spring (5.9), winter (5.8), and summer (3.3).

Table 1: Number of observations, mean use estimate and frequency of occurrence by species

	Fall (54 surveys)			Winter (42 surveys)			Spring (56 surveys)			Summer (49 surveys)		
Species/Group	**# Obs**	**Use**	**% Freq**	**# Obs**	**Use**	**% Freq**	**# Obs**	**Use**	**% Freq**	**# Obs**	**Use**	**% Freq**
Passerines												
horned lark	325	6.0	80	148	3.5	60	114	2.0	68	72	1.5	61
western meadowlark	24	0.44	24	4	0.095	9.5	33	0.59	45	6	0.12	10
loggerhead shrike	0	0	0	0	0	0	2	0.036	3.6	0	0	0
white-crowned sparrow	2	0.037	1.9	0	0	0	8	0.14	3.6	0	0	0
black-billed magpie	9	0.17	9.3	3	0.071	2.4	1	0.018	1.8	0	0	0
barn swallow	0	0	0	0	0	0	1	0.018	1.8	0	0	0
red-winged blackbird	0	0	0	0	0	0	5	0.089	5.4	11	0.23	4.1
common raven	39	0.72	33	21	0.50	19	5	0.089	8.9	7	0.14	12
bank swallow	0	0	0	0	0	0	0	0	0	4	0.082	8.2
cliff swallow	0	0	0	0	0	0	3	0.054	1.8	0	0	0
unidentified passerine	66	1.2	9.3	0	0	0	1	0.018	1.8	4	0.082	2.0
unidentified swallow	0	0	0	0	0	0	2	0.036	1.8	1	0.020	2.0
western kingbird	0	0	0	0	0	0	1	0.018	1.8	0	0	0
brewer's blackbird	52	0.96	1.9	0	0	0	1	0.018	1.8	2	0.041	2.0
american robin	0	0	0	0	0	0	6	0.11	3.6	0	0	0
lark sparrow	1	0.019	1.9	0	0	0	0	0	0	0	0	0
say's phoebe	2	0.037	3.7	0	0	0	0	0	0	0	0	0
american goldfinch	22	0.41	3.7	0	0	0	0	0	0	0	0	0
house finch	1	0.019	1.9	0	0	0	0	0	0	0	0	0
unidentified finch	5	0.093	1.9	0	0	0	0	0	0	0	0	0
sage thrasher	0	0	0	0	0	0	0	0	0	3	0.061	2.0
unidentified sparrow	2	0.037	1.9	0	0	0	0	0	0	0	0	0
Raptor												
ferruginous hawk	0	0	0	0	0	0	2	0.036	3.6	2	0.041	4.1
swainson's hawk	13	0.24	3.7	0	0	0	14	0.25	18	13	0.27	12
red-tailed hawk	9	0.17	11	2	0.048	4.8	5	0.089	7.1	7	0.14	10
rough-legged hawk	8	0.15	9.3	6	0.14	12	6	0.11	8.9	0	0	0
golden eagle	0	0	0	1	0.024	2.4	4	0.071	7.1	1	0.020	2.0
american kestrel	3	0.056	5.6	2	0.048	4.8	2	0.036	3.6	4	0.082	2.0
northern harrier	4	0.074	7.4	1	0.024	2.4	3	0.054	5.4	2	0.041	4.1
prairie falcon	1	0.019	1.9	2	0.048	4.8	0	0	0	0	0	0
unidentified buteo	0	0	0	0	0	0	2	0.036	3.6	4	0.082	8.2
turkey vulture	0	0	0	0	0	0	0	0	0	1	0.020	2.0
Waterbird												
long-billed curlew	0	0	0	0	0	0	9	0.16	13	9	0.18	8.2
sandhill crane	0	0	0	0	0	0	26	0.46	1.8	0	0	0
unidentified gull	0	0	0	0	0	0	43	0.77	3.6	1	0.020	2.0
Waterfowl												
Mallard	0	0	0	9	0.21	7.1	8	0.14	5.4	2	0.041	2.0
canada goose	4	0.074	1.9	45	1.1	4.8	0	0	0	0	0	0
Upland Gamebird												
California quail	2	0.037	1.9	0	0	0	14	0.25	3.6	0	0	0
Dove												
morning dove	0	0	0	0	0	0	7	0.13	7.1	1	0.020	2.0
rock dove	19	0.35	5.6	0	0	0	0	0	0	2	0.041	2.0
Total	**613**	**11**		**244**	**5.8**		**328**	**5.9**		**159**	**3.3**	

Mean use, percent composition, and frequency of occurrence for avian groups by season were also calculated (Table 2). Waterbird use was influenced greatly by one flock of sandhill crane (26 individuals) and one flock of unidentified gull (38). These two observations, recorded during the spring surveys, account for approximately 82% of the total observations for waterbirds. Waterfowl use in the winter was higher than all other groups except passerines due to one flock of Canada geese (40 individuals) observed at plot 26 in January. This observation accounted for 74% of the waterfowl use recorded during the winter. Raptor use was highest in the fall (0.71 birds/survey), followed by summer (0.69), spring (0.68), and winter (0.34). Raptor mean use for the fall was influenced somewhat by a large group of Swainson's hawks (12 individuals) observed at site 8 on September 11. This event accounted for 92% of the observations for this species for the entire fall period. Passerine use was highest in the fall (10 birds/survey), followed by winter (4.2) and spring (3.3), and lowest in the summer (2.3). Raptors with the highest use within the study area were Swainson's hawk, red-tailed hawk, rough-legged hawk, and northern harrier. Passerines with the highest use were horned lark, western meadowlark, common raven, and Brewer's blackbird.

Table 2: Number of observations, mean use estimate and frequency of occurrence by group

	Fall			Winter			Spring			Summer		
Species/Group	**Use**	**% Comp**	**% Freq**	**Use**	**% Comp**	**% Freq**	**Use**	**% Comp**	**% Freq**	**Use**	**% Comp**	**% Freq**
Passerines	10	90	93	4.2	72	71	3.3	56	89	2.3	69	80
Raptor	0.71	6.2	30	0.34	5.7	24	0.68	12	45	0.69	21	41
Waterbird	0	0	0	0	0	0	1.4	24	18	0.20	6.3	10
Waterfowl	0.070	0.65	1.9	1.3	22	12	0.14	2.4	5.4	0.04	1.3	2.0
Upland Gamebird	0.044	0.33	1.9	0	0	0	0.25	4.3	3.6	0	0	0
Dove	0.35	3.1	5.6	0	0	0	0.13	2.1	7.2	0.06	1.9	4.1
Total	**11**			**5.8**			**5.9**			**3.3**		

Fall

A total of 19 species were identified out of 613 observations. Overall mean use was 11 birds/survey. Horned lark (6.0 birds/survey), unidentified passerine (1.2), Brewer's blackbird (0.96), American goldfinch (0.41), and rock dove (0.35), were the five small bird species with the highest fall use. Common raven (0.72 birds/survey), Swainson's hawk (0.24), black-billed magpie (0.17), red-tailed hawk (0.17), and rough-legged hawk (0.15), were the five large bird species with the highest fall use. Passerines were the most abundant avian group (10 birds/survey), followed by raptors (0.71). Passerines made up 90% of the avian use, followed by raptors at 6.2% and doves at 3.1%. Common raven (33%) had the highest frequency of occurrence for large bird species, followed by red-tailed hawk (11%), black-billed magpie (9.3%), rough-legged hawk (9.3%), northern harrier (7.4%), and American kestrel (5.6%). Horned lark (80%) and western meadowlark (24%) were the two small bird species observed during more than ten percent of the surveys. Passerines were observed during 93% of the surveys, followed by raptors at 30% and doves at 5.6%. Waterfowl and upland game-birds were observed during less than 5% of the surveys.

Winter

During the winter, 12 species were identified out of 244 total observations. Overall mean use was 5.8 birds/survey. Horned lark (3.5 birds/survey) and western meadowlark (0.095) were the only small bird species observed during the winter. Canada goose (1.1 birds/survey), common raven (0.50), mallard duck (0.21), and rough-legged hawk (0.14), were the four large bird species with the highest winter use. Passerines were the most abundant avian group (4.2 birds/survey), followed by waterfowl (1.3) and raptors (0.34). Passerines made up 72% of the avian use, followed by waterfowl (22%) and raptors (5.7%). Common raven (19%) had the highest frequency of occurrence for large bird species, followed by rough-legged hawk (12%), mallard duck (7.1%), red-tailed hawk (4.8%), American kestrel (4.8%), prairie

falcon (4.8%), and Canada goose (4.8%). Horned lark (60%) and western meadowlark (9.5%) had the highest frequency of occurrence for small bird species. Passerines were observed during 71% of the surveys, followed by raptors (24%) and waterfowl (12%).

