SFWAPPDoc87

APPLICATION

FOR A SITE CERTIFICATE FOR THE

SHEPHERDS FLAT WIND FARM

SUPPLEMENTAL INFORMATION

PREPARED FOR THE

OREGON ENERGY FACILITY SITING COUNCIL

PREPARED BY

CAITHNESS SHEPHERDS FLAT, LLC

NOVEMBER 19, 2007

CONTENTS

Caithness Shepherds Flat, LLC, the Applicant, filed a preliminary Application for a Site Certificate for the Shepherds Flat Wind Farm in January 2007. In February 2007, the preliminary application was amended in its entirety. The information contained herein supplements the information found in the February 2007 Application amendment.

Applicant's response to RAI#2, V3, submitted May 11, 2007

EXHIBIT W **FACILITY RETIREMENT AND SITE RESTORATION**

Applicant's response to RAI#2, W1, submitted June 18, 2007

EXHIBIT X **NOISE**

Applicant's response to RAI#2, X1, submitted June 20, 2007

Applicants response to RAI#3, X2, submitted October 12, 2007

Applicant's response to RAI#3, X3, submitted September 19, 2007

Applicant's response to RAI#3, X4, submitted September 19, 2007

Applicant's response to RAI#3, X5, submitted September 19, 2007

Applicant's response to RAI#3, X6, submitted September 19, 2007

Applicant's response to RAI#3, X7, submitted September 19, 2007

Applicant's response to RAI#3, X8, submitted September 19, 2007

Applicant's response to RAI#3, X9, submitted October 12, 2007

Applicant's response to RAI#3, X10, submitted October 12, 2007

Correspondence

Noise analysis conference call, submitted October 29, 2007

Email attachment: ODOE Comments on additional information

Noise layout and habitat, submitted October 29, 2007

Email attachments: Noise N and Noise S maps

Noise submittal comments, submitted November 8, 2007

Noise analysis, submitted November 12, 2007

Email attachment: Noise analysis description

Email attachments: Figures RAI#3 X1a Revision 3, RAI#3 X1b Revision 3 and RAI#3 X1c

Email attachment: Component locations and noise analysis in Excel®

EXHIBIT AA **ELECTRIC TRANSMISSION LINE**

Applicant's response to RAI#2, AA1, submitted June 14, 2007

Applicant's response to RAI#3, AA1 follow-up, submitted August 30, 2007 and captioned RAI#3 AA1b

Applicant's response to RAI#3 AA1 follow-up, submitted October 23, 2007

Shepherds Flat Wind Farm

First Request for Additional Information (RAI#1) – February 22, 2007

<table>
<tr><th>Request Number</th><th>Page Reference</th><th>Request for Additional Information</th></tr>
<tr><td colspan="3">Exhibit B: Description of Proposed Facility</td></tr>
<tr><td colspan="3">Caithness Shepherds Flat (CSF) seeks the flexibility to install up to 303 wind turbines of various types and sizes. Other applicants have sought and obtained similar flexibility after describing the micrositing corridors within which the turbines would be erected without committing to the exact location of the turbines pending final design. This approach requires applying the Council standards based on “worst case” conditions after the applicant has thoroughly assessed the environmental aspects of the turbine micrositing corridors and other micrositing areas. CSF has not identified micrositing corridors or areas. If CSF intends that the entire 27,520-acre “site boundary” area (described in Exhibit C) be the micrositing area, then the application must thoroughly analyze the environmental aspects of that entire area and include the results of those analyses in all applicable exhibits. If CSF intends to install the turbines within defined corridors following the routes depicted in Figures C-2a and C2b, then CSF must provide a comprehensible description of those corridors, including width and longitudinal and latitudinal points of reference, thoroughly analyze the environmental aspects of the corridors and extended study areas, and include the results of those analyses in all applicable exhibits.</td></tr>
<tr><td>B1</td><td>Exhibit B, Page 4</td><td>Correct the table showing specifications for the alternative turbine types. For each turbine type:
1. Show the weight of metals in the nacelles and towers in US tons.
2. Show the cubic yards of concrete in the foundations above three feet below grade.
3. Show the maximum diameter of the concrete turbine foundation above three feet below grade.
4. Show the manufacturer’s guaranteed maximum sound power level and the manufacturer’s uncertainty band. If manufacturer’s data is unavailable, show an estimate (marked as an estimate) and include an explanation in support of the estimate.</td></tr>
<tr><td>B2</td><td>Exhibit B, Page 5</td><td>Describe the concrete pads for the pad-mounted transformers, including length, width, height and depth below ground level.</td></tr>
<tr><td>B3</td><td>Exhibit B, Page 5</td><td>Describe the total amount of permanent surface disturbance that will be required near the base of each turbine, including length and width and type of surfacing. Confirm that the total permanent disturbance includes the area affected by any turnout from the access road.</td></tr>
<tr><td>B4</td><td>Exhibit B, Page 6</td><td>Describe the size of the meteorological tower foundations, including length, width, height and depth below ground level. Would these foundations be concrete?</td></tr>
<tr><td>B5</td><td>Exhibit B, Page 6</td><td>Describe the total number of wires and cables that would comprise the collector system and communications lines. That is, for each segment of the system, how many individual wires? For purposes of calculating the cost of site restoration, we need to know the total length of aboveground wire that would have to be spooled up.</td></tr>
<tr><td>B6</td><td>Exhibit B, Page 6</td><td>Describe the total length of the collector system and communications lines, including connections between disjointed site parcels and connections to the substation. Provide an upper limit of the length of collector system that would be installed aboveground.</td></tr>
<tr><td>B7</td><td>Exhibit B, Page 6</td><td>The description of the proposed facility does not include any Operations & Maintenance building. Describe the structure and location of any proposed O&M buildings, including area permanently affected, size and type of building and site surfacing.</td></tr>
<tr><td>B8</td><td>Exhibit B, Page 6</td><td>Describe the total length and width of access roads, including access roads that would interconnect the roads serving each turbine string, roads interconnecting with offsite access roads and roads interconnecting the</td></tr>
</table>

		disjointed site parcels.
B9	Exhibit B, Page 7	Describe the two substations, including locations, size of site, size of substation and site surfacing.
B10	Exhibit B, Page 7	Describe the related or supporting high-voltage transmission lines that would interconnect the substations with the BPA Slatt switching station located about 2 miles west of the westerly boundary of the northern project area.
B11	Exhibit B, Page 7	The application states that CSF "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." Explain why you have not applied for 909 MW of transmission. Is it likely that 909 MW of transmission service is available for this facility? If so, explain the basis for that conclusion. If not, then the application should be revised so that the proposed facility is designed for the available transmission capacity.
General comment: Unlike most applications we have seen, CSF did not format this and other exhibits in a way that clearly shows the applicant's response to each section of the applicable rule (in this case OAR 345-021-0010(1)(b). As a result, it is difficult for the Department to determine whether CSF has responded at all to some parts of the exhibit. For example, have you fully responded to parts (b)(A)(i), (b)(A)(ii), (b)(A)(iv), (b)(A)(v), (b)(A)(vi) and (b)(G)? In addition, although the project order excluded consideration of (b)(D), that was based on the assumption that the facility would not include any transmission lines that would meet the energy facility definition in ORS 469.300. We cannot tell from the information you have submitted so far whether the transmission lines that would connect the separate sections of the project might be large enough to qualify. Please review the statutory definition and confirm whether or not a transmission line meeting the qualifications referenced in (b)(D) would be needed for this project.		
Exhibit C: Location of Proposed Facility		
C1	Exhibit C, Page 2	Revise the Permanent Project Facilities Footprint table, as necessary, to reflect the following: 1. Confirm that the area permanently affected by each turbine pad would be 6,000 square feet and that this estimate includes turnouts from the access road 2. Confirm that each substation site will occupy no more than one acre (we have typically seen substation sites of 4 to 6 acres). 3. If the facility would include O&M facilities, provide specific details about the associated footprints. 4. Provide specific information about the area to be affected by the high-voltage transmission lines interconnecting with the BPA Slatt switching station. 5. Provide specific information about the area to be affected by the aboveground segments of the collection system and communication lines. 6. Confirm that the area affected by new project roads would include roadways along the turbine strings, roadways interconnecting the turbine strings, roadways interconnecting the disjointed site parcels, and roadways interconnecting with offsite access roads. Describe the dimensions and total area occupied by these roads.

C2	Exhibit C, Page 3	Revise the Temporary Project Facilities Footprint table, as necessary, to reflect the following: 1. Confirm that construction disturbance associated with the turbine pads and roadway turnouts would be no greater than 9,500 square feet per turbine pad. Describe the dimensions of the entire area at the base of each turbine that would be used for assembling and installing the turbine rotor. 2. Confirm that construction disturbance associated with the substations would be no greater than 1.25 acre per substation. 3. Estimate the area of construction disturbance (excluding the final footprint) for O&M facilities. 4. Provide specific information about the area of construction disturbance for the high-voltage transmission lines interconnecting with the BPA Slatt switching station. 5. Provide specific information about the construction disturbance area for the underground and aboveground collector system. Describe any additional area of disturbance for construction of the communications system. 6. Include an estimate of the area of construction disturbance (excluding the final footprint) needed for building access roads. 7. Describe any construction disturbance for crane paths for movement of construction cranes off of proposed access roads. Include an estimate of the area affected for crane paths.
C3	Exhibit C, Page 3	Provide a description of the segments of the collector system and communications system that would join the disjointed parcels comprising the “northern project area.” Provide a description of the segments of the collector system and communications system that would join the disjointed parcels comprising the “southern project area.” Provide a description of the segments of the collector system and communications system that would join the “northern” and “southern” project areas. The application states that CSF “believes that the necessary easements for these lines can be secured.” You must demonstrate that you have secured those easements or options for easements before we can find the application complete.
C6	Exhibit C, Page 3	Provide a description of the route that would be followed by the overhead high-voltage transmission lines interconnecting the substations with the BPA Slatt switching station. Is the route for this transmission line with your lease boundary? If not you must demonstrate that you have secured an easement or options for an easement before we can find the application complete.
C7	Exhibit C, Page 3	Provide a description of the routes that would be followed by roadways interconnecting the northern project area with the southern project area, the disjointed parcels comprising the northern project area, the disjointed parcels comprising the southern project area, and connecting the site with existing offsite roads. You must demonstrate that you have necessary lease or easement rights to the land needed to construct the access roads.
C8	Exhibit C, Figures C-5 through C-25	The maps provided are inadequate to show the details that we need to see. It might be helpful if you provide one or more large-size maps (USGS quadrangle maps), depicting the site boundary, the proposed turbine lay-out, all areas of permanent and temporary construction disturbance, laydown areas, substation and O&M locations, all routes interconnecting the disjointed parcels, all routes interconnecting with existing offsite roads and the route of the overhead high-voltage transmission line interconnecting the facility with the BPA Slatt switching station.

Shepherds Flat Wind Farm

Second Request for Additional Information (RAI#2) – April 20, 2007

Request Number	Page Reference	Request for Additional Information
Exhibit B: Description of Proposed Facility		
B7	Exhibit B, Page 9	(Follow-up) Please describe the location of the "off-site" operations office. How would data and operational commands be communicated between the operations office and the facility site? Will the on-site field workshops be staffed? Will the on-site workshops have operational capability (computer control stations)? Will you be constructing the off-site operations office rather than using an existing structure?
B11	Exhibit B, Page 8	(Follow-up) To approve a site certificate for an energy facility of up to 909 MW of generating capacity, the Council will need to find either that the applicant has a transmission access contract for 909 MW or that 909 MW of transmission capacity is available from the proposed point of interconnection and that the applicant has a reasonable likelihood of acquiring access at that level of generating capacity. Please provide information that would support either of these findings.
B12	Exhibit B, Page 6	Will the field workshops have electrical service? What is the source of that electrical service? Describe the route of the electrical service lines? If the service line will be aboveground, describe the support structures. What is the overall length of these lines under worst-case assumptions? What area would be temporarily disturbed during construction of the distribution lines? What area would the lines permanently occupy?
B13	Exhibit B, Pages 6-7	Describe the maximum number of junction boxes that would be included in the collector system. (This affects the calculation of retirement costs.)
B14	Exhibit B, Page 7	Describe the area to be affected and the facilities to be installed at the interconnection point adjacent to the BPA Slatt Switching Station.
B15	Exhibit B, Page 6	The application describes six met towers up to 80 m (263 feet) in height. Would the FAA require aviation warning lights on these structures?
B16	Exhibit B, Page 9	Please discuss your proposed construction "phasing" in more detail. Where will the "first 250 MW" be built within the micrositing area? Where will the "second 250 MW" be built?
Exhibit C: Location of Proposed Facility		
C2	Exhibit C, Page 3	RAI #1 requested the dimensions of the area at the base of each turbine that would be used for assembling and installing the turbine rotor. The table on page 3 of the March 23 revised Exhibit C shows an area of 8,837 sq ft of temporary disturbance at each turbine location. How did you estimate this area? The assembled rotor would have a diameter of up to 96 m. This would require a much larger laydown area than 8,837 sq ft.
C9	Exhibit C, Pages –2-3	Describe the permanent and temporary disturbance attributable to the interconnection point adjacent to the BPA Slatt Switching Station. What project facilities would be built at this location?
Exhibit D: Organizational Expertise		
D1	Exhibit D, Pages 1-2	Describe Caithness Energy's (CE's) direct experience in the design, construction and operation of wind energy facilities. In particular, describe the "375 MW of wind projects." If Caithness Shepherds Flat (CSF) or CE would rely on the direct experience of CE's "affiliates" for expertise in constructing or operating a wind energy facility, please identify those "affiliates" and describe their expertise. OAR 345-021-0010(1)(d)(A)

D2	Exhibit D, Page 2	Please identify the key personnel who would be responsible for constructing and operating the facility and describe their qualifications. OAR 345-021-0010(1)(d)(B)
D3	Exhibit D, Page 2	Describe the past performance of CSF, including but not limited to the number and severity of any regulatory citations in constructing and operating a facility similar to the proposed SFWF. OAR 345-021-0010(1)(d)(D)
D4	Exhibit D, Page 2	If CSF has no previous experience in constructing or operating a wind energy facility, provide other evidence that CSF can successfully construct and operate the proposed facility. OAR 345-021-0010(1)(d)(E)
D4	Exhibit D, Page 2	Respond to OAR 345-021-0010(1)(d)(G).
Exhibit E: Construction and Operations Permits		
E1	Exhibit E, Page 3	You state that the field workshops will have septic tanks for wastewater disposal. Will WPCF permits or local on-site sewage disposal permits be needed to construct or operate wastewater disposal facilities at the field workshops?
Exhibit F: Property Owners		
F1	Exhibit F, Page –1	Confirm that Exhibit F identifies all property owners, as shown on the most recent property tax assessment roll, within the proposed site boundary and within 500 feet of the proposed site boundary, including the transmission line corridor to the point of interconnection with the BPA Slatt Switching Station.
Exhibit G: Materials Analysis		
G1	Exhibit G, Page 1	Provide an inventory, including estimated quantities and descriptions, of substantial quantities of industrial materials flowing into and out of the proposed facility during construction and operation.
G2	Exhibit G, Page 2	Where will lubricants, oils, greases, antifreeze, cleansers, degreasers and hydraulic fluids be stored on-site? List representative types of these materials that are likely to be used or stored on-site.
G3	Exhibit G, Page 1	What quantity of diesel fuel will be stored on-site during construction? Describe how this fuel will be stored.
Exhibit H: Geologic and Soil Stability		
H1	Exhibit H, Page 3	Respond to OAR 345-021-0010(1)(h)(A). Have you consulted with DOGAMI regarding what level of site characterization is needed (including any site-specific subsurface investigation) for the Department to find the application to be complete?
H2	Exhibit H, Page 3	Attachment H describes the “Shepherds Ridge Wind Project” in an area that is mostly or entirely outside the proposed site boundary for the SFWF. Attachment H does not address the northern project area at all and it is unclear whether it addresses any part of the southern project area. What on-site geotechnical assessment has been done within the proposed site boundary?
H3	Exhibit H, Page 3	Please respond to OAR 345-021-0010(1)(h)(B). What specific pre-construction geotechnical investigation would be performed?
H4	Exhibit H, Page 3	Respond to OAR 345-021-0010(1)(h)(C).
H5	Exhibit H, Page 3	Respond to OAR 345-021-0010(1)(h)(F). [Note that since adoption of the 2003 International Building Code, Oregon no longer identifies a seismic zone designation. In response to OAR 345-021-0010(1)(h)(F)(i), provide the applicable 2003 IBC design parameters.]
H6	Exhibit H, Page 3	Respond to OAR 345-021-0010(1)(h)(G).

H7	Exhibit H, Page 3	Respond to OAR 345-021-0010(1)(h)(H)
H8	Exhibit H, Page 3	Respond to OAR 345-021-0010(1)(h)(I)
Exhibit I: Soil Conditions		
I1	Exhibit I, Page 4	Provide a description of measures that will be implemented to avoid or mitigate adverse impacts to soils in the northern project area.
I2	Exhibit I, Pages 8-9	Provide a description of measures that will be implemented to avoid or mitigate adverse impacts to soils in the southern project area
I3	Exhibit I, Pages 9	Please explain the statement that the temporary disturbance areas outside the finished width of project access roads (up to 38 feet of temporary disturbance) would be "plowed and planted by the landowner as appropriate" after completion of construction. In general, the certificate holder is responsible for the cost of restoring areas disturbed by construction.
I4	Exhibit I, Pages –1-8	Identify which soils in the project area are considered Class II or better by the NRCS. Identify which soils have high wind or water erosion potential.
Exhibit J: Wetlands		
J1	Exhibit J, Page 2	Upon completion of the wetlands and waters survey being conducted in consultation with the Oregon Department of State Lands, please respond to OAR-021-0010(1)(j)(A)-(F). When do you anticipate this survey will be done? Exhibit J should also discuss any potential "waters of the United States" and whether a federal Section 404 permit might be needed. NOTE: The requirements of Exhibit J (OAR 345-021-0010(1)(j)) are currently under review by the Council. We anticipate that new rules will be in place before the SFWF application is found to be complete. Although the Council has yet to act on any changes to the rule, you should consider, in your response, the Department's proposed revision to the Exhibit J requirements as posted on our website.
J2	Exhibit J, Figure J-1	Are there no drainages within the site boundary that are potentially waters of the State or waters of the United States?
Exhibit K: Land Use		
K1	Exhibit K, Pages 3-5	Please discuss each applicable land use regulation and comprehensive plan criterion (the "applicable substantive criteria") as described in ORS 469.504(1)(b)(A) for both Gilliam County and Morrow County, and explain how the proposed facility would comply with those criteria. OAR 345-021-0010(1)(k)(C)(ii). It is not sufficient to state that the application "includes information assuring compliance." Exhibit K must identify the information and facts about the proposed facility that demonstrate compliance with the land use criteria.
K2	Exhibit K, Pages 3-5	Respond to OAR 345-021-0010(1)(k)(C)(iii). Are there any "directly applicable" administrative rules, goals and statutes?
K3	Exhibit K, Pages 3-5	Respond to OAR 345-021-0010(1)(k)(C)(iv).
K4	Exhibit K, Pages 3-5	Respond to OAR 345-021-0010(1)(k)(C)(v).
Exhibit L: Protected Areas		
L1	Exhibit L, Page 1	Explain how you made the determinations reflected in the table on pages 1 and 2 that there was or was not a potential for impact within the protected areas listed. Provide a table listing each protected area in the analysis area, and for each protected area list the basis for protection (based on the list in OAR 345-022-0040), the approximate distance from the nearest point of the protected area to the site boundary and the direction in which the protected area lies from the site (for example, N, NE, E, SE, S etc).