Spring

In spring, 24 species were identified out of 328 total observations. Overall mean use was 5.9 birds/survey. Horned lark (2.0 birds/survey), western meadowlark (0.59), white-crowned sparrow (0.14), American robin (0.11), and red-winged blackbird (0.089) were the small bird species with the highest spring use. Unidentified gull (0.77 birds/survey) had the highest spring use for large birds, followed by sandhill crane (0.46), California quail (0.25), Swainson's hawk (0.25), long-billed curlew (0.16), and mallard duck (0.14). Passerines were the most abundant avian group (3.3 birds/survey), followed by waterbirds (1.4) and raptors (0.68). Passerines made up 56% of the avian use, followed by waterbirds (24%) and raptors (12%). Swainson's hawk (18%) had the highest frequency of occurrence for large bird species, followed by long-billed curlew (13%), common raven (8.9%), rough-legged hawk (8.9%), red-tailed hawk (7.1%), and golden eagle (7.1%). Horned lark (68%) and western meadowlark (45%) were the two small bird species with a frequency of occurrence greater than 10%. Passerines were observed during 89% of the surveys, followed by raptors (45%) and waterbirds (18%).

Summer

During summer surveys, 18 species were identified out of 159 total observations. Overall mean use was 3.3 birds/survey. Horned lark (1.5 birds/survey), red-winged blackbird (0.23), and western meadowlark (0.12) were the three small bird species with the highest summer use. Swainson's hawk (0.27 birds/survey) had the highest summer use for large birds, followed by long-billed curlew (0.18), common raven (0.14), and red-tailed hawk (0.14). Passerines were the most abundant avian group (2.3 birds/survey), followed by raptors (0.69). Passerines made up 69% of the avian use, followed by raptors (21%). Common raven (12%) and Swainson's hawk (12%) had the highest frequency of occurrence for large bird species during the summer period, followed by red-tailed hawk (10%), unidentified buteo (8.2%), and long-billed curlew (8.2%). Horned lark (61%), western meadowlark (10%), and bank swallow (8.2%) were the only small bird species with frequencies greater than 5%. Passerines were observed during 80% of the surveys, with raptors at 41%.

Other Surveys

Suitable nesting habitat is scarce in the project area. Nesting activity was very low, with only three active and one inactive nest sites being identified. All three active nests were occupied by red-tailed hawks. Two of the nests were located in the Willow Creek valley, with the nearest nest approximately 0.3 miles east of the nearest proposed turbine string. The other nest is located in Fourmile Canyon and is approximately 0.5 miles west of the nearest proposed turbine string. Other nests in the area include a common raven nest approximately 5.5 miles south of the project along Fourmile Canyon Road, and a golden eagle and red-tailed hawk nest in metal power-line towers approximately 7.0 miles to the north of the project boundary.

Surveys of habitat suitable for burrowing owls and ground squirrels showed no evidence of activity associated with these species. No indications of the presence of these species were found in the area of the proposed facility during the spring period of focused observation, nor were any found during the balance of the year. Evidence of agricultural pests, such as pocket gophers, was encountered.

Discussion

Comparisons to other sites

Passerine use at Shepherds Ridge was compared to other wind conversion facilities in the region. Use was higher than found at Nine Canyon and Zintel Canyon wind projects during the fall, and lower than Nine Canyon and Zintel Canyon in the winter, spring, and summer (References 2 and 3).

Mean raptor use estimates for Shepherds Ridge Wind Farm were compared to raptor use estimates from several different wind projects in and outside of the Pacific Northwest (Reference 4). Winter use estimates were not included in the comparison because of the reduced survey period at Shepherds Ridge. Raptor use at Shepherds Ridge was similar to Buffalo Ridge Reference Area for spring and fall periods, and Buffalo Ridge Phase II and Foote Creek Rim for summer. Raptor use was lower at Shepherds Ridge than at Buffalo Ridge Phase II, Foote Creek Rim, and Columbia Hills in the spring and fall. Fall, spring, and summer use was higher at Shepherds Ridge than at Condon, Klondike, and Nine Canyon. For study areas within agricultural landscapes, mean raptor use at Shepherds Ridge appears to be most similar to the Buffalo Ridge projects.

General observations of raptors

Raptor use was fairly uniform throughout the study area, with slight differences being associated with individual species. Golden eagles and northern harriers were more often observed at plots located on the east side of the study area, whereas American kestrels and rough-legged hawks were more common at plots located on the west side. Red-tailed hawks and Swainson's hawks were distributed fairly evenly throughout the study area.

Plots of flight paths of raptors during winter, spring, and summer periods (seasons for which information was available), indicate that the majority of observations were associated with the edges or rims of the ridges. Of the 86 raptor observations, 66 (76.7%) fell within this definition and the majority of these had flight paths that were parallel to the ridge edge. For all raptor observations, 75% had flight paths considered to have a very low probability of intersecting proposed turbine strings, 19% were observed in the area of the proposed strings, and 6% were moderately close to proposed turbine strings.

Conclusion

The primary goal of the ecological studies conducted at Shepherds Ridge Wind Farm was to estimate the potential for an adverse impact from the project on the avian community, specifically raptors and special status species. Results of the avian use studies indicate relatively low use and diversity in the project area. Only 34 species were identified during the yearlong study, and mean number of species observed per survey was low for all seasons. Wind plant-related risks to threatened or endangered species appears to be extremely low in the Shepherds Ridge area, as none were observed during the entire study year. Swainson's hawk was the only sensitive species occurring in the area with numbers sufficient to warrant discussion.

Passerines are the most common group of birds killed at new generation wind plants, although the number is considered insignificant when compared to the overall annual avian collision mortality estimate (Reference 4). Mortality for passerines at Shepherds Ridge is expected to be low based on the relatively low mean use estimate for this group. Waterbirds and waterfowl occur in such low numbers within the project area that low mortality is expected for these groups as well. Raptors are usually considered the primary group of interest when assessing impacts related to wind projects. Raptor use estimates at Shepherds Ridge are similar to raptor use estimates for the Buffalo Ridge wind project in Minnesota.

Raptor mortality at all new generation wind plants located in agricultural areas has been very low; only one mortality was recorded during a four-year study at Buffalo Ridge (Reference 4). Another factor indicating low potential for raptor impact is that the majority of the observations of raptors at Shepherds Ridge were concentrated near ridge edges, with the majority of flight patterns parallel to both the ridges and proposed turbine strings.