L2	Exhibit L, Page 2-3	What analysis did you perform to assess the potential visibility of the SFWS from protected areas?
L3	Exhibit L, Page 2	The ODFW comment letter (see RAC1 below) asks about potential noise impacts on wildlife in the Willow Creek Wildlife Area. Please also discuss the potential for adverse noise impacts on wildlife within the Horn Butte ACEC.
Exhibit M: Financial Assurance		
M1	Exhibit M, Page 1	Please respond to OAR 345-021-0010(1)(m)(B) and (C).
M2	Exhibit M, Page 2	The embedded letter from your legal counsel states that CSF has “legal authority to construct and operate the up to 750 megawatt” Shepherds Flat Wind Farm. Assuming that you are able to support a finding by the Council that 909 MW of transmission access is available and you choose to go forward with an application for a site certificate to approve 909 MW of peak generation, please provide an appropriate letter from legal counsel responding to OAR 345-021-0010(1)(m)(A). Although your counsel’s qualifications to practice in New York and New Jersey is acceptable with regard to an opinion about the documents listed in the second paragraph of his letter, we would like to have an opinion from a qualified member of the Oregon State Bar regarding whether CSF is legally qualified to do business in Oregon (specifically construction and operation of a wind energy facility).
Exhibit O: Water Requirements		
O1	Exhibit O, Page 2	Address the amount of water that would be required for sanitary facilities or other incidental uses at the field workshops. Explain the source of this water and whether a water right is needed. OAR 345-021-0010(1)(o). ORS 537.545(1)(f) provides that a new water right is not required for industrial and commercial uses of up to 5,000 gallons per day. Discuss the need for a water right or confirm that water use would not exceed 5,000 gallons per day during facility operation.
O2	Exhibit O, Page 2	Describe the commercial sources from which water would be purchased during construction of the proposed facility. Describe the total amount of water that would be needed for construction of the facility. Provide verification that sufficient water is available from a “commercial source” that has an appropriate water right for this proposed use.
O3	Exhibit O, Page 2	Do you anticipate the need for blade-washing at any time during operation of the facility? If so, describe the amount of water needed for this purpose and the source of this water.
Exhibit P: Fish and Wildlife Habitat		
P1	Exhibit P, Pages 4-5	Please work with ODFW to refine and describe the habitat subtypes within the categories you have identified on pages 4-5. You will need to reach agreement with ODFW regarding the classification of habitat within the site boundary. Note that we have generally considered cultivated agriculture (identified on your list as Category 5 “DW” and “IA”) to be Category 6.
P2	Exhibit P, Page 7-11	Is there any habitat within the site boundary that is suitable for rare plant species (including the threatened or candidate plant species listed in Tables P-1 and P-2)? If so, have these areas been surveyed for the presence of these species during the appropriate season?
P3	Exhibit P, Page 22	On page 22, you state that, “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.” When do you anticipate submitting this information? When this information becomes available, please provide a table showing habitat categories and subtypes and the estimated acres of permanent and “temporary” construction disturbance for each subtype, based on a “worst-case” analysis. The “worst-case” analysis is necessary to support micrositing flexibility; that is, we need to know what the maximum potential impacts on higher-value habitat would be based on a

		possible "maximum impact" facility layout within the proposed micrositing area.
P4	Exhibit P, Page 22-24	Please provide further discussion of the "temporary" impacts that could result from construction of the facility. In your discussion, please address the following questions. Propose additional mitigation if necessary, as justified by your discussion. 1. Considering the local climate and soil conditions, how many years is it likely to take for higher-value habitat (Category 5 and higher) to return to pre-disturbance condition if no restoration actions are taken (time-to-restore)? Distinguish between "shrub" habitat and grassland (or other) habitat if your estimate of the time-to-restore would be different. 2. If the restoration actions described on page 24 are implemented, how many years is it likely to take for higher-value habitat to return to pre-disturbance condition (time-to-restore with mitigation measures)? Distinguish between "shrub" habitat and grassland (or other) habitat if your estimate of the time-to-restore would be different. 3. Taking the time-to-restore into account, how would the ODFW goal of "no net loss" of quantity or quality be achieved for Category 2, 3 and 4 habitat "temporarily" affected by construction? 4. Taking the time-to-restore into account, how would the ODFW of "net benefit" be achieved for Category 2 and Category 5 habitat "temporarily" affected by construction?
P5	Exhibit P, Page 24	Provide a draft "Revegetation Plan." Include a discussion of success criteria, post-construction monitoring and proposed mitigation if successful restoration of areas of "temporary" impact is not achieved in a reasonable time.
P6	Exhibit P, 25-26	Provide a draft Habitat Mitigation Plan. The plan should: (a) identify and describe the location of the proposed mitigation area; (b) describe the current condition, habitat categories and use of the proposed mitigation area; (c) justify the size of the mitigation area by comparison with the potential loss of habitat within the site boundary; (d) discuss whether additional mitigation area is needed to ensure "no net loss" and "net benefit" for "temporary" impacts to habitat (see RAI P4); (e) discuss how the area would be "protected" for the life of the facility; (f) discuss proposed habitat "enhancement" actions; (g) describe success criteria for enhancement actions; (h) discuss proposed monitoring of the mitigation area over the life of the facility; (i) discuss appropriate mitigation actions if success criteria are not met within a reasonable time; (j) discuss whether you propose any surveys of wildlife use of the mitigation area (by raptors, other avian species and WGS) before construction and during the life of the facility.
P7	Exhibit P, Page 26	Provide a map showing the "identified raptor nests and long-billed curlew nesting areas" and areas of "identified Washington ground squirrel activity" that would be protected from disturbance.
P8	Exhibit P, Page 28	Please list the specific "best siting practices" that you will apply in determining the final design layout of the facility within the micrositing areas.
P9	Exhibit P, Pages 28	What is the scope of the "cumulative effects analysis" that you have commissioned? When do you anticipate this report will be available?
P10	Exhibit P, Page 30	Provide a draft Wildlife Monitoring and Mitigation Plan. Discuss the pros and cons of standardized fatality monitoring. Discuss whether you propose any specific monitoring for effects on habitat important for raptors, State Sensitive species and Washington ground squirrels. Provide a more detailed description of the proposed "annual spring raptor and long-billed curlew nesting surveys and annual fall horned lark census," including how you intend to collect and analyze the data, what species would be included for monitoring purposes and the biological rationale for this approach. Include criteria to determine whether operation of the facility results in a significant impact. Discuss appropriate mitigation that might be implemented if significant impacts occur.

P11	Exhibit P, Attachments P-2 and P-3	These attachments appear to assess impacts associated with the “Shepherds Ridge Wind Farm.” Please explain how the information in these attachments could be useful to the Council’s consideration of the proposed SFWF.
Exhibit Q: Threatened and Endangered Species		
Q1	Exhibit Q, Pages –3-5 and 17	You state that “the facility site includes appropriate habitat types” for Laurence’s milkvetch but the species was not observed during the 2002 vegetation survey. Did the nine survey points described in Attachment P-4 include all areas of appropriate habitat for this species within the site boundary? If not, how do we know whether this species is at risk from construction of the proposed SFWF? On page 17, you state that there would be permanent loss of habitat for this species. Has that habitat been surveyed during the appropriate season to determine whether Laurence’s milkvetch is present?
Q2	Exhibit Q, Page 8	Provide a detailed description of the “two years of focused searches for Washington ground squirrels” that have been performed. Describe the survey protocols, locations surveyed and analysis of results.
Q3	Exhibit Q, Page 11	Please provide a more complete description of the proposed surveys for Washington ground squirrels (WGS). Please consult with ODFW regarding the protocol for these surveys (specifically, is it appropriate to survey only those areas with soil depth of 0.6 meters or more, as you suggest?). It would be informative to determine this spring (2007) whether WGS are present within the site boundary, so that we can decide what WGS mitigation or monitoring should be required in the site certificate.
Exhibit R: Scenic and Aesthetic Values		
R1	Exhibit R, Page 1	You state that one-third of the analysis area is within the state of Washington, “which is not considered in this Exhibit.” Please provide the information described in OAR 345-021-0010(1)(r) for the areas within the State of Washington.
R2	Exhibit R, Page 2	Please describe the visual analysis you performed to determine whether any part of the proposed SFWF would be visible from the areas discussed on page 2 and whether any visual impact would be significant.
R3	Exhibit R, Page 2	Please provide citations of the federal land management plans and county comprehensive plans that identify significant important scenic resources as described on page 2. Provide copies of the relevant text.
R4	Exhibit R, Figure R-1	Please provide a revised map. The outer radius shown on Fig. R-1 appears to be a larger radius than the 30-mile analysis area, if the scale shown on the figure is accurate. It would be informative to include the locations of the existing visual features that you describe on page 3.
Exhibit S: Historic, Cultural and Archaeological Resources		
S1	Exhibit S, Page 3	You state that “systematic ground surveys” are “pending.” When do you anticipate that a report on these surveys will be available?
S2	Exhibit S, Page 3	With what tribes have you consulted?
S3	Exhibit S, Page 4	Please provide a map showing the alignment of the Oregon Trail within the site boundary in relation to the location of facility components (based on preliminary layouts). Describe the proposed fence. Where would it be located? What are the estimated perimeter dimensions? What materials would be used in its construction? Describe in more detail how you would monitor the condition of the proposed Oregon Trail fence.
Exhibit T: Recreational Opportunities		
T1	Exhibit T, Pages 1-2	Address recreational opportunities that could be affected in the analysis area within the State of Washington.

T2	Exhibit T, Page 2	Discuss the criteria in OAR 345-022-0100 for each of the recreational facilities you identify within the analysis area as a basis for the conclusion that these recreational opportunities are not important.
Exhibit U: Public Services		
U1	Exhibit U, Pages 1-3	Address public services that may be affected in the analysis area within the State of Washington.
U2	Exhibit U, Pages 1-3	Respond to OAR 345-021-0010(1)(u)(B). Identify the public and private providers of sewers and sewage treatment, water, storm water drainage, solid waste management, housing, traffic safety, police and fire protection, health care, and schools services within the analysis area.
U3	Exhibit U, Pages 1-3	Respond to OAR 345-021-0010(1)(u)(C). Describe any likely adverse impact to the providers identified in response to OAR 345-021-0010(1)(u)(B) to provide their public services during construction and operation of the proposed facility.
U4	Exhibit U, Figure U-1	Please provide a revised map. The outer radius shown on Fig. U-1 appears to be a larger radius than the 30-mile analysis area, if the scale shown on the figure is accurate.
Exhibit V: Solid Waste and Wastewater		
V1	Exhibit V, Pages 1-3	Describe the septic systems that would be installed at the field workshops. OAR 345-021-0010(1)(v)(A).
V2	Exhibit V, Pages 2	What specific measures would you implement to “meet the requirements of the NPDES water quality criteria regardless of the requirement for a permit?”
V3	Exhibit V, Page 2	Have you consulted with a concrete contractor to determine whether it is practical to limit truck wash-down to off-site locations?
Exhibit W: Facility Retirement and Site Restoration		
W1	Exhibit W, Page 2	Please explain the basis or method you used to determine the unit costs shown on page 2. NOTE: The site restoration cost estimate must account for additional areas of temporary disturbance caused by the restoration activity. These areas would also have to be restored. Your estimate should include removal and site restoration of the field workshops. The estimate must include general costs (such as permits, mobilization, engineering, overhead, utility disconnects), a performance bond, administrative and project management costs, and a contingency adder to address future developments. Our own preliminary site restoration estimate is in the range of $19.7 million, but we are continuing internal discussions of how the estimates of wind project site restoration might be reduced. Any information that you can provide to verify the restoration cost estimates could be helpful in this discussion.
Exhibit X: Noise		
X1	Exhibit X, P2	Respond to OAR 345-021-0010(1)(x). A noise analysis (including modeling data used to show compliance under OAR 340-035-0035(1)(B)(iii)(IV) and (VI)) must be included as part of a “complete” application. You must analyze the potential noise levels at any noise sensitive property that could receive significant noise from the proposed facility, whether or not the noise sensitive properties (typically residences) are owned by “the project’s landlords.”
Exhibit AA: Electric Transmission Line		
AA1	Exhibit AA, Page 1	Respond to OAR 345-021-0010(1)(aa).
Exhibit BB: Other Information		
BB1	Exhibit BB, Page 2	Please address the requirements of OAR 345-024-0090. Note that we consider the 34.5-kV collector lines to be “high voltage” transmission lines for the purposes of this standard.

BB2	Exhibit BB, Page 2	Please describe your discussions with appropriate authorities regarding any concerns about the nearby Boardman Military Operating Area.
Reviewing Agency Comments		
RAC1	ODFW	Please discuss your response to the ODFW comment letter from Rose Owens (March 26, 2007).
RAC2	WRD	Please discuss your response to the WRD comments from Jerry Sauter (February 26, 2007).
RAC3	OHTAC	Please discuss your response to the OHTAC comments from Keith May (February 26, 2007).

Shepherds Flat Wind Farm

Request for Additional Information (RAI#3), August 7, 2007

Request Number	Page Reference	Request for Additional Information
Exhibit B: Description of Proposed Facility		
B7	Exhibit B, Page 6	(Follow-Up) Please discuss your plans for the “off-site operations office” as soon as you have decided whether the proposed project will include the office. [Comment: If you build an off-site structure to serve as the “Operations Office,” it might fall within the definition of a “related or supporting facility” (OAR 345-001-0010(49). This would require us to analyze the proposed location and recommend findings to the Council. The structure would be subject to the site certificate. If you purchase or lease an existing structure, however, it would not be a related or supporting facility, unless it is “significantly modified solely to serve the energy facility.]
B8	Revised Exhibit B, Page 9	(Follow-Up) The field workshop in the northern project area is described as a building measuring 50’ x 125’, with a 75-foot skirt of crushed stone and an adjacent fenced lay-down area measuring 75’ x 200’. The field workshop in the southern project is described as a building measuring 50’ x 83’ 7”, with a 75-foot skirt of crushed stone and an adjacent fenced lay-down area measuring 75’ x 200’. Assuming, in both cases, that the fenced lay-down area is situated within the skirt at one end of the field workshop, the area permanently affected by the field workshop in the northern project area would be 75,000 square feet, and the area permanently affected by the field workshop in the southern project area would be 46,717 square feet. In revised Exhibit C (March 23 version), the permanent footprint of these areas is described as 70,000 square feet and 61,720 square feet, respectively. Please explain the difference and make appropriate corrections.
B11	Exhibit B, Page 8	[Comment: We are asking BPA for confirmation of you statement that the “transmission reservation” of 750 MW would be adequate to handle the potential peak capacity of 909 MW. Until this is clarified, our recommendation would be for CSF to reduce the size of the proposed SFWF to 750 MW or less. If the Council approves a site certificate, it could be amended later if additional transmission capacity is acquired.]
B14	Exhibit B, Page 7	(Follow-Up) Please provide a description of the “interconnect facility” when it is available from BPA. Do you anticipate that your transmission line would terminate within a BPA switchyard with no additional project structure outside of the BPA footprint?
B16	Exhibit B, Page 9	(Follow-Up) Describe the proposed phases in greater detail. Your response appears to say that the northern project area would be built first and probably in two phases. Depending on the size of turbine selected, completion of the northern project area, totaling 500 MW, could take more than two years. Do you anticipate that the southern project area would be constructed in multiple phases? How many years do you anticipate construction of the southern area would take? Given the proposed phasing, is your proposed construction completion date of April 2011 realistic? Have you considered starting with a smaller project and expanding it later by amendment?
Exhibit C: Location of Proposed Facility		
C1	Revised Exhibit C, Page 2	(Follow-Up) Revise the Permanent Facilities Footprint table, as necessary, to reflect the following (see B8 above):

		1. The area permanently affected by the field workshop (including the building, the gravel skirt and the adjacent lay-down area) in the northern project area. 2. The area permanently affected by the field workshop (including the building, the gravel skirt and the adjacent lay-down area) in the southern project area.
C2	Revised Exhibit C, Page 3	(Follow-Up) A. Please clarify the Temporary Project Facilities Footprint table and revise as necessary. We note that the areas shown for "staging and storage north" and "staging and storage south" are identical to the areas shown in the Permanent Facilities Footprint table for "field workshop north" and "field workshop south." Does this mean that the field workshops (including the adjacent permanent fenced laydown areas and water tanks) would be built within the areas used for staging and storage during construction? Or, would there be an additional 70,000 sf in the north and 61,720 sf in the south that would be used for construction laydown and staging? [Comment: To calculate the estimated site restoration cost, we include an estimate of the area that would be disturbed (in addition to the permanent footprint area) during site restoration. After the field workshops are built, the area they occupy would be part of the permanent footprint. Therefore, we have to estimate the additional area of temporary disturbance during site restoration.] B. What is the estimated area of temporary disturbance associated with construction of the field workshops that would not be part of the permanent footprint (and which therefore would need to be revegetated after construction)? C. In considering previous wind project applications, the Council has considered that the entire area needed for laydown of the assembled rotor to be part of the area subject to construction disturbance. Although we appreciate your construction practice of minimizing disturbance during construction, we believe that the area of construction disturbance at the base of each tower must include an area of sufficient size to accommodate the fully-assembled rotor (with blades attached), plus room for cranes, construction equipment and workers to maneuver safely. The diagram included in your response is compact, but includes no scale or dimensions from which we can calculate the size of the area needed. Please revise the Temporary Project Facilities Footprint table to show both the area "scraped and leveled" at the base of each turbine and the area subject to "lighter" temporary disturbance, including the area occupied by the assembled rotor.
C10	Exhibit C, Page 1	Please confirm that CSF has entered into effective wind leases with the landowners throughout the northern and southern project areas.
C11	Exhibit C, Page 2	Please provide a written description of the location of the area within the site boundary (see definition in OAR 345-001-0010(53)). This should be written in the format that you would use to comply with the mandatory condition described in OAR 345-027-0020(2), which requires the certificate holder to submit a "legal description." Your response to this RAI should be a preliminary legal description that supplements and cross-references a project map (or maps) and describes in writing the site boundary shown on the referenced map (or maps).
Exhibit D: Organizational Expertise		
D1	Exhibit D, Pages 1-2	(Follow-up) Of the 345 MW of wind power projects that Caithness Energy is "currently developing of managing," how many projects – and how many total MW – has the company had direct responsibility for permitting, design

		and construction? We note that the largest wind project that the company lists as "current wind power concerns" is a 60-MW project and that 10 of the 13 projects are smaller than 40 MW. Can you provide any further assurance to the Council that the applicant has the organizational expertise to permit, design, build and operate a facility of up to 909 MW of wind power? Please discuss the recently-announced sale by Caithness Energy of most of the wind power generation projects listed in your response to RAI D1. After the sale of these assets to ArcLight Capital Partners or its affiliates, what wind power facilities will Caithness still own and operate?
D2	Exhibit D, Page 2	(Follow-Up) The second paragraph of your response states that "maintenance and service" of the facility would be provided by the turbine manufacturer "in the initial two to five years." The next paragraph states that "Caithness Operating Company LLC" would "assume" responsibility for facility operation "following this initial period." Please explain who would be responsible for operating the facility during the first five years after construction of each phase of the project. [Comment: Note that the site certificate applicant is "Caithness Shepherds Flat, LLC." If ownership and control of the facility is transferred to "Caithness Operating Company LLC" in the future, then a site certificate amendment will be necessary (OAR 345-027-0100).]
D4(A)	Exhibit D, Page 2	Please describe in more detail the habitat and wildlife impact mitigation projects that Caithness Energy has successfully undertaken at other wind projects. How were these projects similar to – and how were they different from – the mitigation proposed for the SFWF?
Exhibit G: Materials Analysis		
G3	Exhibit G, Page 1	(Follow-Up) Would it be feasible (by site certificate condition) to limit the location or locations where refueling would occur on-site? For example, could refueling be limited to the sites of the northern and southern field workshops?
Exhibit H: Geologic and Soil Stability		
H1	Exhibit H, Page 3	(Follow-Up) Based on a copy of letter dated June 12, 2007, to CFS from your geotechnical consultant, we understand that you have consulted with DOGAMI regarding the necessary level of site characterization (including any site-specific subsurface investigation) for the Department to find the application complete. The letter refers to DOGAMI's request for a "specific approach to addressing the Exhibit H requirements." The letter also refers to a "May 23, 2007, Exploration Plan," although it is not clear whether this plan constitutes a response to DOGAMI's request. In any case, we have not received the plan. [Comment: Note that under the amended Council's rules, RAI H1 addresses OAR 345-021-0010(1)(h)(A) and (C).]
H3	Exhibit H, Page 3	(Follow-Up) Your response describes several proposed geotechnical studies in both the northern and southern project areas. Please clarify when this work would be performed and when the results would be made available to DOGAMI and ODOE for each phase of construction. [Comment: Note that under the amended Council's rules, RAI H3 addresses OAR 345-021-0010(1)(h)(B).]
H4	Exhibit H, Page 3	(Follow-Up) Your response describes proposed geotechnical studies for transmission lines. Please clarify when this work would be performed and when the results would be made available to DOGAMI and ODOE for each phase of construction. [Comment: Note that under the amended Council's rules, RAI H4 addresses

		OAR 345-021-0010(1)(h)(D).]
H5	Exhibit H, Page 3	(Follow-Up) The June 12 letter (see H1 above) also refers to a seismic hazard analysis. Please provide the results of that analysis. Explain how the facility would be designed to avoid dangers to human safety from identified seismic hazards. [Comment: Note that under the amended Council's rules, RAI H5 addresses OAR 345-021-0010(1)(h)(F) and H.]
H6	Exhibit H, Page 3	(Follow-Up) To find the application complete, the Department must find that CSF has included in the application an assessment of soil-related hazards. Please provide the required assessment. Explain how the facility would be designed to avoid dangers to human safety from identified soil-related hazards. [Comment: Note that under the amended Council's rules, RAI H6 addresses OAR 345-021-0010(1)(h)(G) and (I).]
Exhibit K: Land Use		
K1	Exhibit K, Pages 3-5	(Follow-Up) A. Explain what you mean by "plow-arounds" and how their minimization affects accepted farming practices in the area. B. [Comment: GCZO 7.020(T)(6) requires gates on "private access roads" to a wind power generating facility. The ordinance does not contain an exception for "internal" roads that do not directly lead from public roads. We have interpreted this ordinance as requiring gates on turbine string access roads.] C. Both Gilliam and Morrow Counties have an acreage restriction on power generation facilities on EFU land. The ordinances mirror OAR 660-033-0130(22). Please discuss the acreage occupied by the facility components in each county separately. Please provide a table for each county showing the acreages (similar to Table 5 in the Draft Proposed Order for the Leaning Juniper II Wind Power Facility, available on our website). D. On page 8 of your response, in discussing the Morrow County ordinances, you refer to farming in the northern project area. The parts of the SFWF in Morrow County are in the southern project area. Revise your answer to address the facility components in Morrow County only.
K4	Exhibit K, Pages 3-5	(Follow-Up) In discussing the "reasons" exception, please address the areas and percentages for each county separately.
Exhibit L: Protected Areas		
L3	Exhibit L, Page 2	(Follow-Up) A. Please address how noise generated during operation of the proposed facility may affect protected areas, including impacts on the long-billed curlew during the nesting season. B. What source can you provide to back up your statement that the Horn Butte ACEC is designated "for its long-billed curlew nesting habitat"? C. Can you specify a minimum distance (buffer) between the Horn Butte ACEC and the nearest turbine (as a condition of the site certificate)?
Exhibit M: Financial Assurance		
M1	Exhibit M, Page 1	(Follow-Up) Provide evidence that CSF has a reasonable likelihood of obtaining a bond or letter of credit in an amount of up to $20,000,000 to cover the estimated cost of facility retirement and site restoration. Such evidence may take the form of a letter of commitment from an acceptable financial institution.