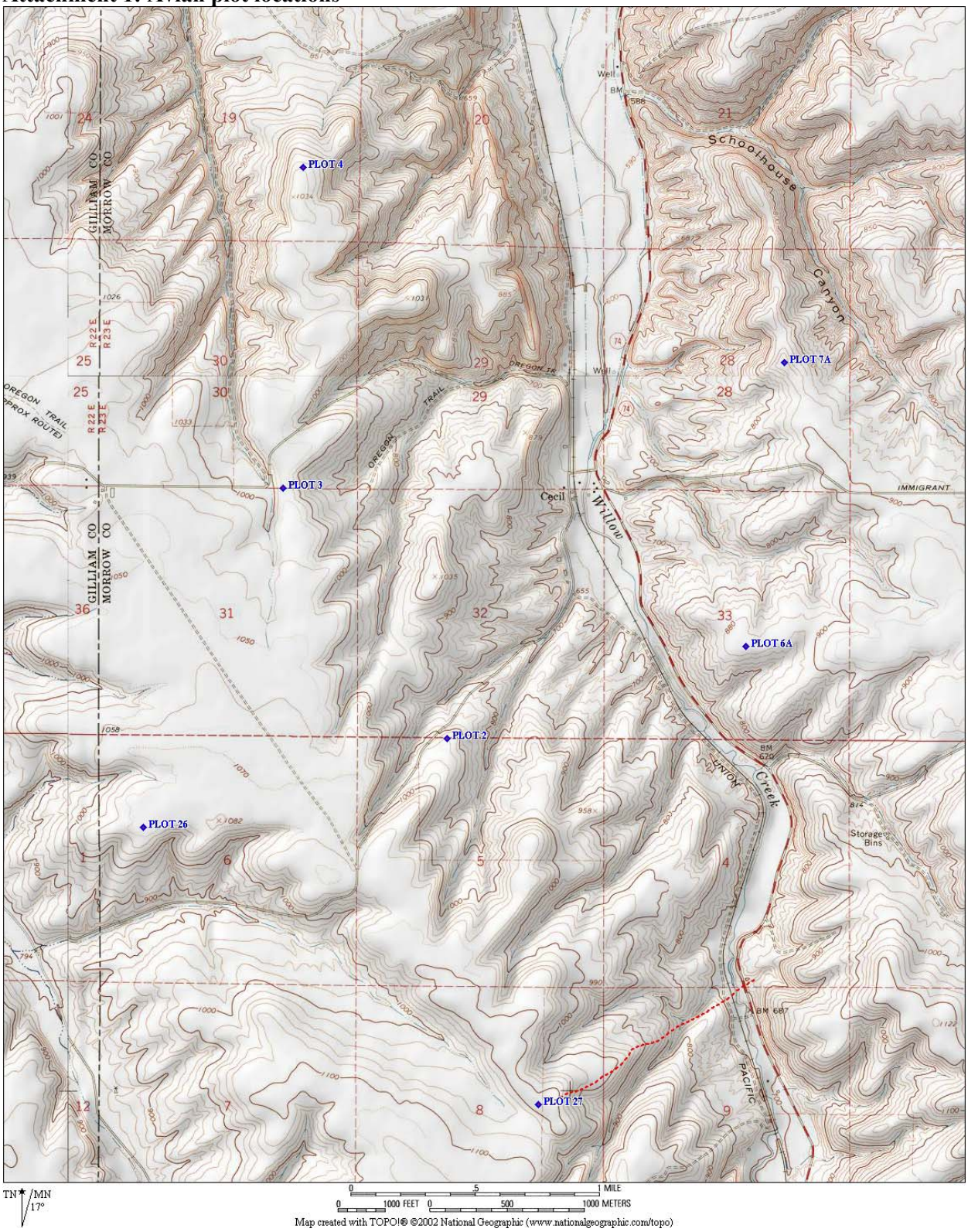
Only one area warrants special attention – the turbine designated A 01-01. Review of flight patterns in this area indicates that some raptors cut across this point to gain access to Schoolhouse Canyon. Their flight path is close to or over the proposed location of the turbine; the survey site is sufficiently distant to make an exact determination difficult. This may not present a significant risk, since the presence of the turbine string could result in an alteration of raptor flight path. However, we suggest that final micrositing of this turbine take avian usage into consideration.

Low nesting density and the scarcity of nesting structures in and near the project site suggests low potential for raptor breeding mortality. The potential for an adverse impact from the project on burrowing owls and ground squirrels appears to be very low as well, as specific foot surveys and yearlong avian surveys revealed no observations of nor activity associated with these species. From these avian use studies, raptor nesting surveys and surveys of special status species, we conclude that adverse impacts from the construction and operation of the Shepherds Ridge Wind Farm on the avian community and on special status species would be low.

References:

1. Preliminary Findings of Fact, Conditional Use Request, Application No. CUP-N-192
2. Wildlife Baseline Study for the Nine Canyon Wind Project, West, Inc.
3. Ecological Baseline Study for the Zintel Canyon Wind Project, West, Inc.
4. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments, West, Inc.

Attachment 1: Avian plot locations



Vegetative Characteristics of the Shepherds Flat Wind Farm

Prepared for:

LifeLine Renewable Energy, Inc.

Prepared by:

Steven O. Link Ph.D.[†], Richard E. Welch,

Randy M. Hermann, and Terry E. Northstrom Ph.D.

Environmental Solutions[†] and

Energy Northwest Environmental Services

January 2003

Introduction

At the request of LifeLine Renewable Energy, Inc., a preliminary assessment of the vegetative characteristics of a proposed wind power conversion facility site was conducted in preparation for environmental regulatory reviews. The study area, known as the Shepherds Flat Wind Farm, is located in north-central Oregon between the City of Arlington and Heppner Junction, immediately south of the Columbia River. Shepherds Flat Wind Farm is comprised of two distinct areas: the northern property, which includes Hurlburt Flats, Eightmile Canyon, and Horn Butte; and the southern or Cecil area property. This study focused on a portion of the northern property situated north and west of Eightmile Canyon, including Hurlburt Flats and the area immediately north and south of Rhea Road. Eightmile Canyon and the Horn Butte area were not included in this assessment.

Climatically, this area can be classified as arid to semiarid with low precipitation, hot dry summers, and cold winters. Annual precipitation averages 23.1 cm (9.1 in), with the majority of the precipitation occurring in the late fall and winter periods (November through February). According to the Western Regional Climate Center (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?orarli) maximum temperatures usually occur in July (monthly average highs 32.8° C (91° F)), and minimum temperatures in January (monthly average lows –2.2° C (28° F)).

Traditional use of the study area has been for the grazing of sheep. Discussions with the current landowner indicate that grazing of the property has been an annual event since approximately 1917. Typically, sheep are brought in from their summer range in mid- to late November and remain on the property until mid-January, at which time they are transported to the ranch headquarters for lambing operations. The sheep are returned to the property in mid- to late February and remain until mid- to late May.

Vegetation surveys were performed at nine locations within the array of proposed wind power generator sites. At each survey site, a representative area was selected and characterized by identifying all species present, determining species frequency and determining percent cover of species and other cover categories. The sites were classified into associations commonly described in the Columbia Basin (Daubenmire 1970). Species were grouped into native and invasive alien species to create a measure of rangeland condition. The presence of noxious weeds and other plants of concern were described. The conclusions drawn from the study are subject to the conditions of the study. Late fall allows for identification of a subset of the flora of the area. An examination at other times of the year would reveal most if not all of the species present in the study area.

Materials and Methods

The study area was visited on November 25 and December 5, 2002. Nine (9) survey sites were selected (Figure 1) and characterized by: 1) identifying all species present, and 2) determining species frequency and percent cover of plant species and other cover categories (litter, soil, soil cryptogam, and feces). Photographs were taken of each area.

A species inventory was developed by inspecting a circular area (approximately 200 m in diameter) at each survey site. Unknown species were collected for later identification using Hitchcock and Cronquist (1973). Specific epithets follow current convention (http://plants.usda.gov/).

Each survey site was selected as being representative of the general area. A 100 m tape was placed on the ground and rebar driven into the ground at each end of the tape. A red flag was also driven into the ground at each end for future reference. Species frequencies were determined by placing a 0.1 m^2 metal rectangular frame every 5 m along the tape for a total of 21 observations. In each frame, all species were identified and recorded. Even though the plot size is relatively small, it represents a widely accepted method of assigning a level of native plant abundance within each site. The exact location of the frame was recorded for future repeated measures if needed.

Cover was estimated by identifying what was present at each 1 m hash mark on the tape (Bonham 1989). If the plant was above the hash mark then it was recorded. Otherwise, the first recognizable entity directly below the hash mark was identified. The entities included vascular plant species, litter, soil, feces, and soil cryptogams. Litter is defined as plant material that was broken off and lying on the ground or was too small to recognize as still attached or broken. Standing dead vegetation was identified to species.

Results and Discussion

There were a total of 36 species identified at the nine (9) survey sites. Of these, 25 (69%) are native (Table 1). The identification of a few species was tentative because of the time of year that sampling was conducted. This is noted with 'cf' in the species names in Table 1.

Table 1. Plant species found at the Shepherds Flat Wind Farm.

Family *Species*	**Common Name**	**Native or Alien**	**Life cycle**	**Life form**
Boraginaceae				
Cryptantha cf *pterocarya*	Winged cryptantha	Native	annual	herb
Caryophyllaceae				
Holosteum umbellatum	Jagged chickweed	Alien	annual	herb
Chenopodiaceae				
Salsola kali	Russian thistle	Alien	annual	herb
Compositae				
Antennaria dimorpha	Low pussytoes	Native	perennial	herb
Artemisia tridentata	Big sagebrush	Native	perennial	shrub
Centaurea diffusa	Diffuse knapweed	Alien	annual/biennial	herb
Centaurea solstitialis	Yellow starthistle	Alien	annual/biennial	herb
Chrysothamnus viscidiflorus	Green rabbitbrush	Native	perennial	shrub
Cirsium undulatum	Wavy-leaved thistle	Native	perennial	herb

Family *Species*	**Common Name**	**Native or Alien**	**Life cycle**	**Life form**
Conyza canadensis	Horseweed	Native	annual	herb
cf *Crocidium multicaule*	Spring gold	Native	annual	herb
Ericameria nauseosa	Gray rabbitbrush	Native	perennial	shrub
Gutierrezia sarothrae	Matchbrush	Native	perennial	shrub
Lactuca serriola	Prickly lettuce	Alien	annual	herb
Tragopogon dubius	Salsify	Alien	annual	herb
Cruciferae				
Descurainia pinnata	Pinnate tansymustard	Native	annual/biennial	herb
Draba verna	Spring-whitlow grass	Alien	annual	herb
Sisymbrium altissimum	Tumblemustard	Alien	annual	herb
Cupressaceae				
Juniperus occidentalis	Western juniper	Native	perennial	tree
Geraniaceae				
Erodium cicutarium	Redstem storksbill	Alien	annual	herb
Graminae				
Agropyron cf *dasytachyum*	Thick-spike wheatgrass	Native	perennial	grass
Bromus tectorum	Cheatgrass	Alien	annual	grass
Elymus elymoides	Bottlebrush squirreltail	Native	perennial	bunchgrass
Hesperostipa comata	Needle-and-thread grass	Native	perennial	bunchgrass
Poa secunda	Sandberg's bluegrass	Native	perennial	bunchgrass
Pseudoroegneria spicata	Bluebunch wheatgrass	Native	perennial	bunchgrass
Taeniatherum caput-medusae	Medusa head	Alien	annual	grass
Vulpia cf *octoflora*	Six-weeks fescue	Native	annual	grass
Leguminosae				
Astragalus purshii	Wooly-pod milkvetch	Native	perennial	herb
Lupinus sp.	Lupine	Native	perennial	herb
Liliaceae				
Calochortus macrocarpus	Mariposa lily	Native	perennial	herb
Onagraceae				
Epilobium paniculatum	Tall willowherb	Native	annual	herb
Polemoniaceae				
Phlox longifolia	Longleaf phlox	Native	perennial	subshrub
Polygonaceae				
Eriogonum cf *strictum*	Buckwheat	Native	perennial	subshrub
Rosaceae				
Purshia tridentata	Bitterbrush	Native	perennial	shrub
Santalaceae				
Comandra umbellata	Bastard toadflax	Native	perennial	herb

There are approximately 20 vascular plant species listed as federal and/or state species of interest at various levels of concern for Gilliam and Morrow counties (Oregon Natural Heritage Program 2001) that potentially could occur on the property. None were observed at or near any of the survey sites.

There are three species listed by the Oregon Department of Agriculture (http://oda.state.or.us/plant/weed_control/index.html) as noxious weeds on the property. They are *Centaurea diffusa* (diffuse knapweed), *Centaurea solstitialis* (yellow starthistle), and *Taeniatherum caput-medusae* (medusa head). All are listed as 'B' designated weeds. 'B' designated weeds are weeds of economic importance which are regionally abundant, but which may have limited distribution in some counties. *Centaurea solstitialis* is also listed as a type 'T' species. 'T' designated weeds are priority noxious weeds designated by the State Weed Board as target weed species on which the Department will implement statewide management plans. *Centaurea solstitialis* is not yet common on the property, being observed at only two sites. While *Bromus tectorum* (cheatgrass) is not listed as a noxious weed, it is very invasive and is considered a cause for increased fire frequency (Whisenant 1990). It should be noted, however, that cheatgrass makes up a large portion of the available forage for the sheep which now graze the property during the fall, winter and spring months of the year. A native species that is of some risk to the property is *Gutierrezia sarothrae* (matchbrush). This species is near the northern limit of its recognized geographic distribution in the West (Hitchcock and Cronquist 1973). It is often found in rangelands and presents a potential poisoning problem to cattle and sheep (Whitson *et al*. 1992).

The species composition at each survey site is presented in Table 2. *Bromus tectorum* and *Poa secunda,* which are common grasses, were found at each site while *Artemisia tridentata* (big sagebrush) was only found at two sites. *Artemisia tridentata* is becoming less common in this region because of frequent exposure to fire, which it cannot tolerate. A number of native species were only found at one site. The percent of species that are native ranged from 55 to 82% across the sites. Species richness ranged from 11 to 23 species among sites.

Table 2. Species present (1) or absent (0) at each survey site.

Family *Species*	**Site**								
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
Boraginaceae									
Cryptantha cf *pterocarya*	0	0	1	0	0	1	1	1	1
Caryophyllaceae									
Holosteum umbellatum	1	1	1	1	1	1	1	1	1
Chenopodiaceae									
Salsola kali	0	0	1	1	0	0	0	0	0
Compositae									
Antennaria dimorpha	0	0	0	0	1	0	1	0	0
Artemisia tridentata	0	0	0	0	1	0	0	1	0
Centaurea diffusa	0	0	1	1	0	0	0	0	1
Centaurea solstitialis	0	0	0	0	0	0	0	1	1
Chrysothamnus viscidiflorus	1	0	0	0	0	0	0	0	0
Cirsium undulatum	1	1	1	1	1	1	1	1	1
Conyza canadensis	0	0	0	1	0	0	0	0	0
cf *Crocidium multicaule*	0	0	1	1	0	0	1	1	0

Family *Species*	**Site**								
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
Ericameria nauseosa	1	1	1	1	1	1	1	1	1
Gutierrezia sarothrae	1	1	1	1	1	1	1	1	1
Lactuca serriola	0	0	0	1	0	0	1	1	0
Tragopogon dubius	0	0	1	1	1	0	1	0	1
Cruciferae									
Descurainia pinnata	0	0	0	0	0	1	0	1	1
Draba verna	1	1	1	1	1	1	1	1	1
Sisymbrium altissimum	0	0	1	1	0	0	0	1	0
Cupressaceae									
Juniperus occidentalis	0	0	0	0	1	0	1	1	0
Geraniaceae									
Erodium cicutarium	0	0	0	0	0	0	0	0	1
Graminae									
Agropyron cf *dasytachyum*	1	0	0	0	0	0	0	0	0
Bromus tectorum	1	1	1	1	1	1	1	1	1
Elymus elymoides	0	0	0	1	0	1	0	1	1
Hesperostipa comata	1	1	1	0	1	1	1	1	1
Poa secunda	1	1	1	1	1	1	1	1	1
Pseudoroegneria spicata	0	1	1	1	1	1	1	1	1
Taeniatherum caput-medusae	0	0	1	1	1	0	1	1	1
Vulpia cf *octoflora*	0	1	1	1	1	1	1	1	1
Leguminosae									
Astragalus purshii	0	0	0	0	0	0	0	0	1
Lupinus sp.	0	0	0	0	0	1	0	0	1
Liliaceae									
Calochortus macrocarpus	1	0	0	1	1	1	1	0	1
Onagraceae									
Epilobium paniculatum	1	1	1	1	1	1	1	1	1
Polemoniaceae									
Phlox longifolia	0	0	0	0	0	0	0	0	1
Polygonaceae									
Eriogonum cf *strictum*	0	0	0	0	1	0	0	0	0
Rosaceae									
Purshia tridentata	0	0	0	0	0	1	0	0	0
Santalaceae									
Comandra umbellata	0	0	0	0	1	0	0	0	0
Species richness	**12**	**11**	**18**	**20**	**19**	**17**	**19**	**21**	**23**
Percent native	**75**	**73**	**56**	**55**	**74**	**82**	**68**	**71**	**65**

Species frequency is a measure of how widely distributed and common species are across the nine survey sites (Table 3). *Bromus tectorum* (cheatgrass) was found in all but two of the 189 plots in the study area and is the most common plant on the property. *Holosteum umbellatum*, *Draba verna*, and the unknown forb were also very common. It is likely that the unknown forb is *Holosteum umbellatum* and/or *Draba verna*. Both of these species are very small annuals and easily overlooked. *Poa secunda* is the most common native plant and perennial. Each site can be ordered on the relative frequency of native and alien species. Native species are often considered characteristic of high quality lands having few invasive species and at lower risk of fire (Whisenant 1990). The highest rating of quality would be where every native species in a study area was found in all sample plots. None of these sites exceeded 13% in native species frequency. Site 03 had the highest average native frequency, at 12.9%, while site 06 had the lowest, at 5.2%.