Exhibit O: Water Requirements		
O2	Exhibit O, Page 2	(Follow-Up) Please provide a letter verifying that the City of Arlington would be able to supply water in sufficient quantity for facility construction (described as Attachment O1 in your response).
Exhibit P: Fish and Wildlife Habitat		
P6	HMP	[Comment: You have presented some new concepts in the draft Habitat Mitigation Plan. ODOE will consider your proposal and provide a discussion draft that reformats your draft in a document similar to the HMP for Leaning Juniper II. As we prepare that document, we might have specific questions regarding the concepts suggested in your draft. We anticipate several iterations of the discussion draft before the application is complete.]
P10	WMMP	[Comment: ODOE will provide a discussion draft that reformats your draft in a document similar to the WMMP for Leaning Juniper II. We anticipate several iterations of the discussion draft before the application is complete.] (Follow-Up) A. Please confirm whether you propose to calculate fatality rates in a manner that is identical to the calculations laid out in the LJ WMMP (if you are proposing a different method, please explain). B. You have not included any ongoing program for reporting and handling incidental avian or bat fatality finds by facility personnel during facility operation. Are you proposing not to monitor or report those finds?
P12	Revised Exh P, Page 33	You suggest that "potential cumulative habitat and wildlife impact from these [wind power] facilities should be compared to that from facilities with equivalent generating capacities in the same region." You have not provided any analysis that would enable the Council to make such a comparison. Please provide copies of any studies addressing comparative habitat and wildlife impacts of other (non-wind) facilities.
P13	Revised Exh P, Page 40	Please explain by example how you calculated temporary construction disturbance of 0.18 acres per turbine.
P14	Revised Exh P, Page 43	Please expand on the paragraph at the top of page 43. Explain how you calculated that "the maximum number of turbines that can be sited per acre is estimated at 0.036." This figure would equate to 1 turbine per 28 acres. Explain how you calculated that "the temporary disturbance associated with this density of turbines, new roads to service them, and associated met towers and substations, is 1.4% of the habitat." In this calculation, what is the total area of habitat? Explain your statement that "temporary disturbance for the submitted typical layout of the SFWF is 0.8% of the total area." Show your calculation to arrive at this percentage. You appear to be saying that, were there no restoration of temporary disturbance areas, "a 1.4% increase in bare ground and/or alien plant species is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance." Does this mean that you do not believe that restoration of the disturbed areas is necessary?
P15	Revised Exh P, Page 51	You state that aboveground electrical poles would have avian protective devices (APLIC compliant). Would this apply to every pole within the facility? If not, within what distance from turbines would protective devices be installed on poles?
P16	Revised Exh P, Attachment	In the report on the Spring 2007 WGS and BUOW surveys, please clarify the discussion of the WGS sites observed. A table might help here (with a key to map locations). We are unclear which site is the "mapped Washington

	P-5, Page 3 of 12	ground squirrel (WGS) colony complex." Weren't all of the sites "mapped"? Does the paragraph that begins on the bottom of page 3 refer to this same "mapped" colony? The discussion on page 4 refers to four "unmapped" colonies. Please show the locations on a map. Each of these is described as being located more than 1,000 feet from the nearest site boundary. Wouldn't that place each of these locations outside of the survey area? If they are outside the survey area, how were they observed? Please reference a map that shows the "reference Washington ground squirrel complex."
Exhibit R: Scenic Resources		
R2	Exhibit R, Page 2	(Follow-Up) Please provide a discussion of the methods and assumptions used to generate the ZVI analysis.
Exhibit S: Historic, Cultural and Archaeological Resources		
S1	Exhibit S, Page 3	(Follow-Up) Please provide the results of ground surveys addressing the proposed facility layout, including proposed turbine string corridors, roads, and all other related or supporting facilities, together with a discussion of the potential impacts of construction, operation and retirement of the proposed facility on any identified resources and a plan for protection of those resources as required by OAR 345-021-0010(1)(s). [Comment: In your response to RAI S1, you suggest that you cannot provide a "tightly focused" survey for cultural resources because there might be changes to the facility layout due to "changes in assumptions." You also suggest that a cultural resource survey of your proposed "typical" layout would be "worthless" if subsequent information regarding other wind development renders the "typical" layout economically impossible. We assume that in developing any proposed layout, the applicant has already taken into consideration any off-site wind energy development that might occur in the future. Part of the planning for siting wind turbines should include designing the proposed layout with sufficient buffer area to avoid potential loss of wind resource to a neighboring project. The purpose of completing a cultural resource survey on the proposed layout before issuance of a Draft Proposed Order is to demonstrate that there is at least one possible configuration of the proposed facility that could be built in compliance with the siting standards. This does not preclude micrositing after issuance of a site certificate but before construction, although additional on-site cultural resource investigation might then be necessary in areas outside of the previously-surveyed area.]
S4	Exhibit S, Response to RAI #2, S-1	Please provide the results of surveys of the Oregon Trail as it crosses the facility site, together with a discussion of the potential impacts of construction, operation and retirement of the proposed facility on any identified resources and a plan for protection of those resources as required by OAR 345-021-0010(1)(s).
S5	Exhibit S, Response to RAI #2, S-1	Please provide the results of surveys of the areas that would be affected by the proposed facility layout and that are described as having high-to-moderate potential for archaeological resources in Attachment S of the application. Describe the potential impacts of construction, operation and retirement of the proposed facility on any identified resources and a plan for protection of those resources as required by OAR 345-021-0010(1)(s).
Exhibit U: Public Services		
U3	Exhibit U, Pages 1-3	(Follow-Up) A. On page 3 of your response, you state that SFWF would not receive solid waste management services from any of the listed providers. How would these services be provided? B. On pages 4 and 5, you indicate that you "believe" that the proposed

		facility would not have adverse impacts on the ability of county road departments to provide for traffic safety, of local law enforcement agencies to provide police protection or on the ability of fire protection services to provide for fire protection and response. Please provide evidence that you have consulted directly with local road, police and fire agencies to discuss the scope of the proposed facility and its potential impacts on these services and that you have addressed any concerns that the agencies have expressed.
Exhibit X: Noise		
X2	Response to RAI #2, X1, Page 1	In computing noise levels likely to be generated by the SFWF, CFS applied the sound power level guaranteed for the Vestas V-90 wind turbine (as shown on Table B-1). The Department expects the applicant to add the manufacturer's uncertainty level to the guaranteed maximum sound power level before making predictions. Please recalculate the noise contours using a reference sound power level of 111.2 dBA, *i.e.*, the manufacturer's guaranteed sound power level plus the manufacturer's uncertainty level.
X3	Response to RAI #2, X1, Page 1	CSF stated that the amount of atmospheric absorption expected to be present between each turbine and each receiver was computed using the term, $0.00328d_{T,G}$ where "d" is the distance in meters between the turbine "T" and the grid point "G." While this basic equation is correct, the amount of reduction provided by atmospheric absorption between a source and receiver depends on the frequency spectrum of the sound source. Please confirm that the computations of sound pressure level were made using the frequency spectrum data provided for the turbines and not just the overall A-weighted sound power level data and that atmospheric absorption was calculated using a temperature of 50^0 F and a relative humidity of 70%.
X4	Response to RAI #2, Page 1	CSF stated that the sound power level of the Vestas V-90 turbine was used in the calculations because the guaranteed overall sound power level of the Vestas turbine was higher than the sound power level guaranteed for all of the other turbine alternatives (i.e. the V-90 is the "worst-case" turbine, as indicated by Table B-1). While the overall sound power level of the Vestas V-90 turbine is higher than that generated by all other turbines, the resulting sound pressure level at receivers may actually be slightly higher for the Siemens SWT-2.3-93 turbine than the Vestas turbine due to the frequency spectrum associated with the turbine and the fact that the amount of atmospheric absorption between the turbine and the receiver depends on the frequency spectrum of the turbine. To ensure the analysis adequately predicts the loudest noise levels that might be generated by the SFWF, please provide a prediction of the sound pressure level that would be found at 1000, 2000 and 3000 feet from a Vestas V-90 turbine and 1000, 2000 and 3000 feet from a Siemens SWT-2.3-93 turbine using a temperature of 500 F and a relative humidity of 70%.
X5	Response to RAI #2, Figures X1a and X1b	CSF provided Figures RAI#2 X1a and RAI#2 X1b to show the noise levels that will radiate from the proposed wind turbines. CSF presented the predicted noise levels using noise contours on the two figures that show the noise levels every 5 dB between 35 dBA and 55 dBA. CSF stated that noise sensitive receivers were located and placed on the figures using GPS addresses. While the location of the noise sensitive receivers may be accurate, it is not possible to determine the predicted sound pressure level at each of the noise sensitive receivers by reference to these figures. In addition, reference to the figures does not enable the reviewer to determine the exact locations of all the facility turbines. Please revise the figures to show the location of all the turbines and noise sensitive receivers included in the noise analysis, and include for each turbine and each noise sensitive

		receiver an identifying name or number.
X6	Response to RAI #2, Figures X1a and X1b	Figures X1a and X2b do not depict the proposed substations. Please revise the figures to include the locations of the substations, including coordinates.
X7	Response to RAI #2, Figures X1a and X1b	Figures X1a and X1b depict the general locations of noise sensitive receivers and wind turbines by means of X-Y coordinates. These figures would more effectively reflect site and surrounding attributes if they were transferred to USGS quadrangle maps. Please provide noise contour figures that show the precise locations of noise sensitive receivers, turbines and substations relative to surrounding features and the site boundary. Please label the major features (for example, county boundary line, major roads, Eightmile Canyon, Fourmile Canyon).
X8	Response to RAI #2, Pages 1-2	Please provide sound levels that will be associated with the substations and ensure that the noise from the substations is included in the calculation of overall noise levels at each noise sensitive receiver.
X9	Response to RAI #2, Page 2	After completion of the corrected noise analysis, please provide a table showing the predicted total sound pressure level at each noise sensitive receiver and the contribution from each turbine and substation included in the calculation to the total sound pressure level predicted at each noise sensitive receiver.
X10	Response to RAI #2, Page 2	CSF has requested deferral of the final noise analysis pending determination of the facility layout for each phase of construction. In order for the Department to recommend to the Council that the applicant can meet the noise standard, the applicant must prepare a preliminary site configuration showing that the standard can be met, i.e., that the sound pressure level at each noise sensitive receiver does not exceed allowable limits or, where applicable, that the applicant has received from the occupants of the noise sensitive receiver the appropriate waiver. Please provide a noise analysis for a facility configuration that would meet the noise standard, including noise contour maps and a table showing the predicted total sound pressure level at each noise sensitive receiver and the contribution from each turbine and substation to the total sound pressure level predicted at each noise sensitive receiver.
Exhibit AA: Electric Transmission Line		
AA1	Response to RAI #2, AA1	(Follow-Up) CSF must provide evidence in support of a Council finding that the proposed SFWF can meet the applicable standards. Such evidence would include the distance in feet from the proposed center line of the transmission line for each residence located within 200 feet of the centerline, a graph of the predicted electric and magnetic fields levels from the proposed center line to 200 feet <u>on each side</u> of the proposed center line, and the assumptions and methods used in the electric and magnetic field analysis, including the current in amperes on each proposed transmission line. The response should address a site layout that would enable CSF to satisfy the requirements of the applicable standards.
AA1	Response to RAI #2, AA1	(Follow-Up) Describe specific measures CSF would undertake to minimize electric and magnetic fields that could affect occupied residences located less than 200 feet from the centerline of any 230-kV overhead transmission line and the aboveground and underground segments of the 34.5-kV collector system. In addition, specifically address occupied residences located less than 200 feet from the centerline of any 230-kV overhead transmission line that would be “understrung” with 34.5-kV collector lines.

Exhibit BB: Other Information		
BB1	Response to RAI #2, BB1	(Follow-Up) Provide information to support a Council finding that alternating current electric fields would not exceed 9 kV per meter at one meter above ground surface in areas accessible to the public. OAR 345-024-0090. In addition, specifically address the overhead 230-kV overhead transmission line that would be "understrung" with 34.5-kV collector lines.
BB2	Exhibit BB, Page 2	(Follow-Up) In your response, you indicate that there would be a conflict between proposed turbine locations and Restricted Area 5701 as well as the military training routed used to enter the restricted area. As shown on Figure BB2a, there appears to be a conflict with the eastern edge of the northern project area and with practically all proposed turbine locations in the southern project area. Please explain how this conflict can be resolved. What is the status of discussions with the Navy?

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 454.5 megawatts (MW) to 909 MW, depending of the turbine selected. The location of the SFWF, its site boundary and an illustrative site plan, may be found in Exhibit C to this Application.

Facility components include:

- three hundred three wind turbines
- six meteorological towers
- an interconnected electrical system
- two project substations
- a facility communications system
- fifty seven miles of new project roads
- two field workshops

Wind Turbines

Several WTGs are under consideration for the facility:

Table B-1: **Specification**		Siemens SWT-2.3-93	Clipper 2.5 MW Liberty	Vestas V90	GE Energy 1.5xle
Peak Generating Capacity (kW)		2,300	2,500	3,000	1,500
Hub Height (meters)		80	80	105	80
Rotor Diameter (meters)		93	96	90	82.5
Guaranteed Maximum Sound Power Level (dB(A))		107	107	109.2	102.7
Sound Power Level Uncertainty Band		+/- 2	+/- 2	+/- 2	+/- 2
Octave Band Data		See Table B-2			
Weight of Metals in Tower (US tons)		179	208.5	314	138
Weight of Metals in Nacelle (US tons)		91	87	77	24
Maximum Diameter of Turbine Foundation (feet)		17	17	16	16
Cubic Yards of Concrete in Turbine Foundation Above Three Feet Below Grade		66	66	54	54
Maximum Number of Turbines		303			
Nameplate Facility Capacity (MW)		696.9	757.5	909	454.5

Table B-2: 8 m/s LWA dB for:		Siemens SWT-2.3-93	Clipper 2.5 MW Liberty	Vestas V90	GE Energy 1.5xle
Frequency (Hz)					
63		86.3	82.8	92.4	85.1
125		95.3	87.4	97.4	94.0
250		102.0	90.7	101.6	97.2
500		102.6	92.7	104.2	98.6
1000		99.0	93.7	104.3	97.9
2000		95.0	88.5	99.4	94.5
4000		90.2	80.8	93.1	87.3
8000		85.4	70.5	82.9	78.1

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 397 to 492 feet. Their component parts are discussed below:

Foundations

Turbine foundations are excavated to a depth of approximately 32 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 foundation has cured, the excavated material will be used as backfill around the foundation, leaving the exposed foundation at the surface only slightly larger than the diameter of the tower base. A ten foot "skirt" surrounding each WTG will be formed by clearing any debris and vegetation, compacting and sterilizing the soil, and applying a layer of washed crushed rock to reduce step and touch hazard.

Additional information with respect to the WTG footprint may be found in Exhibit C of this Application.

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.

<u>Nacelles and Generators</u>

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.

<u>Rotors</u>

Each wind turbine has three rotor blades, each constructed of one piece of fiberglass or fiberglass composite. Blades are from 135 to 157 feet in length. Ground clearance of the blades, when the tips are closest to the ground, is from 100 to 196 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 six permanent, unguyed, 72 to 80 meter meteorological towers (weather stations) located within the facility site. Anemometers located at different heights on the towers will relay information back to control centers via the communication system.

Meteorological towers have a concrete foundation: a 30’ by 30’ by 2’ concrete pad is poured at a depth of approximately 5.5’; three 30” diameter concrete pedestals are affixed to the pad and rise to approximately 6” above ground level. The meteorological tower is then affixed to the three-point pedestal.

Electrical System

Wind turbines generate low voltage electricity (from 575 to 4,160 volts depending on the technology selected). Low-voltage underground conductors carry the power from the base of the wind turbine tower to its associated step-up transformer. The step-up transformer raises the voltage to 34.5 kilovolts (kV). A medium-voltage (34.5 kV) collector system connects the step-up transformers and then carries the electricity to one of two facility substations where transformers will raise the voltage once more (to 230 kV) for transmission to the interconnect point.

Step-up transformers

A step-up transformer, mounted on a concrete pad measuring 8 feet by 8 feet by 8 inches thick, will be installed seven feet from the base of each WTG. The top of the finished pad will be at ground level, and a washed crushed rock skirt three feet wide will be installed around the pad.

Collector system

Approximately 103 miles of collector system runs will be required to connect the step-up transformers to the facility substations. Each collector system run is made up of 3 individual conductors plus a grounding or bonding cable. Approximately 65 miles of collector system runs will be installed underground in a trench of a depth of three to four feet that will generally run along the edge of the project roads. Terrain and distance leave 38 miles of overhead collector system runs. Approximately 10 miles of these overhead runs will be "understrung" on the 230 kV high-voltage lines discussed below. The remaining 28 miles of collector cable overhead runs will be installed on cross-arm power poles.

Project substations

Two project substations, one each in the north and south of the site, will receive the collector cables. The substations support transformers that will raise the 34.5 kV electricity to 230 KV.

The finished size of each project substation will be 500 feet by 200 feet, and each will be fenced and locked. The area within the substations will be cleared of all vegetation, the soil will be compacted, sterilized, and covered with washed crushed rock to reduce step and touch hazards.

230 kV transmission

The 230 kV electricity at the south substation will be transmitted to the north substation via 13 miles of high-voltage H-type power poles. The 230 KV electricity at the north substation will be transmitted to the interconnect point via 4 miles of high-voltage H-type power poles.

The 13 miles of high-voltage lines connecting the north and south project substations meet the definition of "energy facility" in ORS 469.300.

The transmission corridor connecting the south area to the north area was selected for the following reasons:

- Siting the lines along Fourmile Canyon avoids Willow Creek (the only stream in the area). Fourmile creek is dry and crosses Fourmile road in several places without culverts. In extreme weather, however, the creek might be wet. The proposed lines have been sited on the east side of the road in order to avoid the creek.
- No Habitat Category 1 was identified along the selected corridor.
- The proposed corridor is adjacent to public roads for 6 of its 13 miles.
- All potential corridors would require variances or exceptions.
- The selected corridor is not located in a protected area.
- The selected corridor is not likely to disturb historical, cultural or archaeological resources.

- Seismic, geological and soils hazards are assumed to be constant across all potential corridors.
- All potential corridors would be located within lands zoned for exclusive farm use; however, siting the line along the county road avoids disruption of the wheat fields in the project area.

Additional information may be found in Exhibit C of this Application.

Facility 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).

Should 303 3.0 MW turbines be installed at the facility, the facility's *nameplate* capacity will be greater than the transmission capacity held by Applicant *at this time*. It will be several years before the facility is built out at nameplate capacity, and wind facilities do not operate continually at nameplate capacity. Finally, while the 3.0 turbine is under consideration, no decision has been made with respect to whether this turbine will be installed, nor in what number.

Communication System

Each WTG contains computerized monitors connected to one of two central host computers—one located in each of the field workshops. The supervisory control and data acquisition (SCADA) programs operating on the central computer systems monitor energy production, internal and external temperatures, wind speed and direction, and equipment condition for each WTG. Automatic WTG shutdown in the event of a mechanical fault is also controlled by the SCADA system.

The SCADA system will be connected to the WTGs and meteorological towers with fiber optic communications lines. Approximately 103 miles of these communications lines will run either underground or overhead, parallel to the low- and medium-voltage power collection conductors. Where underground, communications lines are placed in the same trench as collection conductors; where overhead, communications lines run on the same power poles as the transmission system; communications lines are run to the meteorological towers in separate trenches.

Project Roads

Approximately 87 miles of road will be required to serve each turbine string, connect the turbine strings, and connect with site access roads. Thirty miles of existing ranch and farm roads have been incorporated into the road network. Existing 10' roads will be expanded to 18', new roads will be finished at 18'. During construction, 10' wide temporary roads will parallel the project roads. Collector conductors and communications cables will be trenched in these temporary roads, and the surface will be compacted to provide for crane crawl. Permanent roads will have a compacted base of native soil, and will be graveled to a depth of four to six inches.

Additional information about the road network may be found in Exhibit C of this Application.

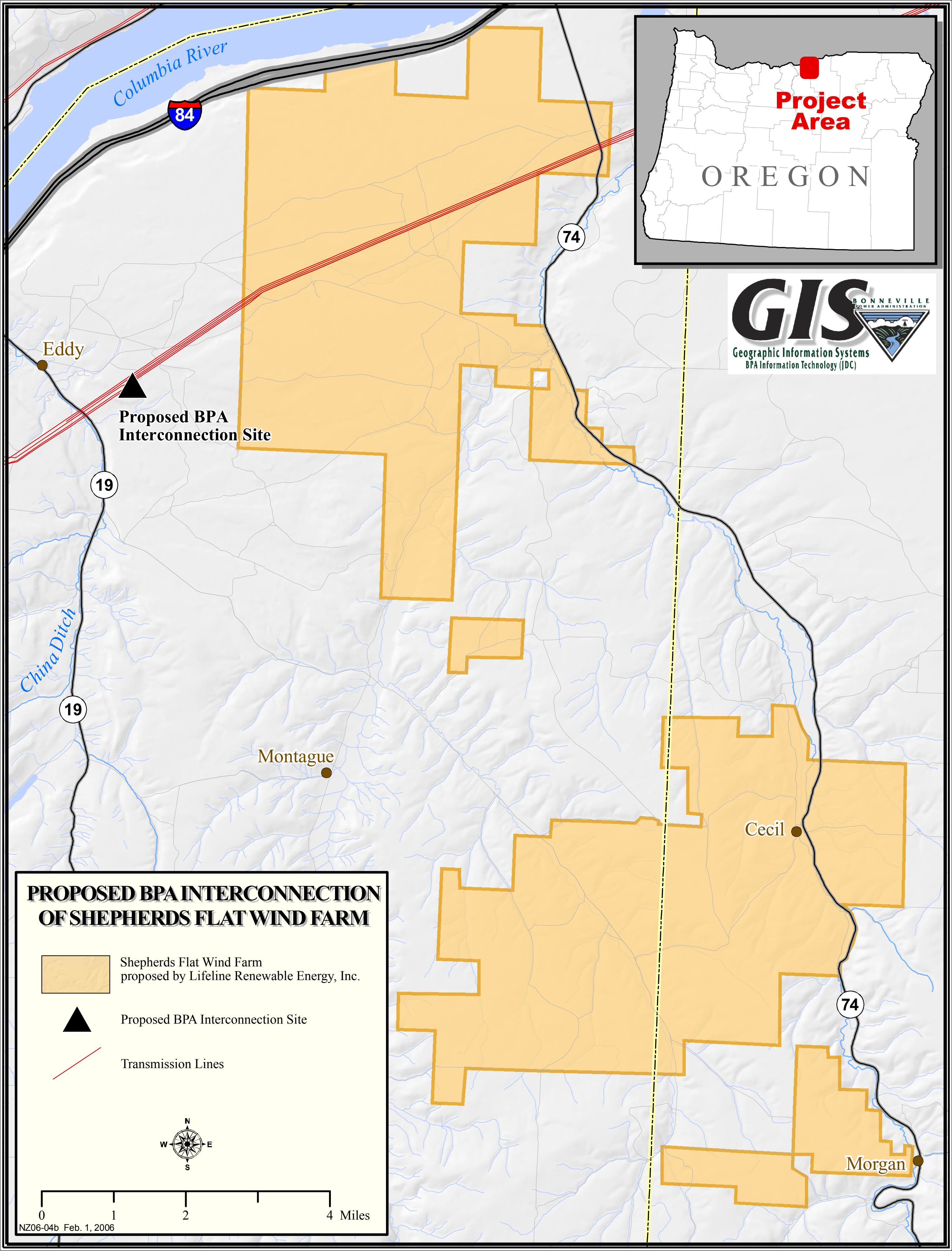
Field Workshops

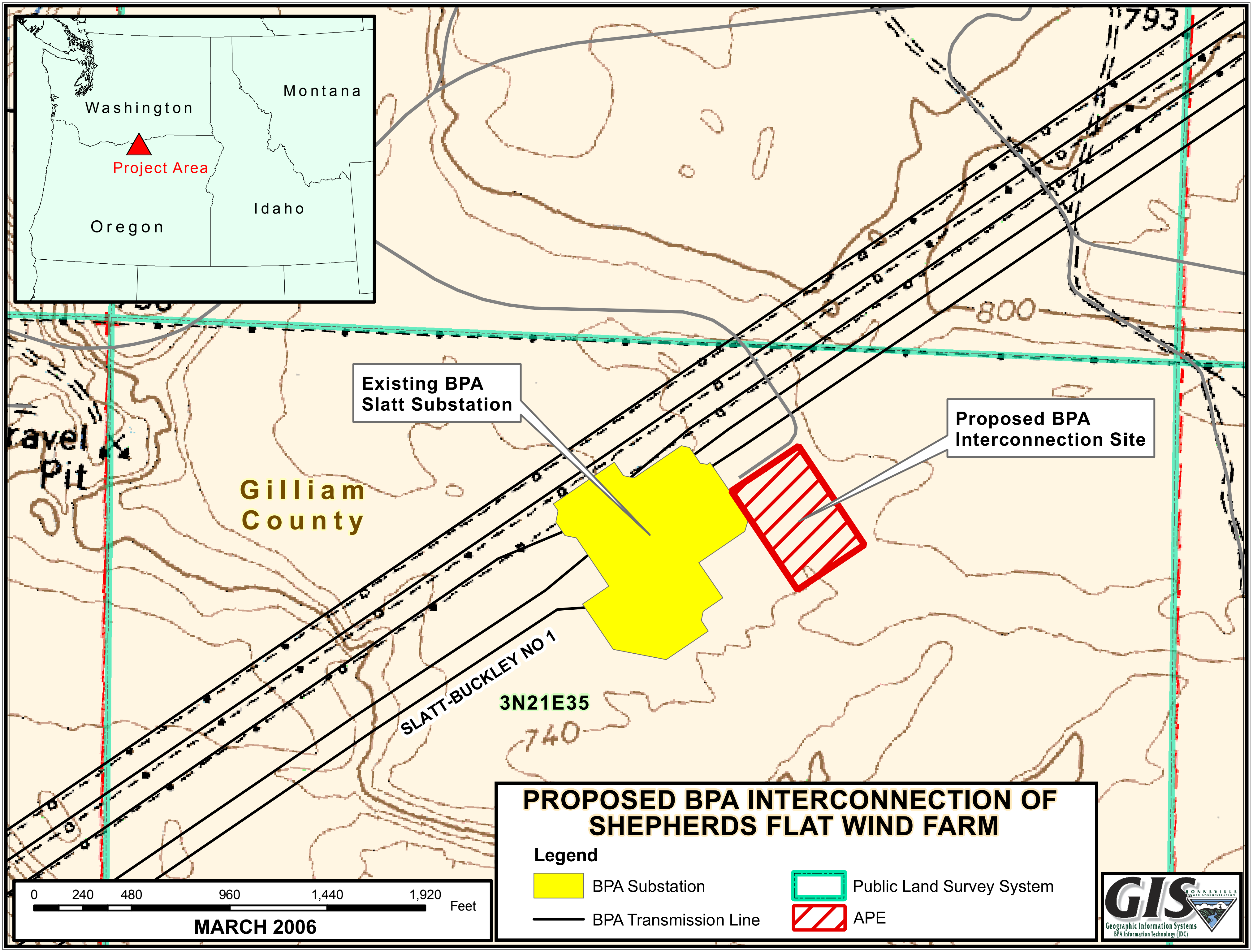
While the primary administration and operations offices will be located-off site in commercial space, two field workshops are proposed on-site—one each in the north and south. The north site building is planned to be 125 feet by 50 feet, and the south site building is planned to be 83 feet 7 inches by 50 feet. Both buildings will be metal clad, insulated structures with a 75 foot skirt of crushed stone. Both workshops will have an adjacent fenced lay-down area of 200 feet by 75 feet, and a 20,000 gallon water tank for fire fighting and back-up water. Applicant proposes wells and septic tanks for both sites.

The workshop footprint will be used for lay-down and secure storage during facility construction.

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


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
Columbia River
84
74
19
China Ditch
Eddy
Proposed BPA Interconnection Site
Montague
Cecil
Morgan
Project Area
OREGON
GIS
BONNEVILLE POWER ADMINISTRATION
Geographic Information Systems
BPA Information Technology (JDC)



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B7

(Follow-up) Please describe the location of the "off-site" operations office. How would data and operational commands be communicated between the operations office and the facility site? Will the on-site field workshops be staffed? Will the on-site workshops have operational capability (computer control stations)? Will you be constructing the off-site operations office rather than using an existing structure?

WORKSHOPS AND OFFICE

Off-site Operations Office

Applicant is not yet certain that an off-site operations office will be required, but has proposed such an office in order to present a worst-case. If established, it is anticipated that the office will be located within, or immediately adjacent to, the town of Arlington in appropriately zoned commercial space.

The off-site office, if established, will be administrative in purpose. Data and operational commands will not be communicated between this office and the facility site. The supervisory control and data acquisition (SCADA) programs will be housed in the field workshops (please see Exhibit B).

Should an off-site office be established, Applicant will investigate the purchase or lease of an existing structure. For worst-case planning purposes, Applicant assumes the construction of a metal-clad insulated structure approximately 125 feet by 50 feet.

On-site Field Workshops

The northern field workshop is expected to be staffed by 25 employees and the southern field workshop is expected to be staffed by seven employees. Both workshops will contain computer control stations (please see Exhibit B).

RAI#3, B7: DESCRIPTION OF PROPOSED FACILITY

(Follow-Up) Please discuss your plans for the "off-site operations office" as soon as you have decided whether the proposed project will include the office.

[Comment: If you build an off-site structure to serve as the "Operations Office," it might fall within the definition of a "related or supporting facility" (OAR 345-001-0010(49). This would require us to analyze the proposed location and recommend findings to the Council. The structure would be subject to the site certificate. If you purchase or lease an existing structure, however, it would not be a related or supporting facility, unless it is "significantly modified solely to serve the energy facility.]

OFF-SITE OFFICE

An off-site office is under consideration for public relations reasons—to provide an accessible "face of the project" within the community, an address for general mail delivery and a meeting place for facility tours, for example. Applicant contemplates a reception area, conference room, lavatories, small kitchen and other similar general office amenities. Payroll and other facility administrative matters will be centrally managed by Caithness Energy affiliates; parts and other operating supplies will be delivered directly to the field workshops; and the field workshops will contain all facility control equipment.

While no decision with respect to an off-site office will be made until experience during either the construction or operation of the facility shows that such an office will be both useful and economical, Applicant agrees to purchase or lease an existing structure which does not require significant modification.

RAI#3, B8: DESCRIPTION OF PROPOSED FACILITY

(Follow-Up) The field workshop in the northern project area is described as a building measuring 50' x 125', with a 75-foot skirt of crushed stone and an adjacent fenced lay-down area measuring 75' x 200'. The field workshop in the southern project is described as a building measuring 50' x 83' 7", with a 75-foot skirt of crushed stone and an adjacent fenced lay-down area measuring 75' x 200'. Assuming, in both cases, that the fenced lay-down area is situated within the skirt at one end of the field workshop, the area permanently affected by the field workshop in the northern project area would be 75,000 square feet, and the area permanently affected by the field workshop in the southern project area would be 46,717 square feet. In revised Exhibit C (March 23 version), the permanent footprint of these areas is described as 70,000 square feet and 61,720 square feet, respectively. Please explain the difference and make appropriate corrections.

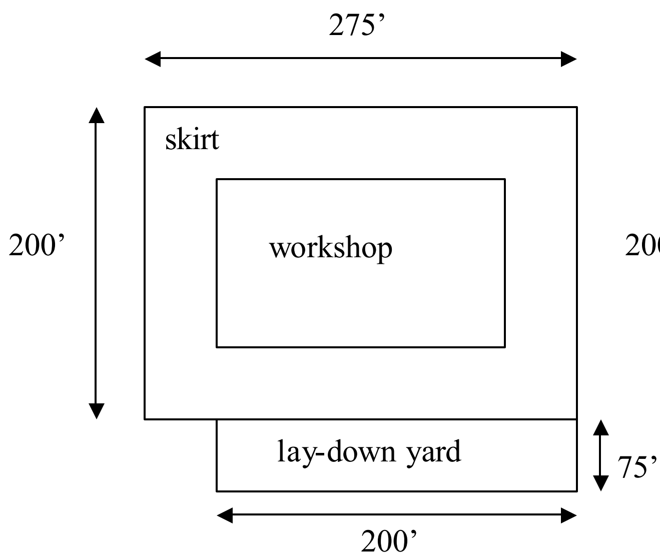
FIELD WORKSHOPS

The worst-case footprint for the field workshops and adjacent lay-down areas was used for disturbance calculations. The area calculations did not place the lay-down yard within the crushed stone skirt.

	North workshop	South workshop
Length	125'	83'7" (83.6')
Width	50'	50'
Skirt (all sides)	75'	75'
Length + skirt	125' + 2 × 75' = 275'	83.6' + 2 × 75' = 233.6'
Width + skirt	50' + 2 × 75' = 200'	50' + 2 × 75' = 200'
Total Workshop	275' × 200' = 55,000 sq ft	233.6' × 200' = 46,720 sq ft
Lay-down length	200'	200'
Lay-down width	75'	75'
Lay-down area	200' × 75' = 15,000 sq ft	200' × 75' = 15,000 sq ft

Total area north workshop	55,000 sq ft + 15,000 sq ft = 70,000 sq ft
Total area south workshop	46,720 sq ft + 15,000 sq ft = 61,720 sq ft

If the lay-down area is not separate from the skirt, the entire yard fits within the skirt and the footprint becomes the same as that for the workshop plus the skirt, 55,000 and 46,720 square feet for the north and south workshops, respectively.



B11

(Follow-up) To approve a site certificate for an energy facility of up to 909 MW of generating capacity, the Council will need to find either that the applicant has a transmission access contract for 909 MW or that 909 MW of transmission capacity is available from the proposed point of interconnection and that the applicant has a reasonable likelihood of acquiring access at that level of generating capacity. Please provide information that would support either of these findings.

FACILITY NOMINAL CAPACITY

Applicant proposes to site 303 wind turbine generators (WTGs) within the Shepherds Flat Wind Farm facility boundary. The turbines under consideration for the facility range from 1.5 megawatts (MW) of nominal (nameplate) capacity, to 3.0 MW of nominal capacity. The facility, therefore has a theoretical nominal capacity of from 454.5 MW to 909 MW.

In the "worst case" scenario 303 3.0 MW turbines will be erected on the facility site and the nominal capacity of the facility will exceed the 750 MW of firm transmission Applicant has *at this time.* Applicant believes that the economic viability of the facility under this worst case scenario is not threatened for the following reasons:

- The average annual output of a 909 MW wind facility at the site would not exceed 320 MW—well within Applicant's transmission reservation.
- Given the geographic variation of the facility site, it is extremely unlikely that all turbines within the facility will ever operate at nominal capacity at the same time.
- If the facility's output at a point in time were to exceed Applicant's reserved transmission capacity, Applicant can attempt to purchase additional transmission capacity on the spot market.
- If the facility's output regularly exceeds Applicant's reserved transmission capacity, Applicant can attempt to purchase or trade for additional transmission rights.
- If short-term transmission contracts are not available, Applicant can restrict the output of the facility.

These production/transmission/power purchase agreement calculations are the foundation of project financing, and the rigors of the financial risk analysis would preclude construction of more capacity than the facility could deliver to market.

Applicant proposes the siting of 303 WTGs at the facility, and wishes to retain the option of purchasing 3.0 MW WTGs. Applicant proposes that the potential for an apparent imbalance between the facility's nominal capacity and firm transmission capacity be resolved by the imposition of conditions as the facility's phases are constructed.

RAI#3, B11: DESCRIPTION OF PROPOSED FACILITY

[Comment: We are asking BPA for confirmation of you statement that the "transmission reservation" of 750 MW would be adequate to handle the potential peak capacity of 909 MW. Until this is clarified, our recommendation would be for CSF to reduce the size of the proposed SFWF to 750 MW or less. If the Council approves a site certificate, it could be amended later if additional transmission capacity is acquired.]

FACILITY CAPACITY

Assuming a 33% capacity factor (as high as can be expected in the area), a 909 MW (nameplate) wind facility will generate the electricity, over the course of a year, of a 303 MW (nameplate) generator operating at a 100% capacity factor. On average, therefore, the facility's transmission requirements will be less than half of its existing firm transmission reservation.

The facility's capacity factor is an average, and includes times when the facility will operate at 20% of capacity. At these times a 909 MW (nameplate) facility will produce at 182 MW, while a 750 MW (nameplate) facility will produce at 150 MW. Applicant is clearly advantaged by the higher nameplate capacity at all capacity factors up to 83%, when the 750 MW of firm transmission capacity is reached.

While some wind facilities operate at 83% of capacity, it is doubtful that the Shepherds Flat Wind Farm (SFWF) will ever operate at 100% of capacity. This is because windward turbines operating at 100% of capacity will create a wake for the turbines behind, and the production of those turbines will be lower. It is also doubtful that wind conditions that maximize production in the northern project area will have the same effect in the southern project area.

In the unlikely event that the facility's power production exceeds the transmission capacity that is available under its transmission agreement or on the spot-market, Applicant will curtail the excess production.

B12

Will the field workshops have electrical service? What is the source of that electrical service? Describe the route of the electrical service lines? If the service line will be aboveground, describe the support structures. What is the overall length of these lines under worst-case assumptions? What area would be temporarily disturbed during construction of the distribution lines? What area would the lines permanently occupy?

FIELD WORKSHOP ELECTRIFICATION

Both the northern and southern field workshops will have electrical service. The source of the electrical service is the facility's collection grid, and both workshops have been located on collector lines whose footprint, both temporary and permanent, has been calculated and included in Exhibit C and RAI#2 P3.

B13

Describe the maximum number of junction boxes that would be included in the collector system. (This affects the calculation of retirement costs.)

JUNCTION BOXES

The electrical plan for the Shepherds Flat Wind Farm includes 33 junction boxes. Conservative convention adds one additional junction box per circuit. The maximum number of junction boxes included in the collector system, by project area, is shown below:

Project Area	Junction Boxes	Circuits	Maximum Number of Junction Boxes
North	21	10	31
South	12	7	19
Total	33	17	50

B14

Describe the area to be affected and the facilities to be installed at the interconnection point adjacent to the BPA Slatt Switching Station.

INTERCONNECT FACILITIES

The Shepherds Flat Wind Farm interconnect facility will be designed, constructed, owned and maintained by the Bonneville Power Administration (BPA) and will be sited on BPA-owned land. Applicant has requested that BPA provide a description of the area to be affected and the facilities to be installed at the interconnection point but is not yet in receipt of this information. BPA is conducting its own NEPA study with respect to any environmental impact related to the interconnect facility, and BPA's NEPA Record of Decision is expected to be released after the SFWF receives its site certificate.

Applicant believes that the interconnect facility is not a related or supporting facility as defined in OAR 345-001-0010, but that it will be a shared facility, and is classified by BPA as a system upgrade. Applicant has requested verification of this classification from BPA so that the Council may make this determination.

Applicant's proposed transmission line from the facility to the interconnect facility is a SFWF supporting facility.

RAI#3, B14: DESCRIPTION OF PROPOSED FACILITY

(Follow-Up) Please provide a description of the "interconnect facility" when it is available from BPA. Do you anticipate that your transmission line would terminate within a BPA switchyard with no additional project structure outside of the BPA footprint?

INTERCONNECT FACILITY

The BPA interconnect facility will occupy approximately 288,100 square feet (6.6 acres) of BPA-owned land, immediately adjacent to BPA's Slatt switchyard in Gilliam County, Oregon. The Shepherds Flat Wind Farm 230 kV transmission line(s) will terminate within the BPA interconnect facility, with no additional project structure outside of the BPA footprint.

In general, the BPA interconnect facility will incorporate one or two 500/230 kV transformers. 500 kV and 230 kV breakers and disconnect switches, auxiliary power equipment for station service, 230 kV capacitor banks, and other, similar equipment.

B15

The application describes six met towers up to 80 m (263 feet) in height. Would the FAA require aviation warning lights on these structures?

AVIATION WARNING LIGHTS

CFR Title 14 Part 77.13 states that any person/organization who intends to sponsor any construction exceeding 200 feet above ground level must notify the Administrator of the FAA.

While notification will be required for all WTGs and meteorological towers, not all structures in excess of 200 feet above ground level will have to be lighted.

The most recent FAA guidance with respect to wind facility lighting[1] states that "not all wind turbine units within an installation or farm need to be lighted. Definition of the periphery of the installation is essential; however, lighting of interior wind turbines is of lesser importance unless they are taller than the peripheral units."

Our lighting plan submissions to the FAA will include both WTGs and met towers, but because the meteorological towers will be placed within the interior of the wind facility, and they will not be taller than the peripheral units, we expect that they will not require warning lights of their own.

[1] U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular AC 70/7460-1K.

B16

Please discuss your proposed construction "phasing" in more detail. Where will the "first 250 MW" be built within the micrositing area? Where will the "second 250 MW" be built?

CONSTRUCTION PHASES

Applicant proposes construction of the Shepherds Flat Wind Farm in 250 MW phases. Applicant anticipates constructing the first 250 MW in the western portion of the northern project area. The second 250 MW phase is expected to complete the development of the northern area, after which construction will begin in the southern project area.

Access and connector roads will also be developed by phase, with construction limited to those roads serving that phase's turbine locations. Likewise, the southern area substation and field workshop will not be constructed until the commencement of development in the southern area; and the transmission corridor connecting the southern and northern areas will not be constructed until this time.

RAI#3, B16: DESCRIPTION OF PROPOSED FACILITY

(Follow-Up) Describe the proposed phases in greater detail. Your response appears to say that the northern project area would be built first and probably in two phases. Depending on the size of turbine selected, completion of the northern project area, totaling 500 MW, could take more than two years. Do you anticipate that the southern project area would be constructed in multiple phases? How many years do you anticipate construction of the southern area would take? Given the proposed phasing, is your proposed construction completion date of April 2011 realistic? Have you considered starting with a smaller project and expanding it later by amendment?

FACILITY PHASING

Applicant's original construction schedule, and therefore its proposed phasing, was based upon estimates of wind turbine delivery schedules. Because wind turbine delivery schedules have now been clarified, Applicant no longer proposes to construct the facility in phases.

Applicant believes that the entire facility will be completed approximately two years from commencement of construction; and that construction will commence within two to three months of site certification. For purposes of construction deadlines, Applicant proposes to begin construction no later than two and one-half years after the effective date of the site certificate, and to complete construction no later than six years after the effective date of the site certificate.

A smaller project will not support the cost of the 500 kV interconnect, the only interconnect available in the project area.

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	13,627	0
Southern area	16,520	8,763	928
Total area	32,100	22,390	928

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 dryland wheat.

Maps

Figure C-1	Quadrangle map showing the facility site in relation to major landmarks
Figure C-2	Facility site showing major components
Figure C-2a-f	Facility site showing major components (tiled)
Figure C-3	Conservation Reserve Program lands within the site boundary
Figure C-4	Analysis areas

Permanent facilities footprint

Component	Area of Footprint Each	Number of Units	Total Footprint (acres)
Turbine pads	1,187 sq ft	303 WTGs	8.257
Turbine turnouts	495 sq ft	303 WTGs	3.443
Substations	2.3 acres	2	4.591
Freestanding medium-voltage power poles	7 sq ft	971	0.158
High-voltage power poles	14 sq ft	586	0.190
Field workshop north	70,000 sq ft	1	1.607
Field workshop south	61,720 sq ft	1	1.417
Meteorological towers	15 sq ft	6	0.002
Expansion of existing roads	42,240 sq ft/mile	30 miles	29.311
New roads	95,040 sq ft/mile	57 miles	123.681
Total			**172.657**

The facility site is crossed by 10' wide farm and ranch roads, and to the extent possible, these roads were used along turbine strings, to connect turbine strings, to connect individual site parcels, and to connect with off-site access roads. Nevertheless, road disturbance was calculated on a "worse case" basis, leaving redundant cross-overs and multiple access points. Thirty miles of these existing roads were used for the project, and their finished width will be increased to 18'.

Temporary project facilities footprint

Component	Area of Footprint Each	Number of Units	Total Footprint (acres)
Turbine pads (including laydown areas)	8,837 sq ft	303 WTGs	61.469
Turbine turnouts	495 sq ft	303 WTGs	3.443
Substations	2.8 acres	2	5.510
Freestanding medium-voltage power poles	207 sq ft	971	4.614
High-voltage power poles	414 sq ft	586	5.573
Off-road trenching	15,840 sq ft/mile	17 miles	6.279
Meteorological towers	1,600 sq ft	6	0.220
Staging and storage north	70,000 sq ft	1	1.607
Staging and storage south	61,720 sq ft	1	1.417
Temporary expansion of existing roads	95,040 sq ft/mile	30 miles	65.950
Temporary width of new roads	147,840 sq ft/mile	56.7 miles	192.393
Total			**348.476**

Crane paths have been included for all new and existing roads. Each road has been paralleled by a temporary crane tread road 10' in width.