Table 3. Species frequency within each survey site. Values are the percentage of species occurrence in the twenty-one 0.1 m^2 plots surveyed at each site.

Species	**Site**								
	01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
Bromus tectorum	90	100	100	100	100	100	100	100	100
Poa secunda	100	100	86	52	81	29	71	100	95
Unknown forb	62	95	100	90	48	95	95	100	95
Holosteum umbellatum	90	81	90	90	57	95	95	100	100
Draba verna	67	38	67	81	29	71	24	62	62
Vulpia cf *octoflora*	0	19	67	0	43	19	19	0	33
Hesperostipa comata	0	43	43	0	0	0	0	0	0
cf *Crocidium multicaule*	0	0	14	14	0	0	14	10	0
Taeniatherum caput-medusae	0	0	0	95	0	0	0	62	0
Pseudoroegneria spicata	0	0	0	0	57	0	19	5	0
Epilobium paniculatum	0	0	14	0	0	5	5	0	0
Gutierrezia sarothrae	0	0	0	14	0	5	14	0	5
Cryptantha cf *pterocarya*	0	0	0	19	0	10	0	0	0
Sisymbrium altissimum	0	0	0	10	0	5	0	0	0
Descurainia pinnata	0	0	0	0	0	5	0	5	0
Erodium cicutarium	0	0	0	0	0	0	0	0	43
Agropyron cf *dasytachyum*	19	0	0	0	0	0	0	0	0
Elymus elymoides	0	0	0	0	0	0	0	0	10
Conyza Canadensis	0	0	0	5	0	0	0	0	0
Lupinus sp.	0	0	0	0	0	0	0	0	5
Centaurea diffusa	0	0	0	0	0	0	0	0	5
Phlox longifolia	0	0	0	0	0	0	0	0	5
Average native frequency	**8.5**	**11.6**	**16**	**7.4**	**12.9**	**5.2**	**10.1**	**8.6**	**10.9**
Average alien frequency	**38.6**	**39.3**	**44.6**	**58.3**	**29.3**	**45.7**	**39.3**	**53**	**50.6**

Percent cover of each plant species and other cover category is the relative amount of the ground covered by the species or category. Just as *Bromus tectorum* had the greatest frequency across sites, it also had the greatest cover of any species across sites. Species were grouped into native and alien classes to provide another means of ordering sites. Site 05 had the greatest percent cover of native species while site 08 had the lowest. A measure of good condition is the sum of native vegetation, soil, and soil cryptogam percent cover, while poor condition is the sum of alien vegetation and litter cover. A high value for poor condition would indicate a site at relatively high risk of fire. A site is in poor condition if the percent cover of alien species and litter is greater than 50%. Site 05 had high good cover as well as site 03. Site 08 had the lowest good cover value. Photographs and plant association classifications for each site are presented in Figures 2 – 10.

Table 4. Percent cover of species and other classes at the nine survey sites.

Species/Cover Classes	Site								
	01	02	03	04	05	06	07	08	09
Bromus tectorum	9	26	8	27	23	42	45	68	54
Poa secunda	34	25	29	1	8	3	7	7	11
Litter	30	24	10	36	12	30	26	15	18
Soil	21	16	11	5	1	11	4	1	3
Unknown forb	3	4	15	11	2	4	1	1	1
Agropyron cf *dasytachyum*	3	0	0	0	0	0	0	0	0
Feces	1	0	0	0	0	1	1	0	0
Hesperostipa comata	0	4	14	0	0	0	2	0	0
Pseudoroegneria spicata	0	1	0	0	28	3	8	0	1
Vulpia cf *octoflora*	0	0	12	5	26	3	1	0	5
Sisymbrium altissimum	0	0	1	0	0	0	0	0	0
Holosteum umbellatum	0	0	1	0	0	0	0	0	0
Taeniatherum caput-medusae	0	0	0	10	0	0	4	5	0
Elymus elymoides	0	0	0	1	0	0	0	1	0
Gutierrezia sarothrae	0	0	0	5	0	0	1	2	2
Epilobium paniculatum	0	0	0	0	1	1	0	0	0
Cryptantha cf *pterocarya*	0	0	0	0	0	1	0	0	0
Ericameria nauseosa	0	0	0	0	0	2	0	0	1
Soil cryptogam	0	0	0	0	0	0	1	1	2
Erodium cicutarium	0	0	0	0	0	0	0	0	1
Native species	**37**	**30**	**55**	**12**	**63**	**13**	**19**	**10**	**20**
Alien species	**12**	**30**	**25**	**48**	**25**	**46**	**50**	**74**	**56**
Good condition (native + soil + soil cryptogam)	**59**	**46**	**66**	**17**	**64**	**25**	**25**	**12**	**25**
Poor condition (alien + litter)	**42**	**54**	**35**	**84**	**37**	**76**	**76**	**89**	**75**

Summary and Conclusion

Overall, 36 plant species were identified with approximately 69 percent of these being native. No federal and/or state rare, threatened, or endangered species were found in or near the survey

sites. Three species designated as noxious weeds were identified on the property, although in limited distribution. The most common noxious weed was *Taeniatherum caput-medusae* (medusa head), being present at six sites but identified in only three sites for cover classification and two sites for species frequency. The least common noxious weed, but probably most important because of its "priority" rating, was *Centaurea solstitialis* (yellow starthistle), being present at two sites but not identified in any plots for species frequency or cover classification. *Bromus tectorum* (cheatgrass) was the most common species encountered in the assessment area; it had the greatest average frequency and average percent cover across all nine sites. *Poa secunda* (Sandberg's bluegrass) was the most common native species. Alien species demonstrated consistently higher frequencies of occurrence than native species at all sites. The lowest average alien frequency (29.3 % at Site 05) was considerably higher than the highest average native frequency (16.0 % at Site 03). Six of the nine sites were rated in poor condition with respect to cover classes, with five of the six sites being dominated by alien species and producing values characteristic of sites at high risk of fire.

Daubenmire (1970) defines shrub-steppe as "a physiognomic subdivision of steppe (perennial grassland) in which there are conspicuous (but discontinuous) layers of shrubs." Shrub-steppe would be characterized by a shrub layer composed primarily of *Artemisia tridentata*, and an understory of perennial grasses, dominated by *Pseudoroegneria spicata* and *Poa secunda* and perennial forbs. Annual grasses and forbs would be represented as minor components. Geographically, the plant community in the assessment area would fall within the *Artemisia tridentata/ Pseudoroegneria spicata* (formerly *Agropyron spicatum*) zonal association. The plant species identified at the nine survey sites are generally representative of the shrub-steppe communities described by Daubenmire. However, the current land use practices and wildfires have altered the climax vegetation presently found in the area.

The property studied in this assessment has a history of land-use practices related to grazing activities dating back to at least the early 1900's and potentially as far back as the late 1800's. This activity, along with wildfire, has played an important role in sculpting the vegetative community now in existence in the study area. Grazing tends to eliminate the larger perennial grasses, particularly *Pseudoroegneria spicata*, and to increase annual grasses, particularly *Bromus tectorum*. Fire seriously affects the dominant shrub, *Artemisia tridentata*, as it is fire sensitive and can be completely eliminated from an area (Franklin and Dyrness, 1973).

Data from this study demonstrate that all sites within the study area have been impacted to various degrees by disturbances related to grazing activities and wildfire events. The distribution of alien species (specifically *Bromus tectorum*), the presence of noxious weeds, and the relative absence of the dominant native species common to the *Artemisia tridentata/Pseudoroegneria spicata* community, are indicative of successional changes brought about by these disturbances. As a result, typical native shrub-steppe habitat, as defined in the classical sense, is largely absent from the study area.