Unconnected Sections

The northern project area contains one "unconnected section" which will be joined to the main northern project area by an existing road, a short segment of new road, and overhead transmission and communications lines running parallel to the new and existing roads. The required rights-of-way will be secured before this Application is complete.

The southern project area contains two "unconnected sections" which will be joined to the main southern project area by existing county and private roads and underground and overhead transmission and communications lines. The required rights-of-way will be secured before this Application is complete.

Applicant proposes to connect the northern and southern project areas via 230 kV transmission lines with underhung collector and communications lines along county road rights-of-way through Fourmile Canyon and through private property along the west side of Eightmile Canyon. This transmission corridor parallels existing roads its entire length, and will enter the project site above Eightmile Canyon. The required rights-of-way will be secured before this Application is complete.

Applicant proposes to connect its facility to its point of interconnect at BPA's Slatt substation via 230 kV transmission lines parallel to or within BPA or local utility powerline easements. Existing roads serve these easements. The required rights-of-way will be secured before this Application is complete.

Figure C-1

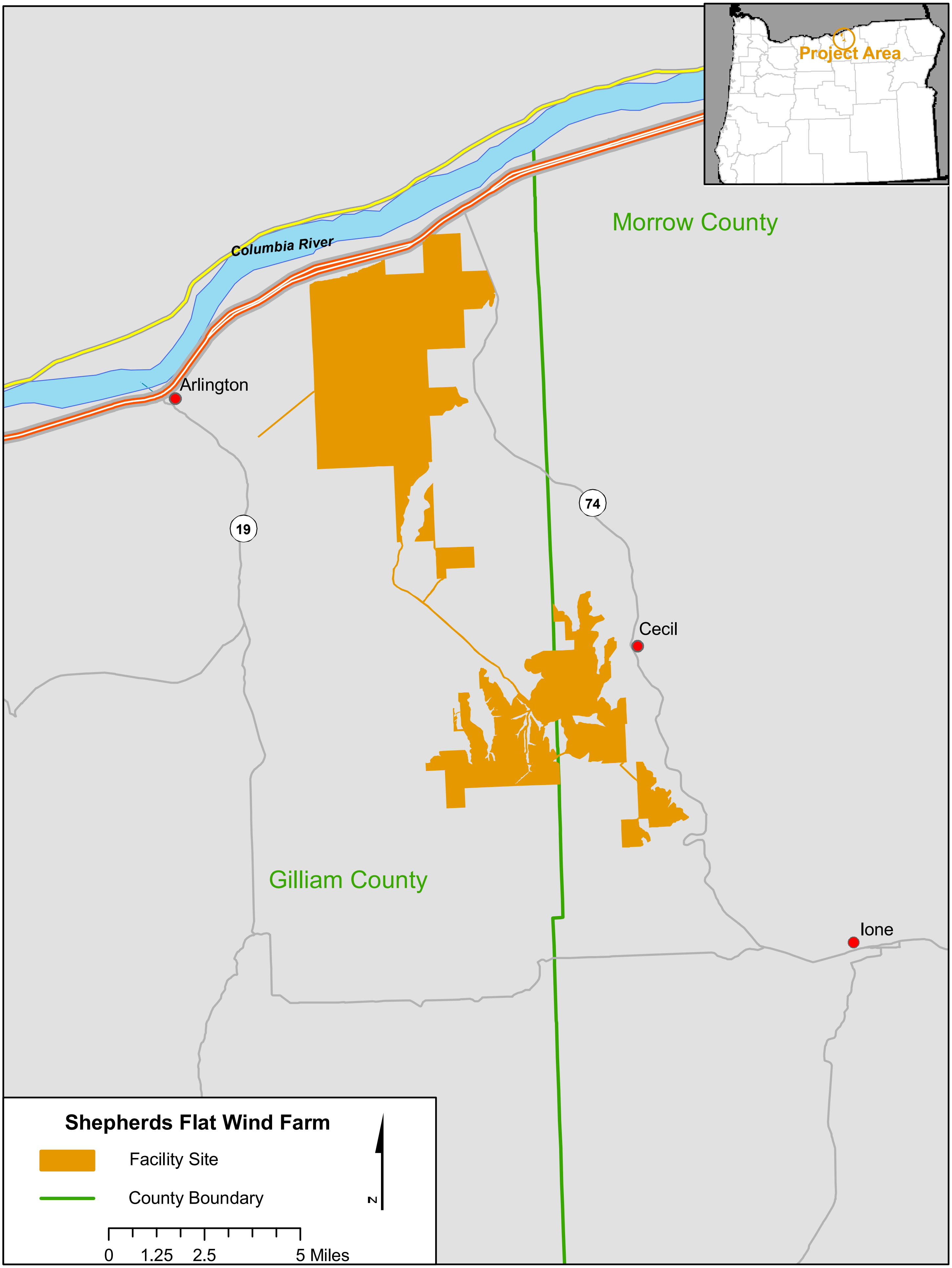

Project Area
Morrow County
Columbia River
Arlington
74
19
Cecil
Gilliam County
Ione
Shepherds Flat Wind Farm
Facility Site
County Boundary
N
0
1.25
2.5
5 Miles

Figure C-2

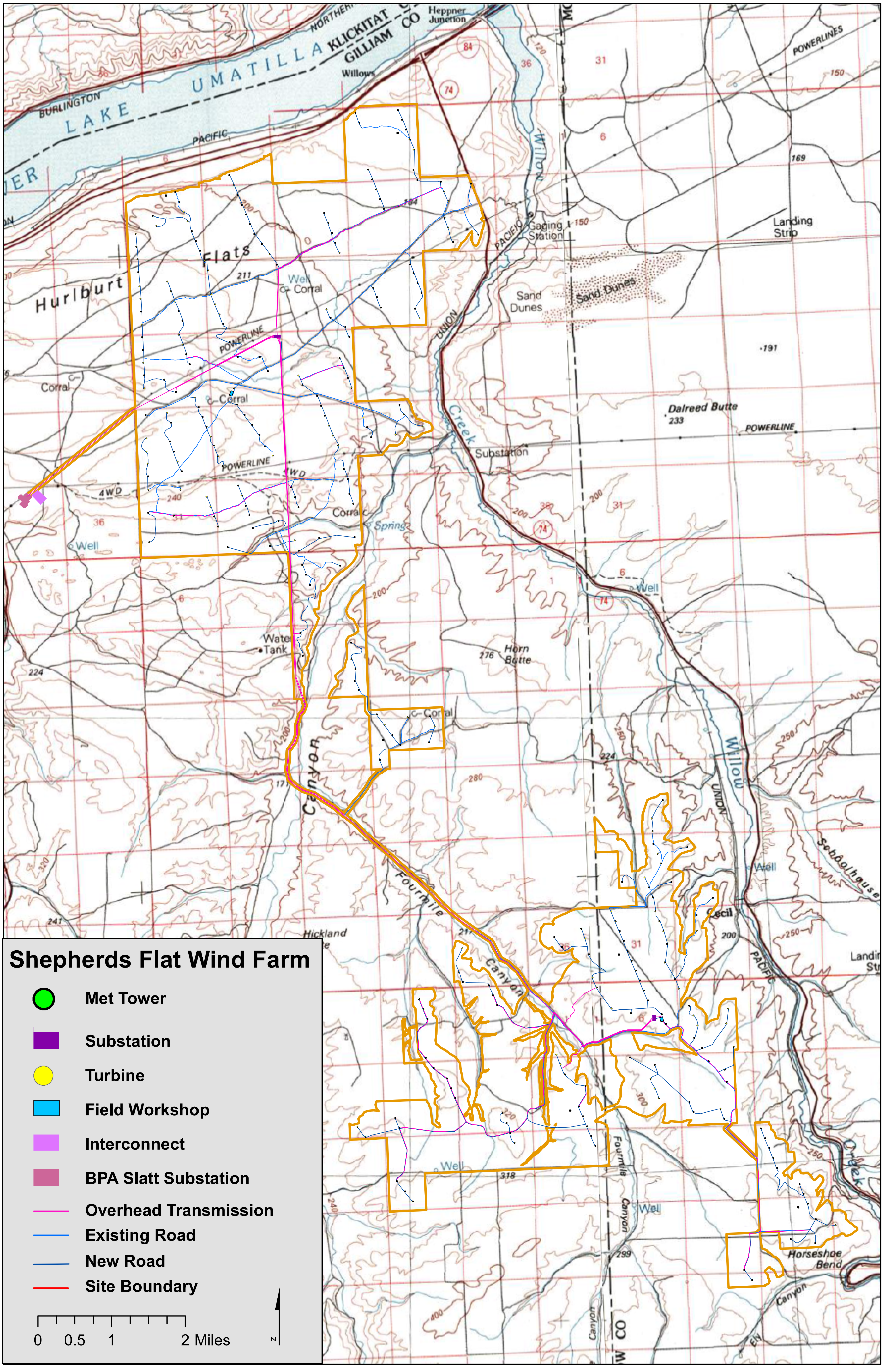
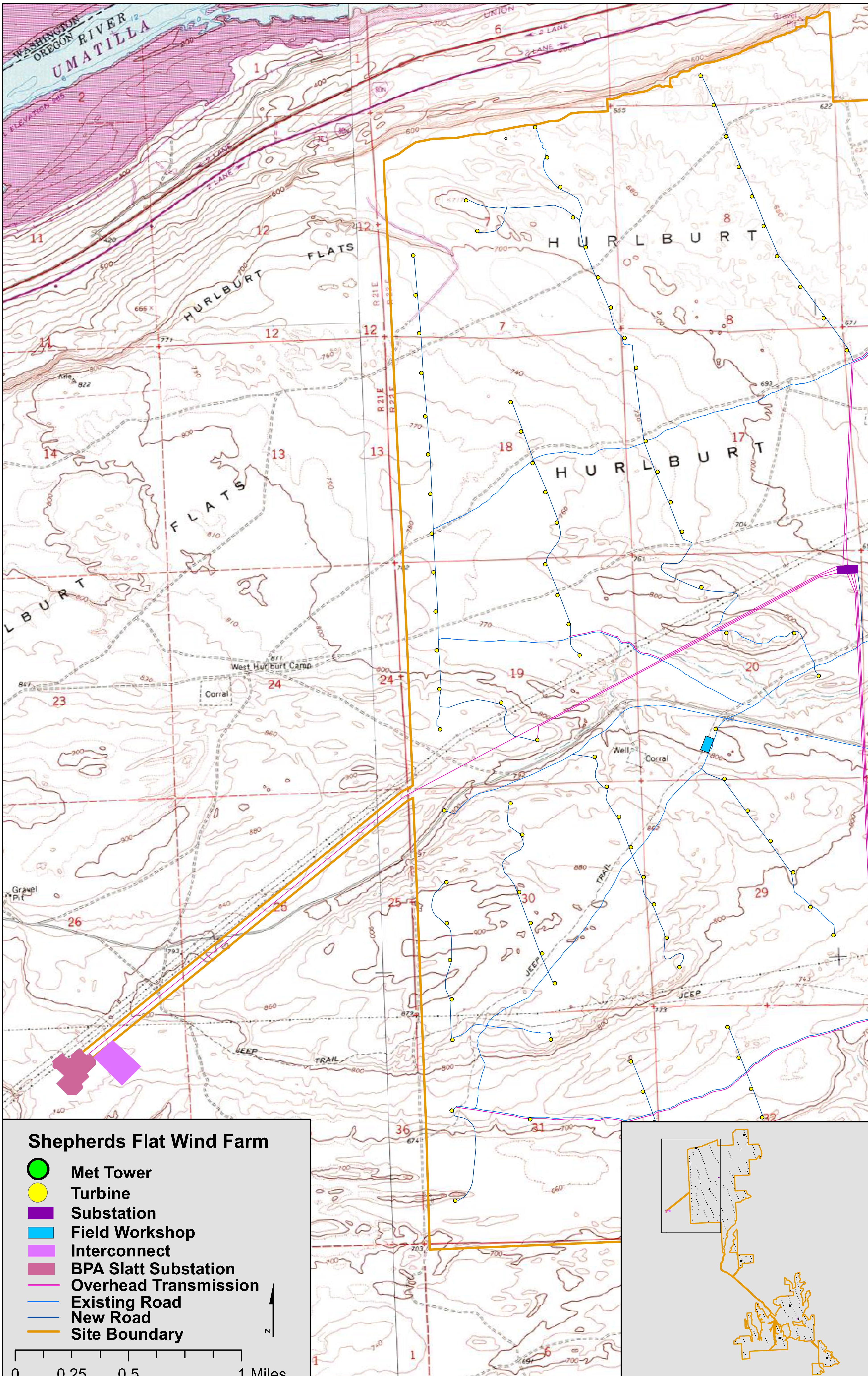
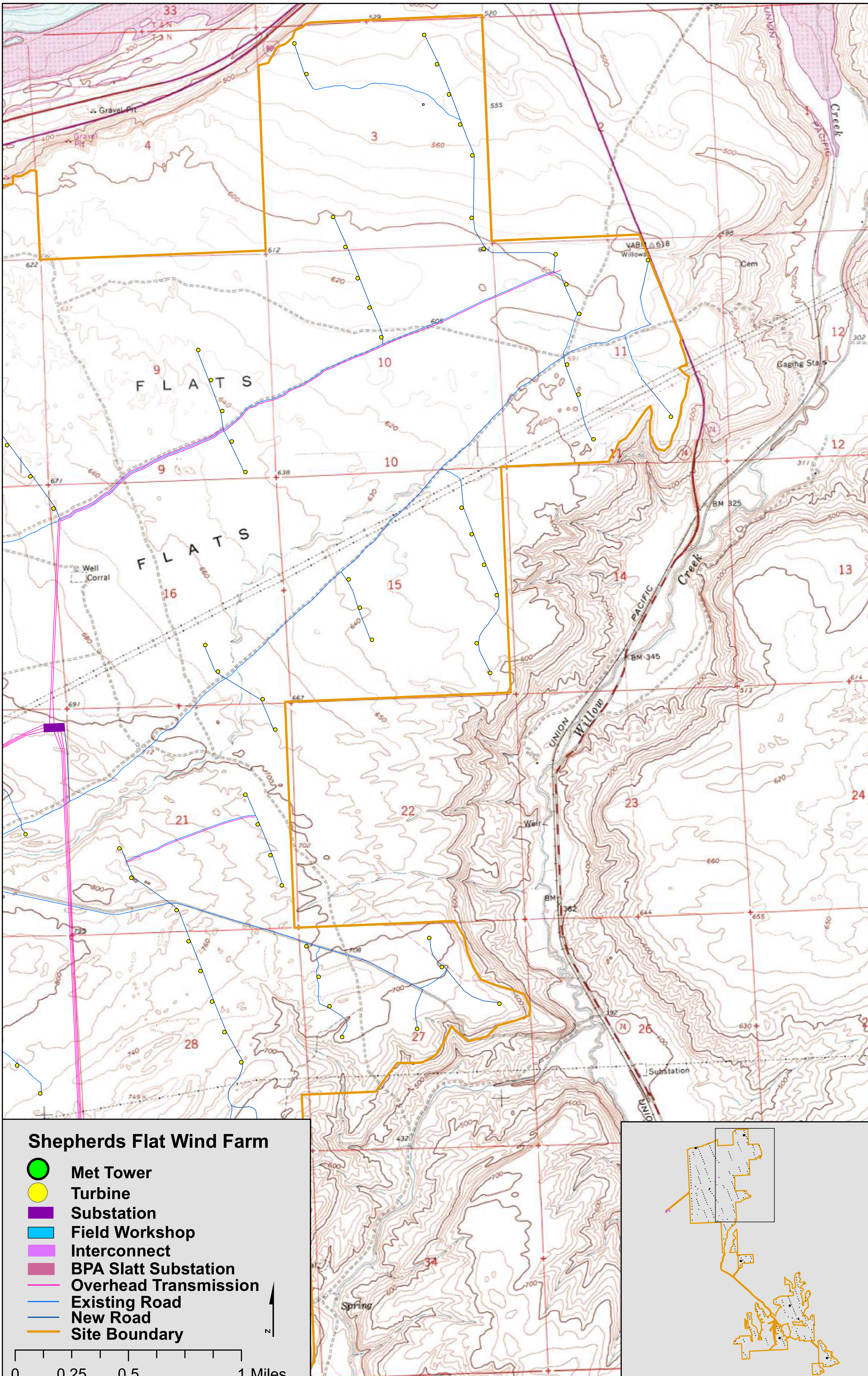

Shepherds Flat Wind Farm
Met Tower
Substation
Turbine
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
0 0.5 1 2 Miles
N
LAKE UMATILLA
KLICKITAT
GILLIAM CO
Heppner Junction
Willows
Hurlburt Flats
Sand Dunes
Dalreed Butte
Horn Butte
Canyon
Fourmile Canyon
Willow Creek
Cecil
Horseshoe Bend
Landing Strip
Gaging Station
Substation
Water Tank

Figure C-2a



Shepherds Flat Wind Farm
Met Tower
Turbine
Substation
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
0 0.25 0.5 1 Miles
N
HURLBURT FLATS
UMATILLA RIVER
WASHINGTON
OREGON
West Hurlburt Camp
Corral
JEEP TRAIL

Figure C-2b



Shepherds Flat Wind Farm
Met Tower
Turbine
Substation
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
0
0.25
0.5
1 Miles
N
FLATS
FLATS
Gravel Pit
Well
Corral
Willow Creek
UNION PACIFIC
Gaging Sta
Cem
BM 325
BM 345
Weir
Substation
Spring

Figure C-2c

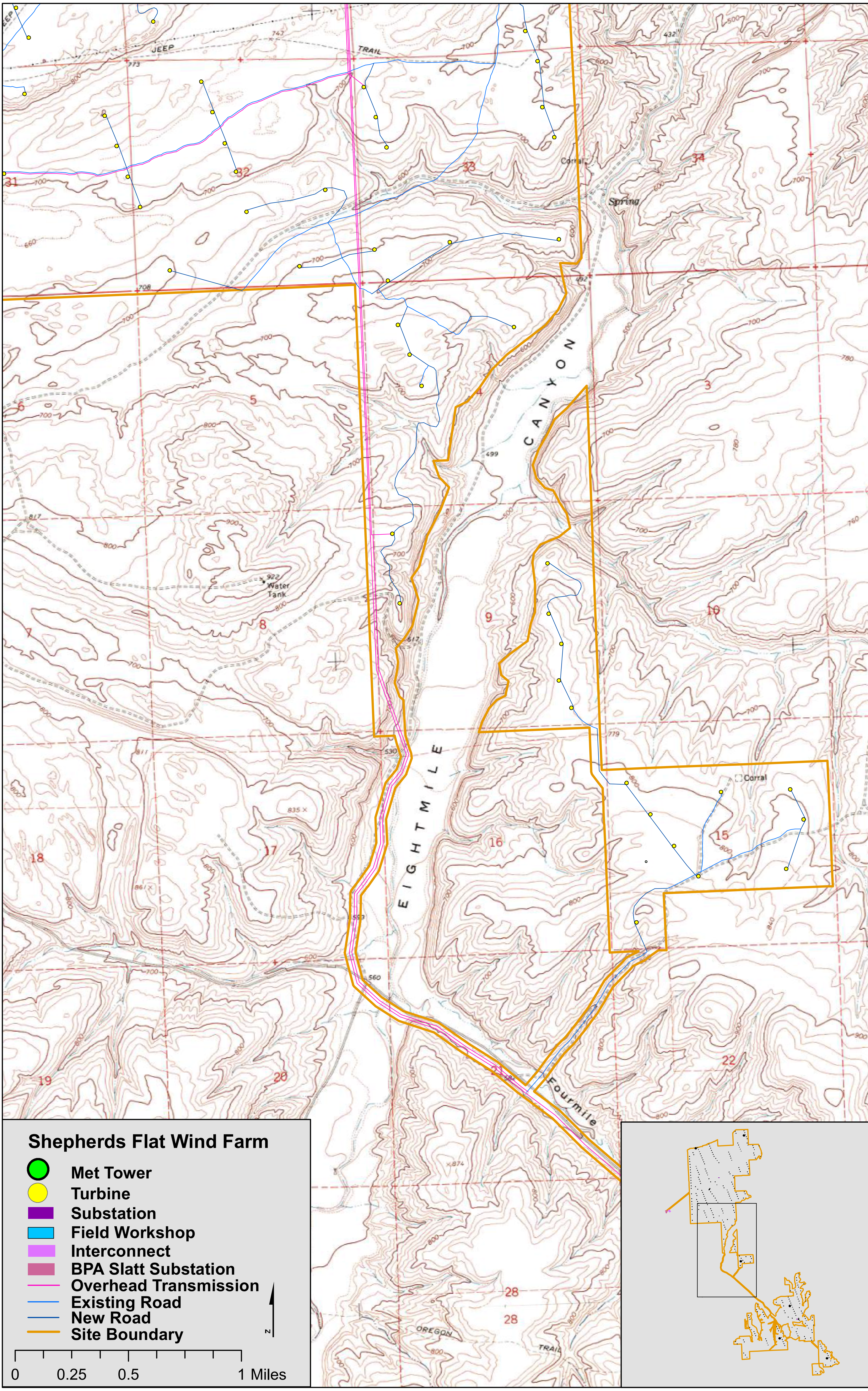

Shepherds Flat Wind Farm
Met Tower
Turbine
Substation
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
N
0
0.25
0.5
1 Miles
EIGHTMILE CANYON
Fourmile
JEEP TRAIL
Corral
Spring
Water Tank
OREGON TRAIL