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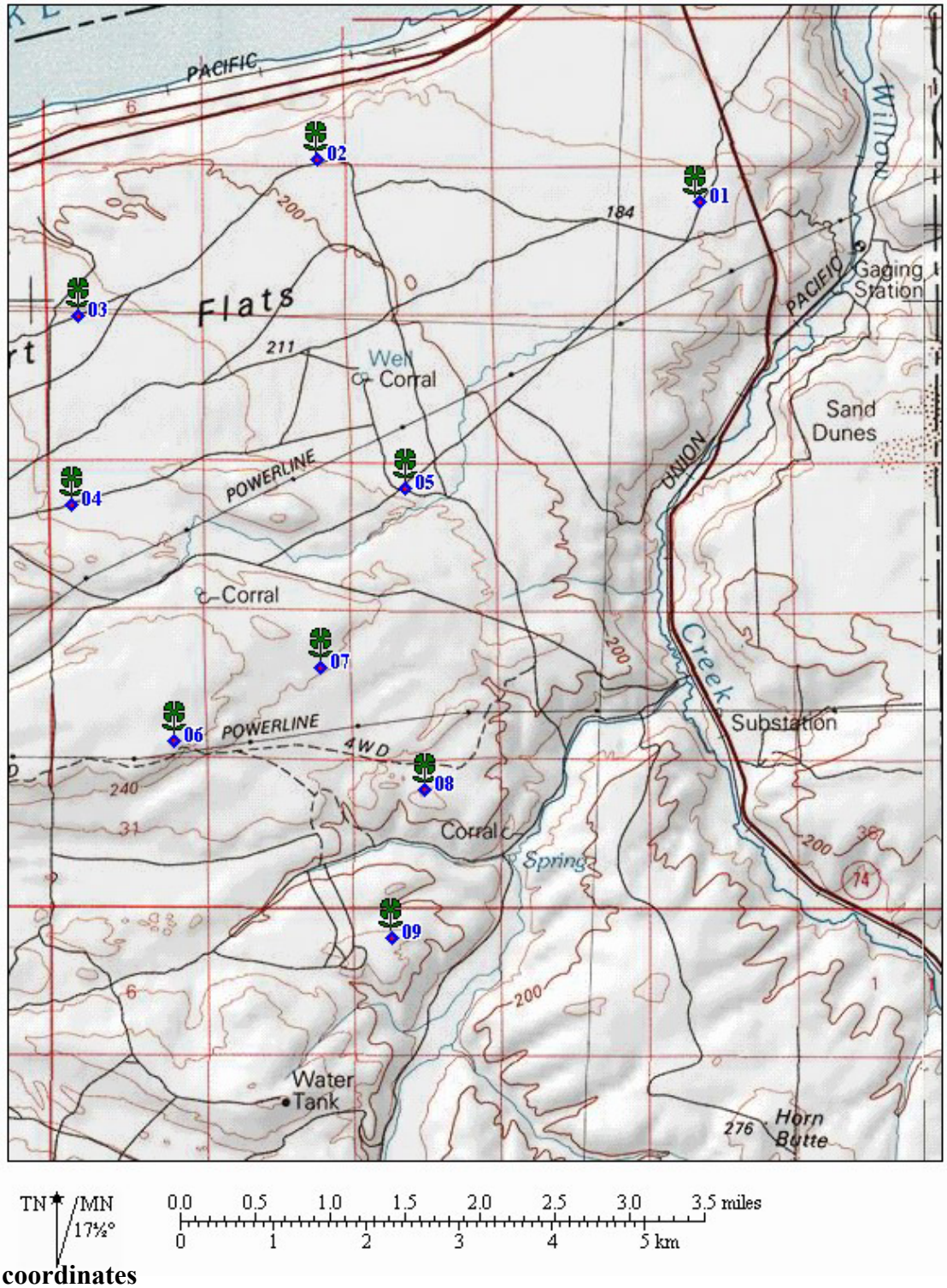

GPS coordinates

01 730778mE 5071597mN	**02** 726614mE 5071901mN	**03** 724065mE 5070110mN
04 724072mE 5068068mN	**05** 727692mE 5068367mN	**06** 725289mE 5065532mN
07 726848mE 5066401mN	**08** 728028mE 5065101mN	**09** 727727mE 5063483mN

Figure 1. Shepherds Flat Wind Farm vegetation survey sites.

Figure 2. Site 01, classified as a *Poa secunda – Bromus tectorum* association.

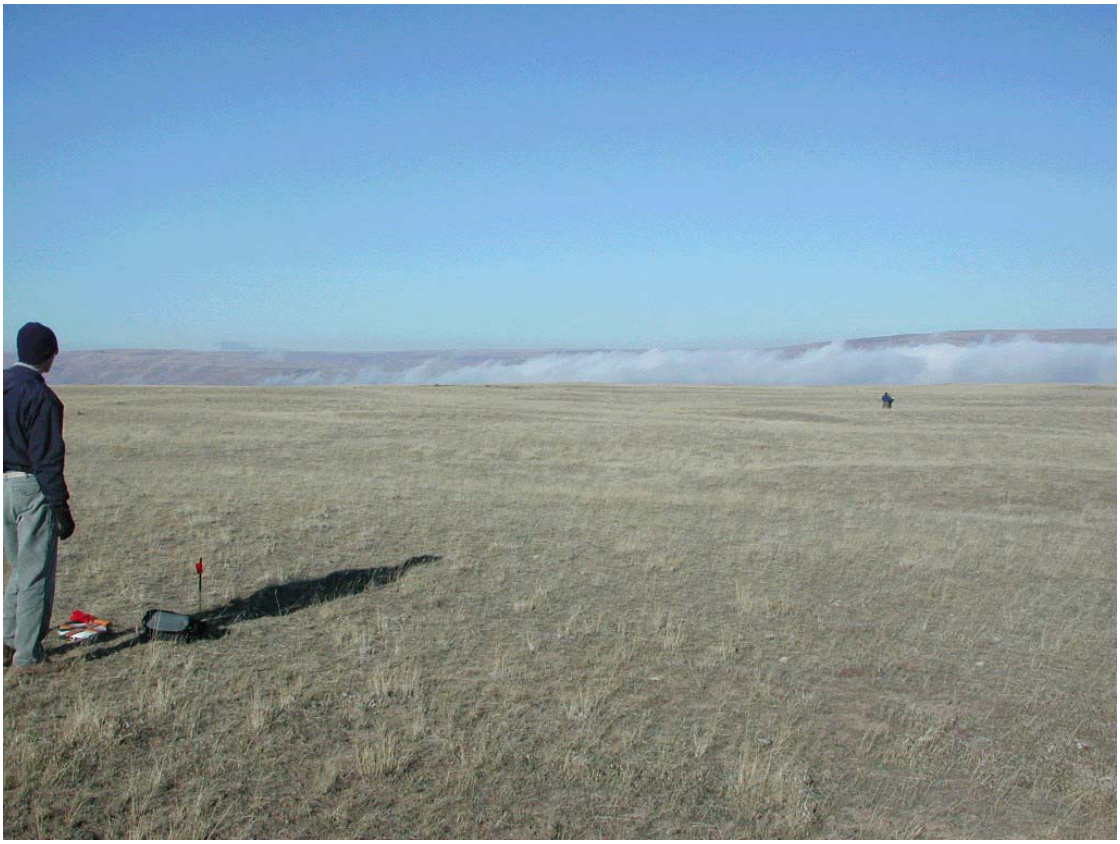

Figure 3. Site 02, classified as a *Hesperostipa comata – Poa secunda – Bromus tectorum* association.

Figure 4. Site 03, classified as a *Hesperostipa comata – Poa secunda – Bromus tectorum* association.

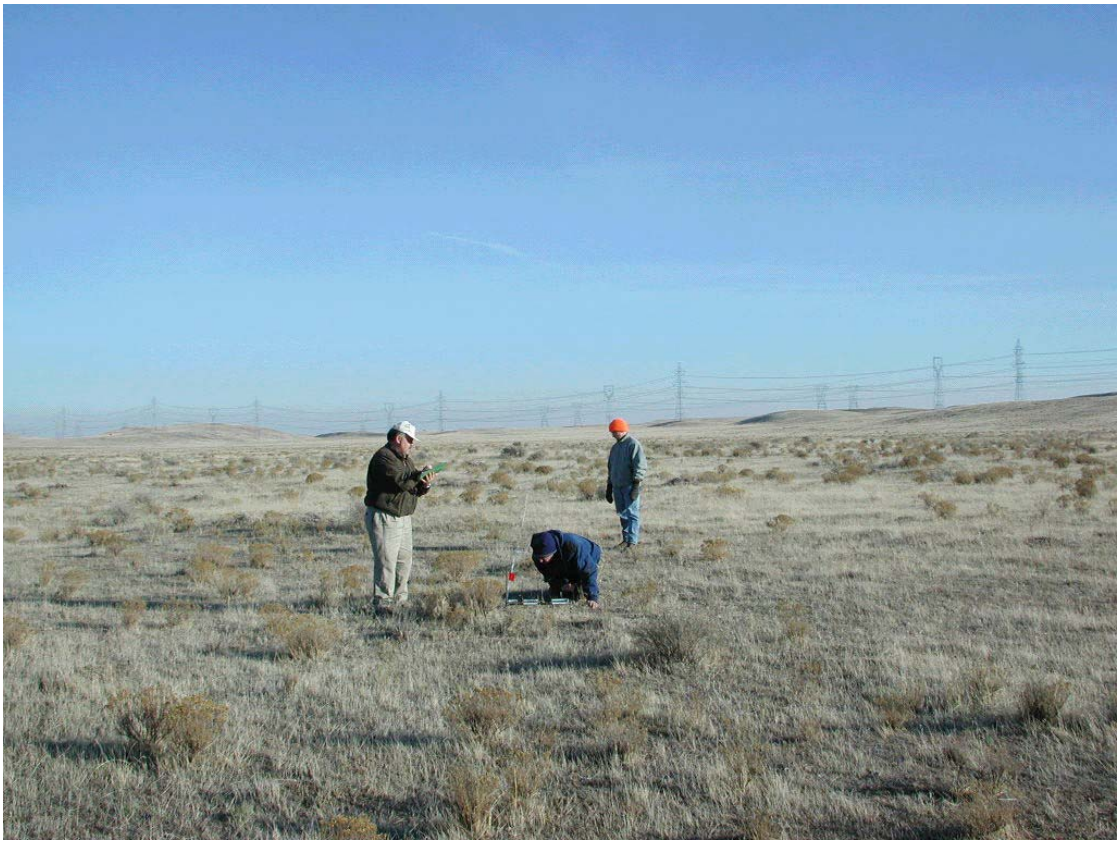

Figure 5. Site 04, classified as a *Gutierrezia sarothrae – Bromus tectorum* - *Taeniatherum caput-medusae* association.

Figure 6. Site 05, classified as a *Pseudoroegneria spicata – Bromus tectorum - Poa secunda* association.

Figure 7. Site 06, classified as a *Bromus tectorum – Gutierrezia sarothrae* association.

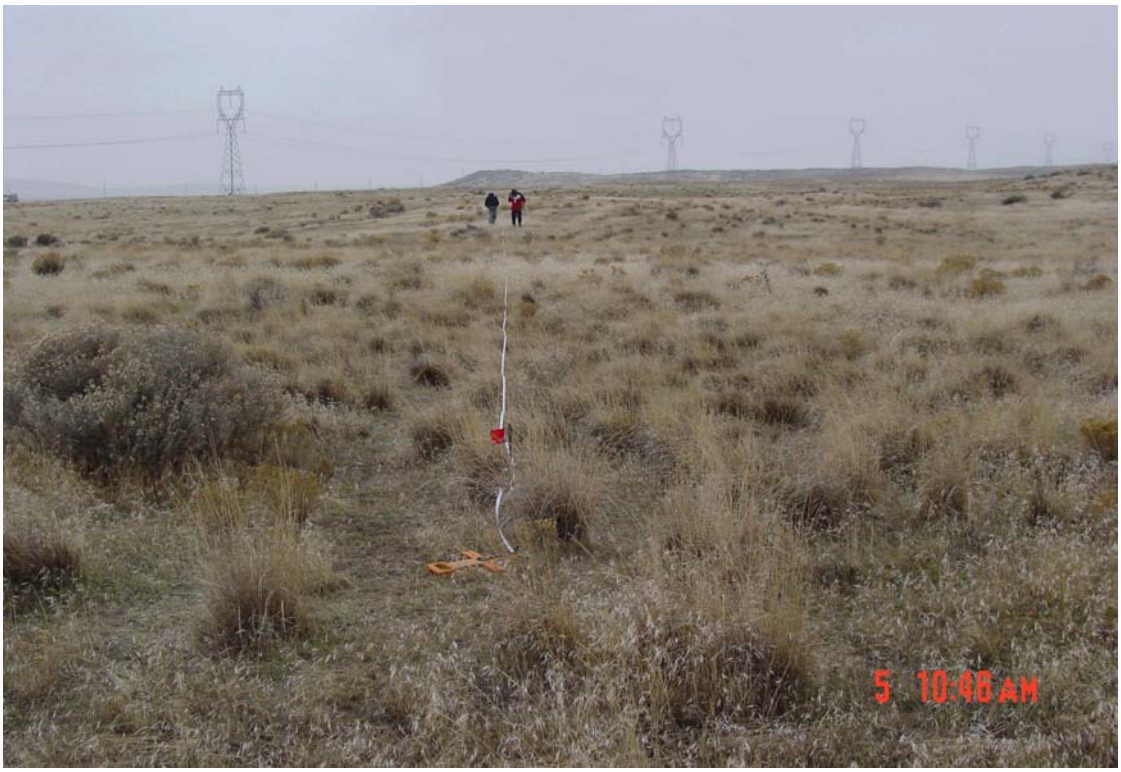

Figure 8. Site 07, classified as a *Pseudoroegneria spicata – Bromus tectorum - Poa secunda* association.

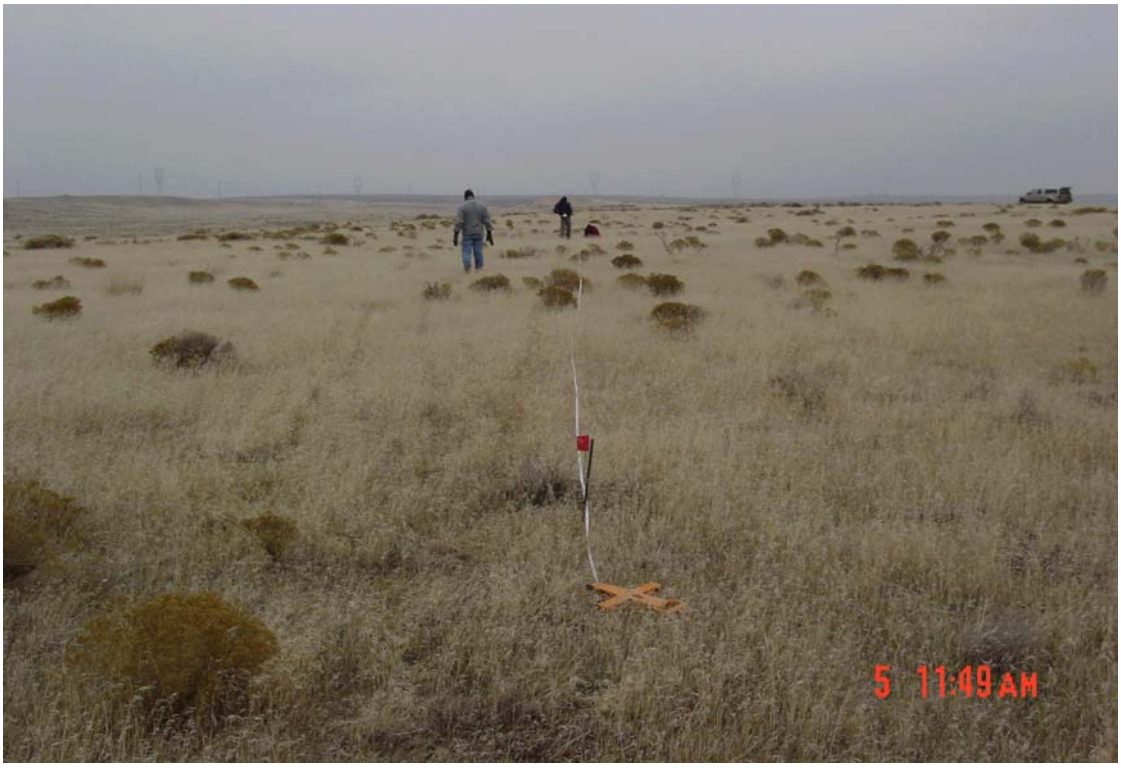

Figure 9. Site 08, classified as a *Gutierrezia sarothrae - Poa secunda - Bromus tectorum* association.

Figure 10. Site 09, classified as a *Bromus tectorum* - *Poa secunda* association with *Gutierrezia sarothrae*.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

Reply To: 8330.8931(02)
File Name: Sp893.wpd
TS Number: 02-6754

August 2, 2002

Patricia Pilz
Life Line Renewable Energy, Inc.
656 San Miguel Way
Sacramento, CA 95819-

Subject: Arlington Wind Plant Project
USFWS Reference # (1-7-02-SP-893)

Dear Ms. Pilz:

This is in response to your Species List Request Form, dated July 18, 2002, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Arlington Wind Plant Project in Gilliam County. The U.S. Fish and Wildlife Service (Service) received your correspondence on July 18, 2002.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Arlington Wind Plant Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Bonneville Power Administration (BPA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, BPA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 402.12.