Figure C-2d

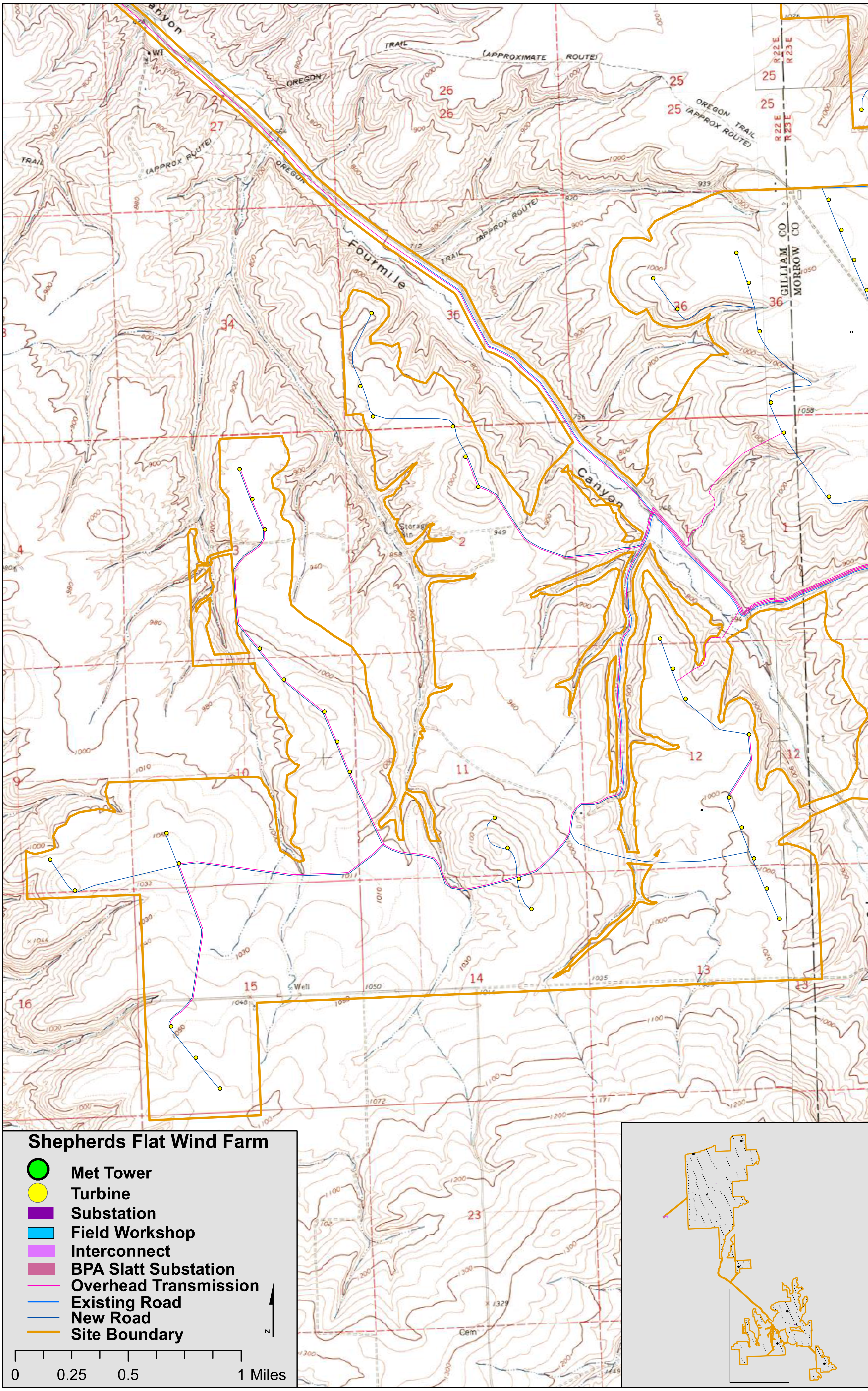

Shepherds Flat Wind Farm
Met Tower
Turbine
Substation
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
N
0
0.25
0.5
1 Miles
Fourmile
Canyon
OREGON TRAIL (APPROXIMATE ROUTE)
GILLIAM CO
MORROW CO
R 22 E
R 23 E

Figure C-2e

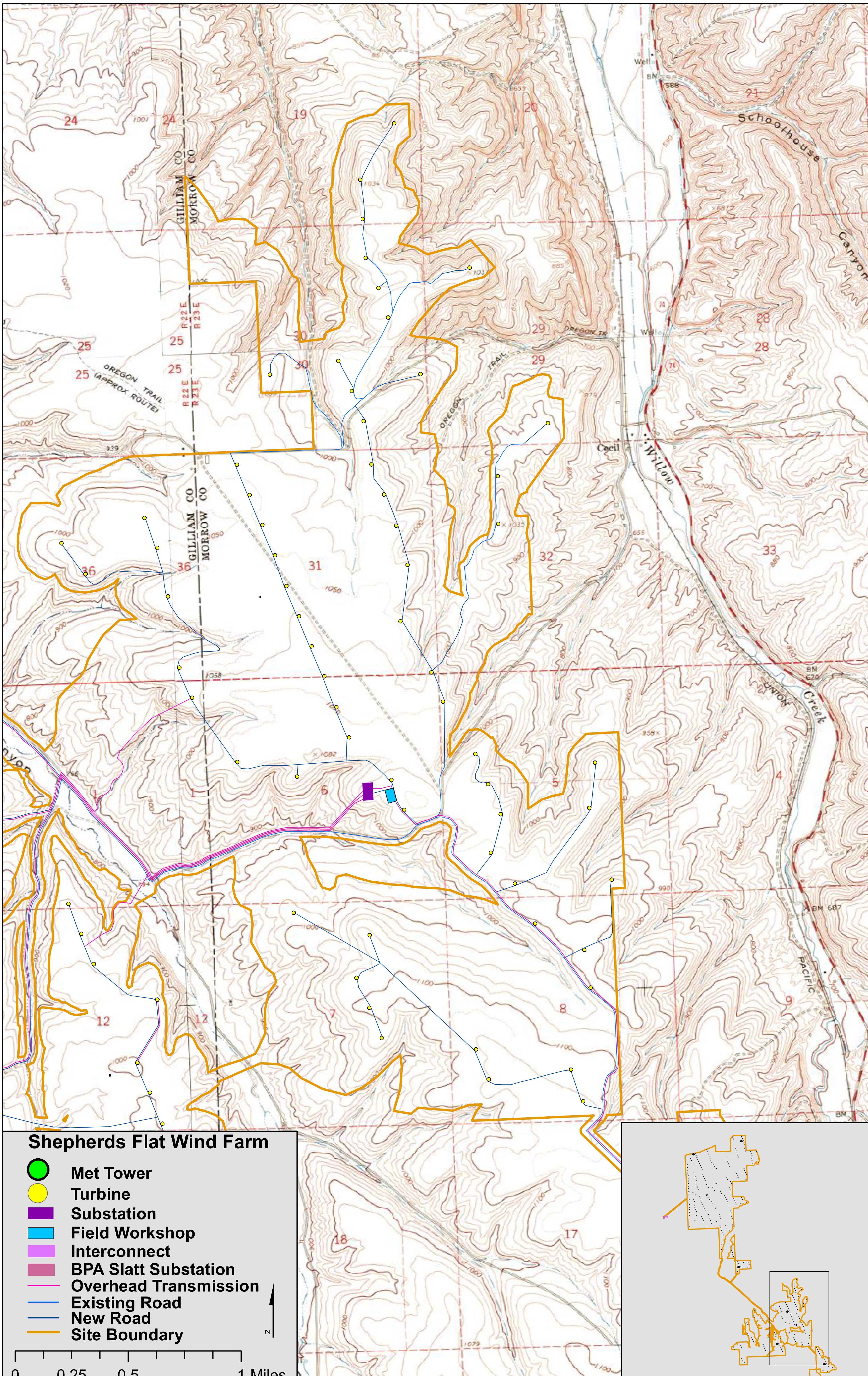
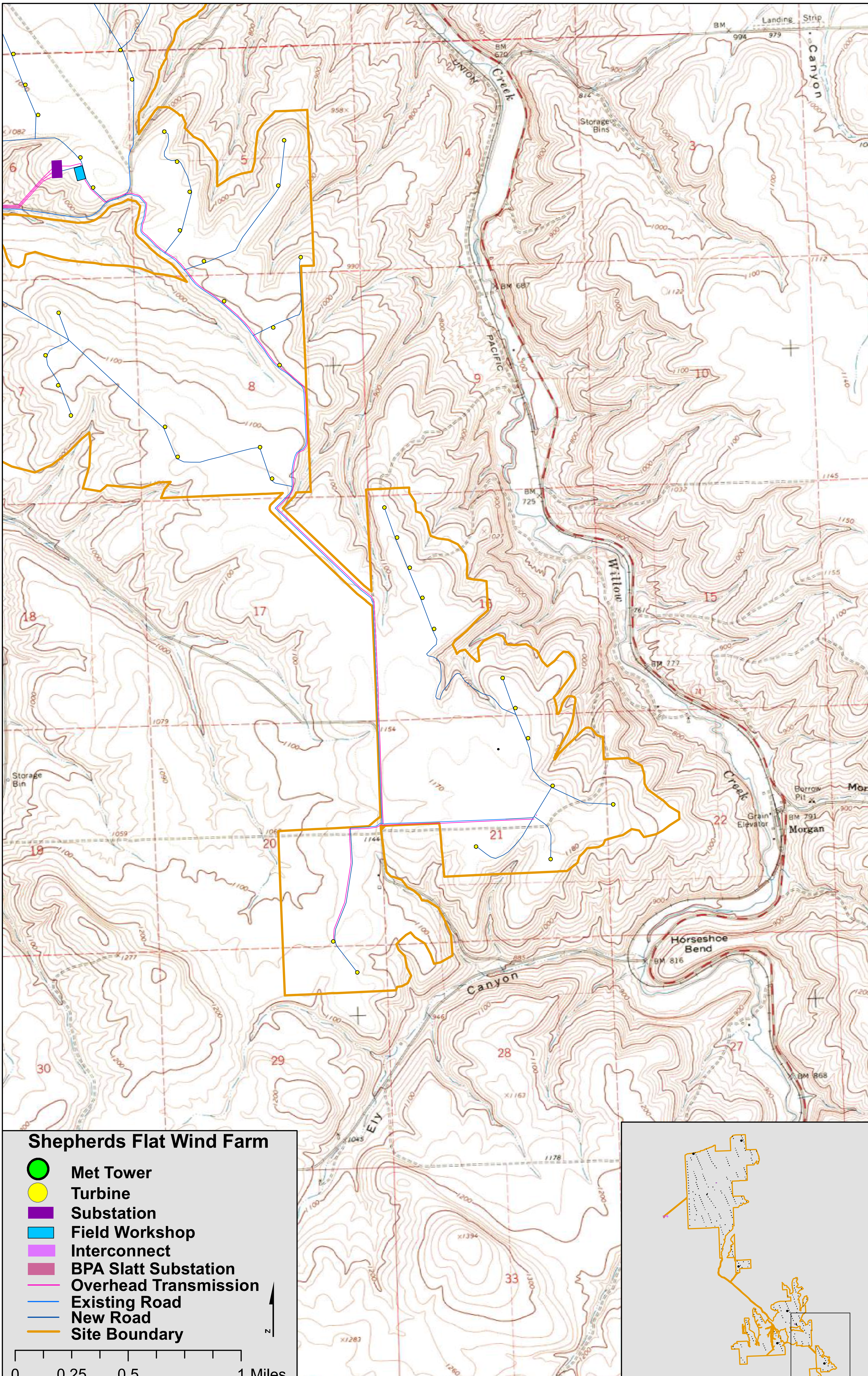

Shepherds Flat Wind Farm
Met Tower
Turbine
Substation
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
N
0
0.25
0.5
1 Miles
GILLIAM CO
MORROW CO
R 22 E
R 23 E
OREGON TRAIL (APPROX ROUTE)
OREGON TRAIL
Schoolhouse Canyon
Willow
Union Creek
Cecil
PACIFIC

Figure C-2f



Shepherds Flat Wind Farm
Met Tower
Turbine
Substation
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
0
0.25
0.5
1 Miles
Horseshoe Bend
Ely Canyon
Willow Creek
Union Pacific
Morgan
Storage Bins
Landing Strip

Figure C-3

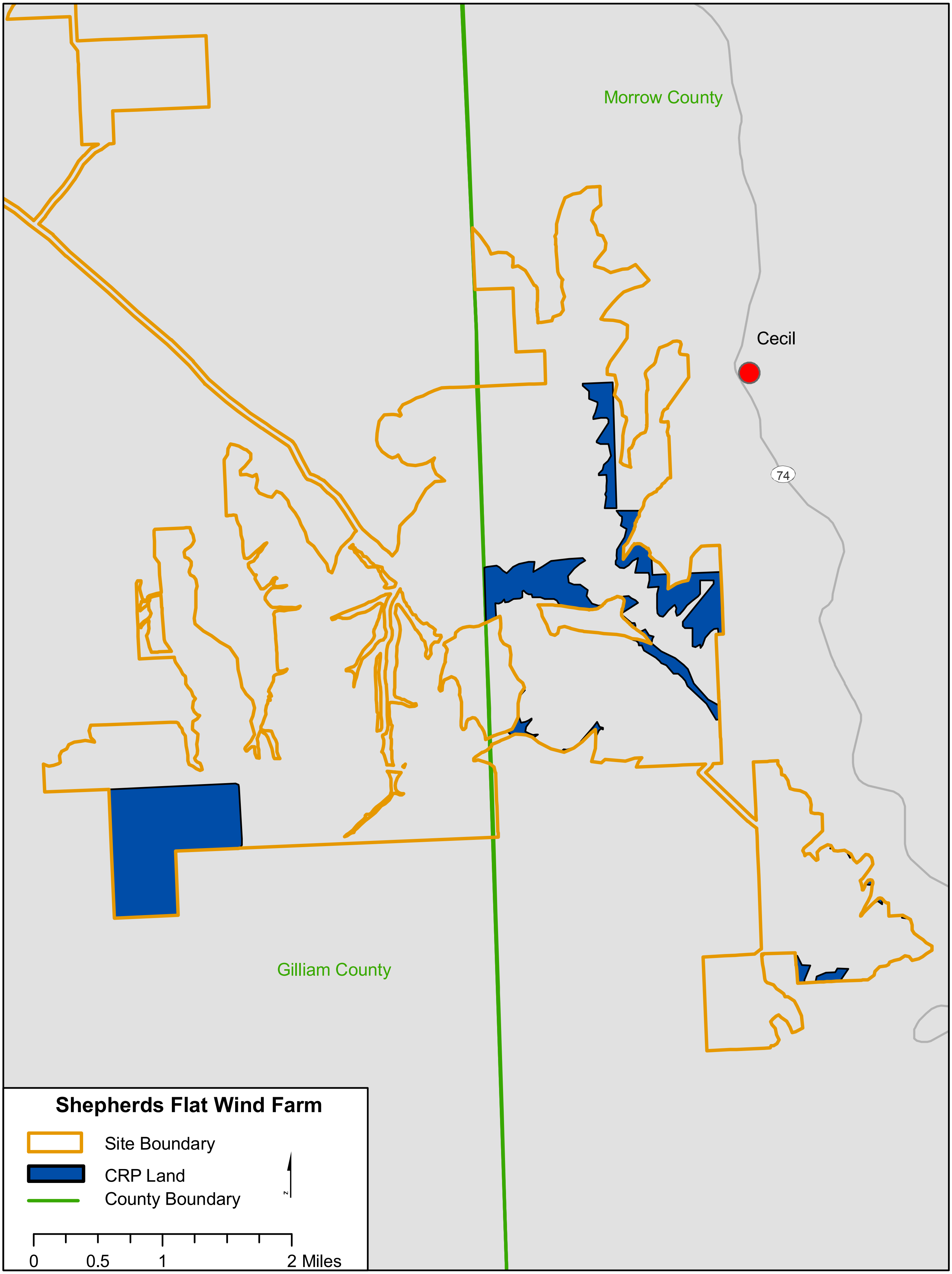
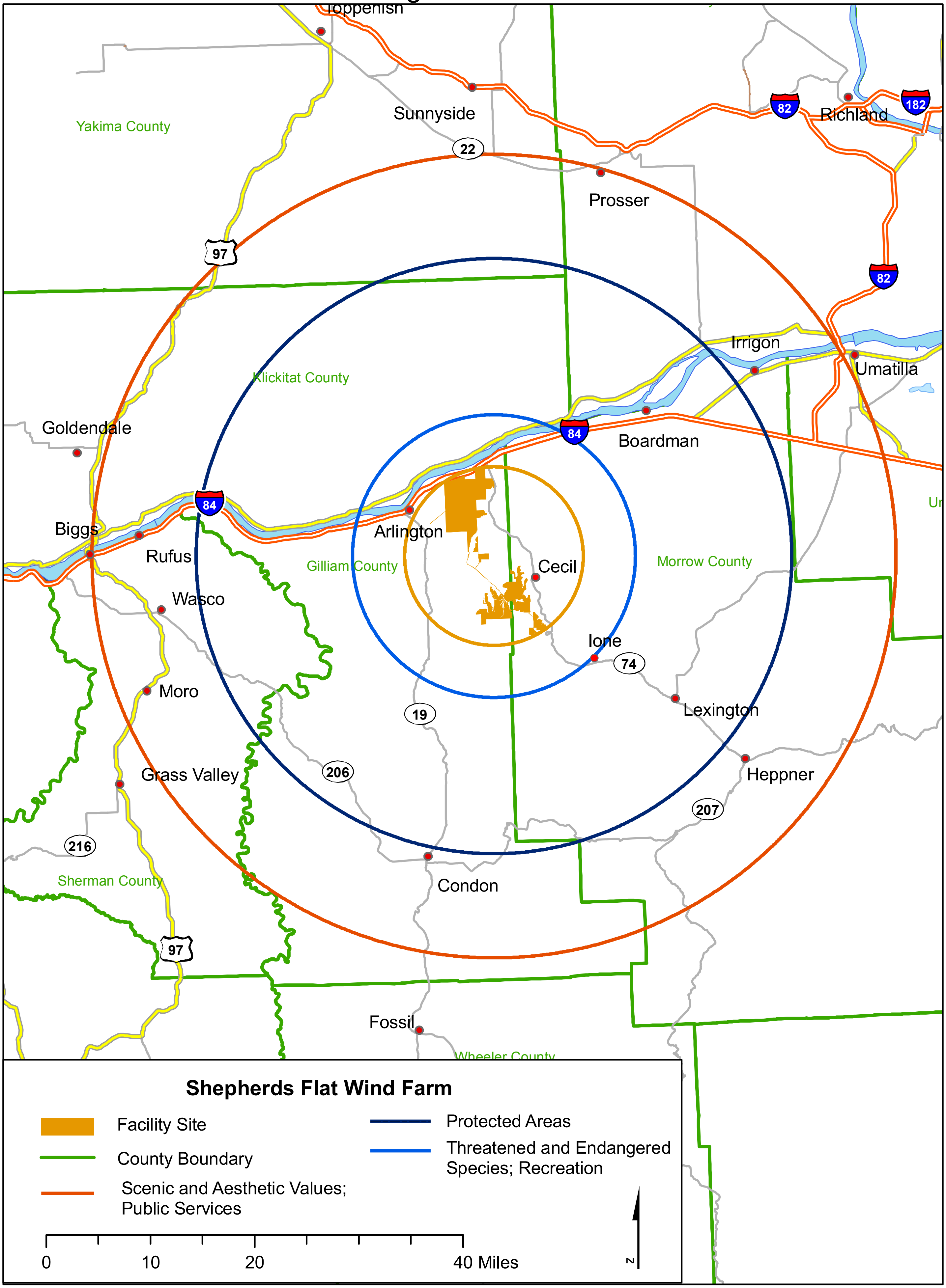

Morrow County
Cecil
74
Gilliam County
Shepherds Flat Wind Farm
Site Boundary
CRP Land
County Boundary
N
0
0.5
1
2 Miles

Figure C-4


Toppenish
Sunnyside
22
Yakima County
Richland
82
182
Prosser
97
82
Irrigon
Umatilla
Klickitat County
Goldendale
84
Boardman
Biggs
84
Arlington
Rufus
Gilliam County
Cecil
Morrow County
Wasco
Ione
74
Moro
Lexington
19
Grass Valley
206
Heppner
207
216
Condon
Sherman County
97
Fossil
Wheeler County
Shepherds Flat Wind Farm
Facility Site
County Boundary
Scenic and Aesthetic Values; Public Services
Protected Areas
Threatened and Endangered Species; Recreation
0
10
20
40 Miles
N

RAI#3, C1: LOCATION OF PROPOSED FACILITY

(Follow-Up) Revise the Permanent Facilities Footprint table, as necessary, to reflect the following (see B8 above):

1. *The area permanently affected by the field workshop (including the building, the gravel skirt and the adjacent lay-down area) in the northern project area.*

2. *The area permanently affected by the field workshop (including the building, the gravel skirt and the adjacent lay-down area) in the southern project area.*

FACILITIES FOOTPRINT

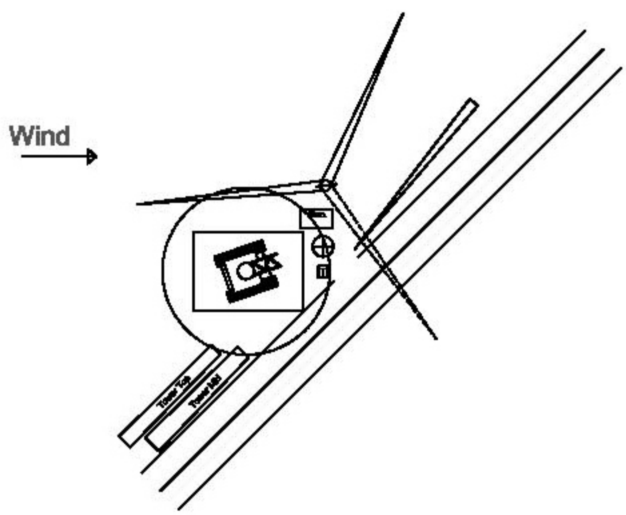
Please see Applicant's response to RAI#3, B8.