If BPA determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, BPA is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

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Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published June 13, 2002, in the Federal Register (Vol. 67, No. 114, 40657) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, BPA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, BPA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages BPA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Stacy Sroufe at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact National Marine Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,

John Marshall

Acting for Kemper M. McMaster
State Supervisor

Attachments
1-7-02-SP-893

cc: OFWO-ES
ODFW (nongame)
Sarah McNary BPA

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE ARLINGTON WIND PLANT PROJECT
1-7-02-SP-893

LISTED SPECIES[1/]

Birds		
Bald eagle[2/]	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Middle Columbia River)[3/]	*Oncorhynchus mykiss*	**T
Steelhead (Upper Columbia River)[4/]	*Oncorhynchus mykiss*	** E
Steelhead (Snake River Basin)[4/]	*Oncorhynchus mykiss*	** T
Sockeye salmon	*Oncorhynchus nerka*	CH **E
Salmon River tributary to the Snake River, Idaho.		
Chinook salmon (Upper Columbia River)[5/]	*Oncorhynchus tshawytscha*	** E
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River spring/summer runs		
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River fall runs		

PROPOSED SPECIES

None

CANDIDATE SPECIES

Mammals	
Washington ground squirrel[6/]	*Spermophilus washingtoni*
Birds	
Yellow-billed cuckoo[7/]	*Coccyzus americanus*
Plants	
Northern wormwood	*Artemisia campestris* ssp. *wormskioldii*

SPECIES OF CONCERN

Mammals	
Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*

<u>Birds</u>	
Western burrowing owl	*Athene cunicularia hypugea*
Ferruginous hawk	*Buteo regalis*
Willow flycatcher	*Empidonax trailli adastus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
<u>Amphibians and Reptiles</u>	
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
<u>Fish</u>	
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorhynchus mykiss gibbsi*
<u>Plants</u>	
Laurence's milk-vetch	*Astragalus collinus* var. *laurentii*
Disppearing monkeyflower	*Mimulus evanescens*
Little mousetail	*Myosurus minimus* ssp. *apus* (=var. *sessiliflorus*)

(E) - Listed Endangered	*(T) - Listed Threatened*	*(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered	*(PT) - Proposed Threatened*	*(PCH) - Critical Habitat has been proposed for this species*
(S) - Suspected	*(D) - Documented*	

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

** *Consultation with National Marine Fisheries Service may be required.*

1/ *U. S. Department of Interior, Fish and Wildlife Service, October 31, 2000, <u>Endangered and Threatened</u> <u>Wildlife and Plants</u>, 50 CFR 17.11 and 17.12*

2/ *Federal Register Vol. 60, No. 133, July 12, 1995 - Final Rule - Bald Eagle*

3/ *Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead*

4/ *Federal Register Vol. 62, No. 159, August 18, 1997, Final Rule-Upper Columbia and Snake River Steelhead*

5/ *Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon*

6/ *Federal Register Vol. 66, No. 210, October 30, 2001, Notice of Review - Candidate or Proposed Animals and Plants*

7/ *Federal Register Vol. 66, No. 143, July 25, 2001, 12-Month Finding for a Petition To List the Yellow-billed Cuckoo*

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects[1]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

---

[1] A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332. (2)c). On projects other that construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 S.E. 98th Avenue, Suite 100
Portland, Oregon 97266
(503) 231-6179 FAX: (503) 231-6195

Reply To: 8330.9971(02)
File Name: Sp997.wpd
TS Number: 02-7612

September 17, 2002

Amanda Pilz
Life Line Renewable Energy, Inc.
656 San Miguel Way
Sacramento, CA 95819

Subject: Shepherds Flat Wind Farm Project
USFWS Reference # (1-7-02-SP-997)

Dear Ms. Pilz:

This is in response to your letter, dated September 3, 2002, requesting information on listed and proposed endangered and threatened species that may be present within the area of the Shepherds Flat Wind Farm Project in Gilliam County. The U.S. Fish and Wildlife Service (Service) received your correspondence on September 3, 2002.

We have attached a list (Attachment A) of threatened and endangered species that may occur within the area of the Shepherds Flat Wind Farm Project. The list fulfills the requirement of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Bonneville Power Administration (BPA) requirements under the Act are outlined in Attachment B.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq.*, BPA is required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Attachment B, as well as 50 CFR 402.12.

If BPA determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, BPA is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Attachment A includes a list of candidate species under review for listing. The list reflects changes to the candidate species list published June 13, 2002, in the Federal Register (Vol. 67, No. 114, 40657) and the addition of "species of concern." Candidate species have no protection under the Act but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

If a proposed project may affect only candidate species or species of concern, BPA is not required to perform a Biological Assessment or evaluation or consult with the Service. However, the Service recommends addressing potential impacts to these species in order to prevent future conflicts. Therefore, if early evaluation of the project indicates that it is likely to adversely impact a candidate species or species of concern, BPA may wish to request technical assistance from this office.

Your interest in endangered species is appreciated. The Service encourages BPA to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact Stacy Sroufe at (503) 231-6179. All correspondence should include the above referenced file number. For questions regarding salmon and steelhead trout, please contact National Marine Fisheries Service, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232, (503) 230-5400.

Sincerely,

Willa Nehlsen

for Kemper M. McMaster
State Supervisor

Attachments
1-7-02-SP-997

cc: OFWO-ES
ODFW (nongame)
Sarah McNary BPA

ATTACHMENT A

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN THAT MAY OCCUR WITHIN THE AREA OF THE SHEPHERDS FLAT WIND FARM PROJECT
1-7-02-SP-997

LISTED SPECIES[1/]

Birds		
Bald eagle[2/]	*Haliaeetus leucocephalus*	T
Fish		
Steelhead (Middle Columbia River)[3/]	*Oncorhynchus mykiss*	**T
Steelhead (Upper Columbia River)[4/]	*Oncorhynchus mykiss*	** E
Steelhead (Snake River Basin)[4/]	*Oncorhynchus mykiss*	** T
Sockeye salmon	*Oncorhynchus nerka*	CH **E
Salmon River tributary to the Snake River, Idaho.		
Chinook salmon (Upper Columbia River)[5/]	*Oncorhynchus tshawytscha*	** E
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River spring/summer runs		
Chinook salmon	*Oncorhynchus tshawytscha*	CH **T
Snake River fall runs		

PROPOSED SPECIES

None

CANDIDATE SPECIES

Mammals	
Washington ground squirrel[6/]	*Spermophilus washingtoni*
Birds	
Yellow-billed cuckoo[7/]	*Coccyzus americanus*

SPECIES OF CONCERN

Mammals	
Pale western big-eared bat	*Corynorhinus (=Plecotus) townsendii pallescens*
Silver-haired bat	*Lasionycteris noctivagans*
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Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
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Ferruginous hawk	*Buteo regalis*
Willow flycatcher	*Empidonax trailli adastus*

Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
<u>Amphibians and Reptiles</u>	
Northern sagebrush lizard	*Sceloporus graciosus graciosus*
<u>Fish</u>	
Pacific lamprey	*Lampetra tridentata*
Interior redband trout	*Oncorhynchus mykiss gibbsi*
<u>Plants</u>	
Laurence's milk-vetch	*Astragalus collinus* var. *laurentii*
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3/ *Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead*

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6/ *Federal Register Vol. 66, No. 210, October 30, 2001, Notice of Review - Candidate or Proposed Animals and Plants*

7/ *Federal Register Vol. 66, No. 143, July 25, 2001, 12-Month Finding for a Petition To List the Yellow-billed Cuckoo*

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

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SFWNOIDoc1
CONFIDENTIAL

A CULTURAL RESOURCES OVERVIEW OF THE PROPOSED SHEPHERDS FLAT WIND FARM PROJECT GILLIAM AND MORROW COUNTIES, OREGON

Prepared for
LifeLine Renewable Energy, Inc.
Sacramento, California

March 17, 2006

REPORT NO. 1651

Archaeological Investigations Northwest, Inc.
2632 SE 162nd Ave. • Portland, OR • 97236 Phone 503 761-6605 • Fax 503 761-6620