C2

RAI #1 requested the dimensions of the area at the base of each turbine that would be used for assembling and installing the turbine rotor. The table on page 3 of the March 23 revised Exhibit C shows an area of 8,837 sq ft of temporary disturbance at each turbine location. How did you estimate this area? The assembled rotor would have a diameter of up to 96 m. This would require a much larger laydown area than 8,837 sq ft.

ROTOR ASSEMBLY

Applicant's construction practices are mindful of causing the least disturbance to the site. Precise road layout and crane pad placement permits Applicant to disturb the least possible ground at the base of each turbine. Applicant's calculation of disturbance is based on the following crane pad configuration:



Areas otherwise calculated as temporarily disturbed (trenching, temporary road widening, turnouts) are not added to the temporary disturbance area at each turbine pad, but these corridors are used for laydown when delivery schedules do not allow for just-in-time-erection. The crane pad is included in the temporary disturbance calculation, although the entire pad is not scraped or leveled. The rotor and heaviest portions of the blades rest on ground that is not scraped or leveled, although that area is included in the temporary disturbance calculation. Beyond this area, ground is neither scraped nor leveled—the far ends of the rotor blades rest on bales of straw during assembly, and these area are not considered disturbed in Applicant's calculation.

RAI#3, C2: LOCATION OF PROPOSED FACILITY

(Follow-Up)

A. Please clarify the Temporary Project Facilities Footprint table and revise as necessary. We note that the areas shown for "staging and storage north" and "staging and storage south" are identical to the areas shown in the Permanent Facilities Footprint table for "field workshop north" and "field workshop south." Does this mean that the field workshops (including the adjacent permanent fenced laydown areas and water tanks) would be built within the areas used for staging and storage during construction? Or, would there be an additional 70,000 sf in the north and 61,720 sf in the south that would be used for construction laydown and staging?

[Comment: To calculate the estimated site restoration cost, we include an estimate of the area that would be disturbed (in addition to the permanent footprint area) during site restoration. After the field workshops are built, the area they occupy would be part of the permanent footprint. Therefore, we have to estimate the additional area of temporary disturbance during site restoration.]

B. What is the estimated area of temporary disturbance associated with construction of the field workshops that would not be part of the permanent footprint (and which therefore would need to be revegetated after construction)?

C. In considering previous wind project applications, the Council has considered that the entire area needed for laydown of the assembled rotor to be part of the area subject to construction disturbance. Although we appreciate your construction practice of minimizing disturbance during construction, we believe that the area of construction disturbance at the base of each tower must include an area of sufficient size to accommodate the fully-assembled rotor (with blades attached), plus room for cranes, construction equipment and workers to maneuver safely. The diagram included in your response is compact, but includes no scale or dimensions from which we can calculate the size of the area needed. Please revise the Temporary Project Facilities Footprint table to show both the area "scraped and leveled" at the base of each turbine and the area subject to "lighter" temporary disturbance, including the area occupied by the assembled rotor.

FACILITIES FOOTPRINT

A. The Exhibit C temporary impact analysis is 'gross temporary disturbance' from which the permanent footprint was subtracted to get 'net temporary disturbance' as used in Exhibit P. Exhibit C considered all disturbed areas to be workspace – such as staging and storage within the areas to be occupied by the workshops, and vehicle access in the crane tracks, turbine turnout and around turbines where rock would eventually be placed.

Applicant will revise and resubmit the Exhibit C temporary project facilities footprint table and base it on net disturbance. Applicant will also provide a separate table providing the estimated temporary disturbance impact from decommissioning. Applicant agrees that decommissioning, were it to occur, would not proceed with the care Applicant has proposed to use during facility construction.

B. The workshop border area that will be graveled provides ample room for construction access, and no further disturbance outside of the permanent footprint is anticipated. Laydown yard fencing will be constructed from within the yard, and no additional impact outside of the permanent footprint is anticipated.

C. Disturbance impacts per turbine were calculated as follows:

Numerical input

<u>Turbine assumptions</u>

Component	Clipper 2.5[1]	Vestas V90[2]
Nacelle length	20 ft	39.3 ft
Nacelle width	15 ft	11.8 ft
Hub diameter	14 ft	11 ft
Blade length	153 ft	147 ft
Blade width		7.8 ft
Tower sections	4	5

The Clipper 2.5 has a larger foundation footprint than the Vestas V90 or GE Energy turbines, but it has a relatively small nacelle. The Vestas nacelle and number of tower segments and the Clipper foundation and hub diameter were used to estimate impacts. Applicant notes that turbine manufacturers require towers to be located before installation on cradles and not directly on the ground.

<u>Other assumptions</u>

Permanent road width:	18 ft
Tower center to road centerline:	55 ft
Crane center to tower center:	65 ft
Crane tread width disturbance (each):	10 ft
Crane width to outside of treads:	35 ft
Crane length:	50 ft
Crane pad:	60 ft x 85 ft
Crane pullout from road to crane pad edge:[3]	85 ft
Turbine foundation:	17 ft diameter
Rock around turbine:	10 ft
Turbine foundation and rock:	37 ft diameter

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[1] http://www.dutchhillwind.com/PDFs/DEIS/Dutch%20Hill%20Final%20DEIS%20.pdf and http://www.clipperwind.com/techspecs.html

[2] http://www.maine.gov/doc/lurc/projects/redington/Documents/Section01_Development_Description/Development_Roads/Transport_Manual_V90.pdf

[3] Assumes crane pad is on side of turbine furthest from road.

Transformer pad:	8 ft x 8 ft
Rock around transformer:	3 ft
Transformer pad to turbine foundation:	7 ft
Transformer extension beyond turbine rock:	5 ft
Transformer extension and rock:	8 ft x 14 ft
Turbine rock edge to closest road edge:	27.5 ft
Turbine turnout:	27.5 ft x 18 ft
Hay bale	5 sq ft
Blade length on ground (approx. half):	75 ft
Blade width on ground (avg. over length):	3 ft
Tower cradle	15 ft x 5 ft

Permanent disturbance

Turnout	27.5 ft × 18 ft = 495 sq ft
Turbine and rock	$\pi \times (37.5 / 2)^2$ = 1,075 sq ft
Transformer and rock	8 ft × 14 ft = 112
Turbine and transformer	1075 sq ft + 112 sq ft = 1,187 sq ft

Temporary disturbance, maximum

Clipper hub	$\pi \times (14 \div 2)^2$ = 154 sq ft
Blades	3 blades × 75 ft x 3 ft = 675 sq ft
Hay bales	3 bales × 5 sq ft = 15 sq ft
Crane (full pad scraped)	85 ft × 60 ft = 5,100 sq ft
Crane pullout to pad	85 ft × 2 treads × 10 ft per tread = 1,700 sq ft
Total	**7,644 sq ft (round to 7,650 sq ft)**

Temporary disturbance, typical (somewhat rocky or uneven sites)

Clipper hub	$\pi \times (14 \div 2)^2$ = 154 sq ft
Blades	3 blades × 75 ft x 3 ft = 675 sq ft
Hay bales	3 bales × 5 sq ft = 15 sq ft
Crane (crane site scraped)	35 ft × 50 ft = 1,750 sq ft
Crane pullout to crane site	100 ft × 2 treads x 10 ft per tread = 2,000 sq ft
Total	**4594 sq ft (round to 4,600 sq ft)**

Temporary disturbance, minimum (most wheat and grassland sites)

Clipper hub	$\pi \times (14 \div 2)^2$ = 154 sq ft
Blades	3 blades × 75 ft × 3 ft = 675 sq ft
Hay bales	3 bales × 5 sq ft = 15 sq ft
Crane pullout to position	155 ft × 2 treads × 10 ft per tread = 3,100 sq ft
Total	**3,944 sq ft (round to 4,000 sq ft)**

Disturbance from untimely component delivery

Vestas nacelle	placed in turnout or on crane tread path
Blade (others placed w/hub)	75 ft × 3 ft = 225 sq ft
Hay bale	5 sq ft
Tower cradles	2 cradles per section × 5 sections × 15 ft × 5 ft = 750 sq ft
Total	**990 sq ft**

Although current SFWF maps do not include elevation contours, these are shown in Exhibit C as submitted January 31, 2007. That layout is substantially the same as the current typical layout, with only minor adjustments in some turbine locations and the relocation of five turbines. Applicant notes that there are 31 turbine sites (listed, below) in locations where slope or lack of level maneuvering room may require scraping of the entire crane pad. An additional 5 turbines are sited in an area with a large number of basalt outcrops and crane pad scraping may be required. Other than these 36 sites, no others are expected to require this level of impact.

Applicant believes it is unreasonable to base temporary disturbance on maximum impact of all sites and early delivery of all components. Maximum disturbance of all sites was presented, but disturbance from early component delivery was not added. However, if all components were delivered early, 200 turbines required maximum disturbance, and 103 required typical disturbance, facility temporary disturbance would not exceed the Exhibit C total estimated disturbance acreage.

On slopes or in constricted areas:
North project area (16)
A13, A15, A21, B1, D19, D20, D28, D29, E7, F14, F15, F25, G1, G2, G3, H22

South project area (15)
1A, 3D, 4E, 4F, 4G, 4H, 41, 4J, 8A, 8X, 9S, 10F, 10G, 10H, 10K

North turbines in rocky areas (5)
F1, F2, F3, D1, D2

C9

Describe the permanent and temporary disturbance attributable to the interconnection point adjacent to the BPA Slatt Switching Station. What project facilities would be built at this location?

INTERCONNECT FACILITY DISTURBANCE

The Shepherds Flat Wind Farm interconnect facility will be designed, constructed, owned and maintained by the Bonneville Power Administration (BPA) and will be sited on BPA-owned land. Applicant has requested that BPA provide a description of the area to be affected and the facilities to be installed at the interconnection point but is not yet in receipt of this information. BPA is conducting its own NEPA study with respect to any environmental impact related to the interconnect facility, and BPA's NEPA Record of Decision is expected to be released after the SFWF receives its site certificate.

Applicant believes that the interconnect facility is not a related or supporting facility as defined in OAR 345-001-0010, but that it will be a shared facility, and is classified by BPA as a system upgrade. Applicant has requested verification of this classification from BPA so that the Council may make this determination.

Applicant's proposed transmission line from the facility to the interconnect facility is a SFWF supporting facility, and areas of permanent and temporary disturbance associated with the proposed transmission line are included in Applicants tables, maps and calculations.

RAI#3, C10: LOCATION OF PROPOSED FACILITY

Please confirm that CSF has entered into effective wind leases with the landowners throughout the northern and southern project areas.

WIND LEASES

Recorded wind leases are in effect with the landowners throughout the northern and southern project areas.

RAI#3, C11: LOCATION OF PROPOSED FACILITY

Please provide a written description of the location of the area within the site boundary (see definition in OAR 345-001-0010(53)). This should be written in the format that you would use to comply with the mandatory condition described in OAR 345-027-0020(2), which requires the certificate holder to submit a "legal description." Your response to this RAI should be a preliminary legal description that supplements and cross-references a project map (or maps) and describes in writing the site boundary shown on the referenced map (or maps).

LEGAL DESCRIPTION

Clockwise starting NW corner. Latitude and Longitude:NAD 1983; State Plane Oregon North FIPS 3601 (feet).

Map Reference (See Figures RAI#3 C11a and RAI#3 C11b).

A	From		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 7 Latitude 45°45'36.676"N Longitude 120°7'24.359"W
	Northeast to		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 7 Latitude 45°45'43.714"N Longitude 120°6'35.824"W
	Northeast to		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 5 Latitude 45°45'47.888"N Longitude 120°5'53.477"W
	Northeast to		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 5 Latitude 45°45'55.475"N Longitude 120°5'41.374"W
B	Northeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section line 5/4 Latitude 45°46'5.805"N Longitude 120°4'56.039"W
	South to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 5 Southeast corner
	East to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 3 Southwest corner
	North to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°46'27.948"N Longitude 120°3'41.509"W

	Northeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°46’38.988”N Longitude 120°3’23.787”W
C	East to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 3 Northeast corner
	South to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 3 Southeast corner
	East to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°45’47.588”N Longitude 120°1’37.81”W That portion lying West of right-of-way of State Highway 74
	Southeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°45’29.624”N Longitude 120°1’28.553”W
D	Southeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°45’26.327”N Longitude 120°1’27.112”W
	Southeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°45’24.266”N Longitude 120°1’26.248”W
	South to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°45’3.046”N Longitude 120°1’27.895”W
	Southwest to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°44’57.909”N Longitude 120°1’34.108”W
	Northeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°45’9.639”N Longitude 120°1’35.479”W
E	Southwest to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°44’55.274”N Longitude 120°1’53.947”W
	West to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 15 Northeast corner
	South to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 15 Southeast corner

	West to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 15 Southwest corner
	South to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 21 Southeast corner
F	East to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 27 Latitude 45°43’10.913”N Longitude 120°2’47.081”W
	Southeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 27 Latitude 45°42’56.489”N Longitude 120°2’40.433”W
	Southeast to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 27 Latitude 45°42’52.931”N Longitude 120°2’25.203”W
	Southwest to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 27 Latitude 45°42’47.185”N Longitude 120°2’28.48” W
	West to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 27 Latitude 45°42’46.651”N Longitude 120°2’49.624”W
G	Southwest to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 27 Latitude 45°42’31.82”N Longitude 120°3’37.305”W
	South to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 33 Latitude 45°41’30.52”N Longitude 120°3’36.314”W
	Southwest to		Township 3 North Range 22 East, W.M. (Gilliam County) Section 33 Latitude 45°41’29.321”N Longitude 120°3’45.422”W
	South to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 4 Latitude 45°41’18.218”N Longitude 120°3’46.682”W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 4 Latitude 45°40’59.012”N Longitude 120°4’21.165”W
H	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 4 Latitude 45°40’43.627”N Longitude 120°4’32.431”W

	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°40’18.143”N Longitude 120°4’38.49”W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°40’7.248”N Longitude 120°4’40.332”W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°40’1.914”N Longitude 120°4’44.186”W
	South to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°39’54.102”N Longitude 120°4’45.417”W
I	Southeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°39’41.954”N Longitude 120°4’41.987”W
	Southeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’39.598”N Longitude 120°4’41.546”W
	Southeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’39.196”N Longitude 120°4’41.158”W
	Southeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’37.418”N Longitude 120°4’40.568”W
	South to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’36.319”N Longitude 120°4’40.335”W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’32.776”N Longitude 120°4’42.29”W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’29.494”N Longitude 120°4’46.171”W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’22.407”N Longitude 120°4’49.478”W

	South to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39'16.913"N Longitude 120°4'49.398"W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39'10.754"N Longitude 120°4'52.457"W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39'7.049"N Longitude 120°4'56.341"W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39'5.03"N Longitude 120°4'58.886"W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°38'59.424"N Longitude 120°4'59.189"W
	Southwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°38'52.107"N Longitude 120°5'1.15"W
J	Southeast along		East side of Four Mile Road, 125' from centerline Township 2 North Range 22 East, W.M. (Gilliam County) Section 20
	Southeast along		East side of Four Mile Road, 125' from centerline Township 2 North Range 22 East, W.M. (Gilliam County) Section 21
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 21 Latitude 45°38'30.89"N Longitude 120°3'53.189"W
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 21 Latitude 45°38'37.649"N Longitude 120°3'45.513"W
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 21 Latitude 45°38'43.182"N Longitude 120°3'40.191"W
K	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 22 Latitude 45°38'45.637"N Longitude 120°3'36.653"W
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 22 Latitude 45°38'48.706"N Longitude 120°3'32.23"W

	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°38’50.13”N Longitude 120°3’28.113”W
	West to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 15 Southwest corner
	North to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°39’27.729”N Longitude 120°3’38.441”W
	Northwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’31.854”N Longitude 120°3’41.342”W
	North to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’41.935”N Longitude 120°3’41.851”W
	West to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’42.24”N Longitude 120°4’8.25”W
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°40’9.148” Longitude 120°3’58.07”
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°40’21.692”N Longitude 120°3’57.094”W
L	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°40’28.025”N Longitude 120°3’45.602”W
	Northwest to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 4 Latitude 45°40’50.467”N Longitude 120°3’51.297”W
	Northeast to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 4 Latitude 45°41’0.498”N Longitude 120°3’38.601”W
	South		Township 2 North Range 21 East, W.M. (Gilliam County) Section 15 Latitude 45°39’32.045”N Longitude 120°3’37.527”W

	East to		Township 2 North Range 21 East, W.M. (Gilliam County) Section 15 Latitude 45°39'32.376"N Longitude 120°2'24.191"W
M	South to		Township 2 North Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°39'3.163"N Longitude 120°2'23.255"W
	West to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°39'3.177"N Longitude 120°3'19.274"W
	South to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°38'50.219"N Longitude 120°3'19.132"W
	West to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°38'50.026"N Longitude 120°3'22.066"W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 22 Latitude 45°38'46.599"N Longitude 120°3'29.9"W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 22 Latitude 45°38'41.896"N Longitude 120°3'37.268"W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 21 Latitude 45°38'35.746"N Longitude 120°3'42.888"W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 21 Latitude 45°38'29.4"N Longitude 120°3'50.855"W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 21 Latitude 45°38'27.354"N Longitude 120°3'53.803"W
N	Southeast along		East side of Four Mile Road, 125' from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 21
	Southeast along		East side of Four Mile Road, 125' from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 27
	Southeast along		East side of Four Mile Road, 125' from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35

	Southeast along		East side of Four Mile Road, 125' from centerline Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°36'25.886"N Longitude 120°0'14.408"W
	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°36'38.259"N Longitude 120°0'21.627"W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°36'35.426"N Longitude 120°0'32.496"W
O	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°36'43.731"W Longitude 120°0'50.596"N
	North to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°36'55.661"N Longitude 120°0'50.494"W
	East to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°36'55.619"N Longitude 120°0'40.528"W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 36 Latitude 45°37'6.415"N Longitude 120°0'15.813"W
	East to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 31 Latitude 45°37'6.358"N Longitude 119°59'15.722"W
	North to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'19.729"N Longitude 119°59'15.894"W
P	West to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'20.006"N Longitude 119°59'32.015"W
	North to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'45.926"N Longitude 119°59'32.369"W

	West to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'45.819"N Longitude 119°59'54.945"W
	North to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'4.334"N Longitude 119°59'55.368"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'50.21"N Longitude 119°59'24.415"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'31.673"N Longitude 119°59'19.011"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'32.423"N Longitude 119°59'2.587"W
Q	Northwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 31 Latitude 45°37'58.556"N Longitude 119°59'4.695"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'19.1"N Longitude 119°58'58.937"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'25.429"N Longitude 119°58'47.785"W
	East to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'25.599"N Longitude 119°58'40.403"W
	South to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'22.103"N Longitude 119°58'40.729"W
	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'13.702"N Longitude 119°58'47.843"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 19 Latitude 45°38'1.732"N Longitude 119°58'39.157"W

R	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'53.539"N Longitude 119°58'46.856"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'49.795"N Longitude 119°58'37.801"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'51.564"N Longitude 119°58'19.607"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'46.807"N Longitude 119°58'14.081"W
	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'44.768"N Longitude 119°58'17.911"W
	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'42.351"N Longitude 119°58'29.074"W
	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'32.34"N Longitude 119°58'44.118"W
S	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'24.04"N Longitude 119°58'28.364"W
	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 30 Latitude 45°37'10.939"N Longitude 119°58'42.263"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'33.058"N Longitude 119°58'35.285"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'31.383"N Longitude 119°58'28.852"W
	North to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'36.94"N Longitude 119°58'29.387"W

	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'42.683"N Longitude 119°58'25.817"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'45.123"N Longitude 119°58'19.639"W
T	Northwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'47.175"N Longitude 119°58'18.448"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°37'2.803"N Longitude 119°58'17.423"W
	North to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'9.594"N Longitude 119°58'17.946"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'13.268"N Longitude 119°58'11.755"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'19.633"N Longitude 119°58'9.351"W
	Northeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'21.222"N Longitude 119°57'57.024"W
	South to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'17.523"N Longitude 119°57'57.938"W
	Southeast to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'15.858"N Longitude 119°57'53.556"W
	South to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°37'7.217"N Longitude 119°57'53.345"W
	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36'53.513"N Longitude 119°58'10.182"W

	Southwest to		Township 2 North, Range 23 East, W.M. (Morrow County) Section 32 Latitude 45°36’28.025”N Longitude 119°58’14.23”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’59.528”N Longitude 119°58’35.008”W
U	South to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’54.591”N Longitude 119°58’35.054”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°36’0.524”N Longitude 119°58’27.966”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°36’0.091”N Longitude 119°58’23.282”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’55.551”N Longitude 119°58’20.101”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45° 35’41.927”N Longitude 119°58’9.679”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’45.165”N Longitude 119°57’58.221”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’54.206”N Longitude 119°57’55.842”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’58.909”N Longitude 119°57’49.887”W
	East to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’58.654”N Longitude 119°57’39.34”W
	South to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’22.449”N Longitude 119°57’39.098”W

	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35’22.675”N Longitude 119°57’43.491”W
V	South to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 8 Latitude 45°34’30.424”N Longitude 119°57’42.815”W
	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 8 Latitude 45°34’30.651”N Longitude 119°57’47.499”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.178”N Longitude 119°57’52.511”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’8.542”N Longitude 119°57’26.329”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’6.885”N Longitude 119°57’24.001”N
	North to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Northeast corner
	East to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°34’30.711”N Longitude 119°57’16.451”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°34’1.769”N Longitude 119°56’46.271”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°33’53.408”N Longitude 119°57’1.581”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°33’49.858”N Longitude 119°56’50.487”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°33’53.718”N Longitude 119°56’40.785”W

W	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°33’45.198”N Longitude 119°56’22.713”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°33’40.893”N Longitude 119°56’25.683”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’26.089”N Longitude 119°56’27.001”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’29.558”N Longitude 119°56’21.403”W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 22 Latitude 45°33’21.234”N Longitude 119°56’1.867”W
	South to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 22 Latitude 45°33’13.209”N Longitude 119°56’1.362”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’9.142”N Longitude 119°56’10.771”W
X	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’1.197”N Longitude 119°56’26.66”W
	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’0.762”N Longitude 119°57’4.433”W
	North to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’12.834”N Longitude 119°57’4.975”W
	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’12.916”N Longitude 119°57’22.249”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’12.105”N Longitude 119°57’24.599”W

	South to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'9.973"N Longitude 119°57'23.695"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'8.495"N Longitude 119°57'23.435"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'6.76"N Longitude 119°57'23.36"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'5.603"N Longitude 119°57'23.097"W
Y	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'2.84"N Longitude 119°57'22.667"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'2.198"N Longitude 119°57'22.581"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'1.81"N Longitude 119°57'22.128"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'1.228"N Longitude 119°57'21.22"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'0.967"N Longitude 119°57'20.308"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33'0.185"N Longitude 119°57'17.848"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°32'51.946"N Longitude 119°57'10.666"W
Z	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°32'46.234"N Longitude 119°57'20.675"W

	South to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 28 Latitude 45°32’34.716”N Longitude 119°57’21.078”W
	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 29 Latitude 45°32’34.476”N Longitude 119°57’57.673”W
	North to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 20 Latitude 45°33’12.943”N Longitude 119°57’57.603”N
	East to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 20 Latitude 45°33’12.804”N Longitude 119°57’28.033”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 21 Latitude 45°33’15.253”N Longitude 119°57’23.91”W
	North to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 16 Latitude 45°34’3.596”N Longitude 119°57’24.326”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’4.871”N Longitude 119°57’25.937”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’5.392”N Longitude 119°57’26.815”W
AA	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’6.643”N Longitude 119°57’28.937”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’9.389”N Longitude 119°57’33.35”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’26.107”N Longitude 119°57’55.908”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’26.369”N Longitude 119°57’56.2”W

	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’26.534”N Longitude 119°57’56.299”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’26.712”N Longitude 119°57’56.364”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’26.888”N Longitude 119°57’56.413”W
	North to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’26.965”N Longitude 119°57’56.404”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.065”N Longitude 119°57’56.411”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.236”N Longitude 119°57’56.368”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.418”N Longitude 119°57’56.299”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.577”N Longitude 119°57’56.189”W
AB	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.723”N Longitude 119°57’56.045”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.864”N Longitude 119°57’55.867”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 17 Latitude 45°34’27.881”N Longitude 119°57’55.833”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 8 Latitude 45°34’30.667”N Longitude 119°57’52.481”W

	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 8 Latitude 45°34’30.423”N Longitude 119°58’28.803”W
	North to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 8 Latitude 45°34’33.918”N Longitude 119°58’28.478”W
	West to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°34’33.81”N Longitude 119°58’49.861”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°34’48.429”N Longitude 119°58’52.95”W
AC	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°34’41.48”N Longitude 119°59’2.973”W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°34’51.433”N Longitude 119°59’20.751”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°34’41.915”N Longitude 119°59’54.816”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34’36.028”N Longitude 120°0’6.547”N
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Southeast corner
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13 Latitude 45°34’3.88”N Longitude 119°59’52.772”W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°34’3.414”N Longitude 120°2’58.745”W
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°33’37.496”N Longitude 120°2’58.951”W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 15 Southwest corner

AD	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 15 Latitude 45°34’4.175”N Longitude 120°3’35.933”W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 15 Northwest corner
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°34’29.204”N Longitude 120°4’12.644”W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°34’38.461”N Longitude 120°4’12.867”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°34’40.689”N Longitude 120°4’3.477”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°34’48.633”N Longitude 120°3’42.911”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 9 Latitude 45°34’55.402”N Longitude 120°3’37.879”W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°34’55.656”N Longitude 120°2’57.159”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°34’38.14”N Longitude 120°2’49.096”W
AE	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°34’35.035”N Longitude 120°2’44.142”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°34’35.847”N Longitude 120°2’41.499”W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°34’57.447”N Longitude 120°2’41.911”W

	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°35'5.678"N Longitude 120°2'42.724"W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°35'21.771"N Longitude 120°2'54.9"W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 10 Latitude 45°35'21.44"N Longitude 120°3'15.411"W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'51.885"N Longitude 120°3'15.755"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'50.438"N Longitude 120°3'14.011"W
AF	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'44.643"N Longitude 120°3'12.543"W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'43.306"N Longitude 120°3'14.056"W
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'41.002"N Longitude 120°3'13.801"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'43.426"N Longitude 120°3'9.232"W
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'38.281"N Longitude 120°3'9.272"W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'35.708"N Longitude 120°3'13.933"W
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'33.893"N Longitude 120°3'13.803"W

	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'35.55"N Longitude 120°3'12.068"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'23.893"N Longitude 120°3'8.355"W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'24.001"N Longitude 120°2'57.084"W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'28.046"N Longitude 120°3'0.569"W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°36'0.059"N Longitude 120°3'2.068"W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°36'2.331"N Longitude 120°3'4.394"W
AG	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°36'13.642"N Longitude 120°3'3.718"W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°36'13.777"N Longitude 120°2'45.841"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°36'8.618"N Longitude 120°2'41.487"W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°36'3.711"N Longitude 120°2'49.145"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 3 Latitude 45°35'34.892"N Longitude 120°2'43.809"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°35'8.456"N Longitude 120°2'17.068"W

	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°34'42.949"N Longitude 120°2'16.983"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°34'38.596"N Longitude 120°2'8.817"W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°34'47.643"N Longitude 120°2'7.864"W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°34'47.832"N Longitude 120°2'3.762"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°34'38.977"N Longitude 120°2'1.198"W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°34'39.165"N Longitude 120°1'56.803"W
AH	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°35'40.402"N Longitude 120°1'41.648"W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°36'6.393"N Longitude 120°1'59.6"W
	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36'17.982"N Longitude 120°2'16.795"W
	West to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36'18.416"N Longitude 120°2'22.653"W
	North to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36'27.879"N Longitude 120°2'22.869"W
	North to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36'39.193"N Longitude 120°2'22.777"W

	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36’46.16”N Longitude 120°2’16.272”W
	Southeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36’42.627”N Longitude 120°2’7.215”W
	Southwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36’32.174”N Longitude 120°2’16.679”W
	Southeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35 Latitude 45°36’22.821”N Longitude 120°1’52.724”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°35’52.256”N Longitude 120°1’23.089”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°36’4.771”N Longitude 120°1’15.365”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°36’9.677”N Longitude 120°1’7.997”W
AI	Northwest along		West side of Four Mile Road, 125’ from centerline Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2
	Northwest along		West side of Four Mile Road, 125’ from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 35
	Northwest along		West side of Four Mile Road, 125’ from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 27
	Northwest along		West side of Four Mile Road, 125’ from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 21
	Northwest along		West side of Four Mile Road, 125’ from centerline Township 2 North, Range 22 East, W.M. (Gilliam County) Section 20
	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°38’52.292”N Longitude 120°5’5.02”W

	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°38’59.894”N Longitude 120°5’2.618”W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39’5.858”N Longitude 120°5’2.28”W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39’8.726”N Longitude 120°4’59.033”W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39’11.8”N Longitude 120°4’55.784”W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39’17.55”N Longitude 120°”4’53.102”W
	North to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 17 Latitude 45°39’22.898”N Longitude 120°4’53.062”W
AJ	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’30.701”N Longitude 120°4’49.485”W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’33.977”N Longitude 120°4’45.354”W
	Northeast to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’36.684”N Longitude 120°4’43.865”W
	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’36.852”N Longitude 120°4’43.866”W
	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’38.933”N Longitude 120°4’44.749”W
	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’39.882”N Longitude 120°4’45.042”W

	Northwest to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 16 Latitude 45°39’41.603”N Longitude 120°4’45.68”W
	West to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 9 Southwest corner
	North to		Township 2 North, Range 22 East, W.M. (Gilliam County) Section 4 Northwest corner
AK	West to		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 31 Southwest corner
	North to		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 30 Northwest corner
	Southwest to		that point 125’ south of existing BPA easement Township 3 North, Range 21 East, W.M. (Gilliam County) Section 25
	Southwest along		125’ south of existing BPA easement Township 3 North, Range 21 East, W.M. (Gilliam County) Section 35
	Northwest to		the southern edge of BPA easement Township 3 North, Range 21 East, W.M. (Gilliam County) Section 35
AL	Northeast to		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 19 Latitude 45°43’12.413”N Longitude 120°7’22.04”W
	North to the point of beginning		Township 3 North, Range 22 East, W.M. (Gilliam County) Section 7 Latitude 45°45’36.676”N Longitude 120°7’24.359”W

Omitting

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°36’3.451”N Longitude 120°1’12.353”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°36’6.514”N Longitude 120°1’7.052”W
AM	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’48.53”N Longitude 120°0’46.107”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’46.891”N

			Longitude 120°0’47.587”W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’46.09”N Longitude 120°0’52.868”W
	Northwest to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°36’3.451”N Longitude 120°1’12.353”W

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°35’34.907”N Longitude 120°1’24.021”W
AN	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’44.033”N Longitude 120°0’52.885”W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’44.02”N Longitude 120°0’49.662”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’35.398”N Longitude 120°0’53.838”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’26.752”N Longitude 120°0’52.154”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’17.552”N Longitude 120°1’5.71”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°35’7.091”N Longitude 120°1’12.829”W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 11 Latitude 45°35’13.898”N Longitude 120°1’17.749”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.87”N Longitude 120°1’0.038”W
	Northwest to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 2 Latitude 45°35’34.907”N Longitude 120°1’24.021”W

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’45.642”N Longitude 120°0’44.081”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’26.411”N Longitude 120°0’20.515”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’26.411”N Longitude 120°0’20.515”W
AO	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’23.954”N Longitude 120°0’23.173”W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’23.758”N Longitude 120°0’25.519”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’22.532”N Longitude 120°0’27.287”W
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’19.449”N Longitude 120°0’27.9”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’17.4”N Longitude 120°0’29.675”W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.395”N Longitude 120°0’44.807”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’3.29”N Longitude 120°0’49.425”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34’59.33”N Longitude 120°0’37.156”W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34’57.889”N Longitude 120°0’36.875”W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County)

			Section 12 Latitude 45°34'58.565"N Longitude 120°0'50.931"W
	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'34.912"N Longitude 120°0'51.426"W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'35.134"N Longitude 120°0'55.232"W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'40.494"N Longitude 120°0'58.115"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'43.574"N Longitude 120°0'56.918"W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'47.278"N Longitude 120°0'57.179"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'48.504"N Longitude 120°0'55.118"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35'4.543"N Longitude 120°0'53.809"W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35'9.896"N Longitude 120°0'54.935"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35'24.08"N Longitude 120°0'52.763"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35'25.305"N Longitude 120°0'50.702"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35'28.592"N Longitude 120°0'49.502"W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35'31.064"N

			Longitude 120°0’50.359”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’37.44”N Longitude 120°0’50.305”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’39.7”N Longitude 120°0’49.699”W
	Northeast to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’45.642”N Longitude 120°0’44.081”W

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’23.104”N Longitude 120°0’20.692”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’25.555”N Longitude 120°0’13.227”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’27.383”N Longitude 120°0’12.838”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’28.679”N Longitude 120°0’10.594”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.455”N Longitude 120°0’8.726”W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.447”N Longitude 120°0’6.679”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.83”N Longitude 120°0’4.814”W
	East to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.428”N Longitude 120°0’2.398”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’29.676”N Longitude 119°59’59.232”W

	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35’30.449”N Longitude 119°59’56.806”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35’31.221”N Longitude 119°59’54.195”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35’32.251”N Longitude 119°59.50.648”W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35’33.413”N Longitude 119°59’47.288”W
AP	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°35’2.504”N Longitude 119°59’30.815”W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 7 Latitude 45°34’47.396”N Longitude 119°59’41.928”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34’42.785”N Longitude 120°0’3.181”W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34’47.905”N Longitude 120°0’8.904”W
	West		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34’48.051”N Longitude 120°0’12.438”W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’1.507”N Longitude 120°0’11.948”W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’6.361”N Longitude 120°0’16.372”W
	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35’3.121”N Longitude 120°0’22.541”W
	Northwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12

			Latitude 45°35'4.828"N Longitude 120°0'24.573"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35'18.786"N Longitude 120°0'19.055"W
	Northwest to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 1 Latitude 45°35'23.104"N Longitude 120°0'20.692"W

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'48.984"N Longitude 120°1'0.445"W
	North to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35'16.961"N Longitude 120°1'0.793"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°35'20.44"N Longitude 120°0'56.661"W
AQ	South to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'49.178"N Longitude 120°0'57.807"W
	Southwest to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'48.984"N Longitude 120°1'0.445"W

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'32.524"N Longitude 120°0'55.533"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'32.079"N Longitude 120°0'47.628"W
	Southeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13 Latitude 45°34'23.021"N Longitude 120°0'45.948"W
AR	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 14 Latitude 45°34'6.697"N Longitude 120°1'17.425"W
	West to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 14

			Latitude 45°34'6.51"N Longitude 120°1'21.82"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13 Latitude 45°34'21.032"N Longitude 120°1'2.074"W
	Northeast to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 12 Latitude 45°34'32.524"N Longitude 120°0'55.533"W

	From		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35'37.52"N Longitude 119°59'25.012"W
	Northeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35'40.192"N Longitude 119°58'38.693"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35'38.117"N Longitude 119°58'34.903"W
	Southwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35'32.162"N Longitude 119°58'37.009"W
	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 5 Latitude 45°35'24.498"N Longitude 119°58'25.36"W
AS	Southeast to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 8 Latitude 45°35'19.952"N Longitude 119°58'21.008"W
	Northwest to		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35'23.093"N Longitude 119°59'18.696"W
	Northwest to the point of beginning		Township 1 North, Range 23 East, W.M. (Morrow County) Section 6 Latitude 45°35'23.608"N Longitude 119°59'18.984"W

	From		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13 Latitude 45°34'33.938"N Longitude 120°0'46.172"W
	Northeast to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13

			Latitude 45°34’34.944”N Longitude 120°0’44.541”W
AT	Southwest to		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13 Latitude 45°34’33.63”N Longitude 120°0’45.454”W
	Northwest to the point of beginning		Township 1 North, Range 22 East, W.M. (Gilliam County) Section 13 Latitude 45°34’33.938”N Longitude 120°0’46.172”W

Figure RAI#3 C11a

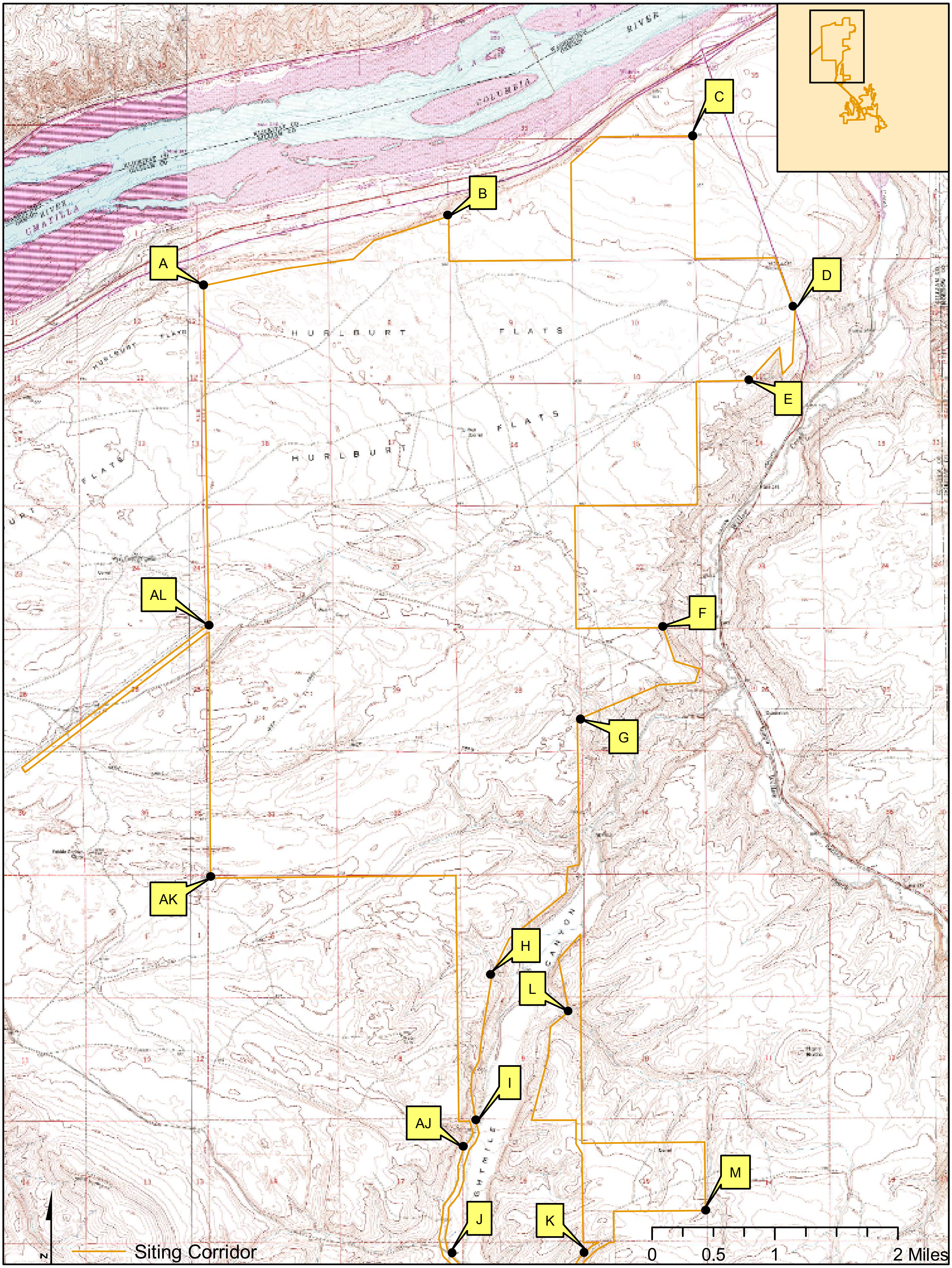
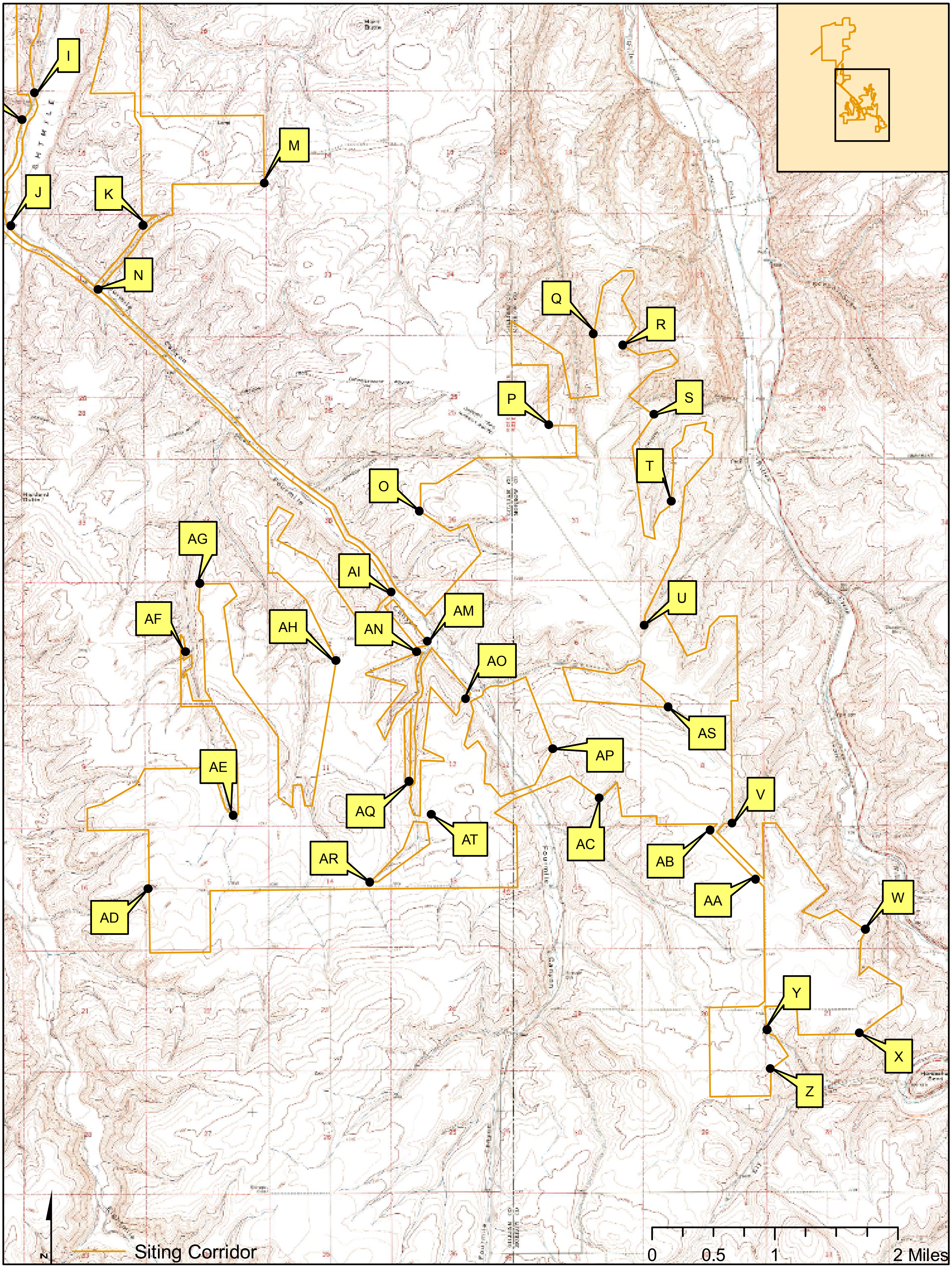


Figure RAI#3 C11b



Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Monday, September 24, 2007 4:03 PM
To: 'John White'; 'jflarson@PacificEnergySystems.com'
Subject: Here are the new tables for Exhibit C

These correct for the debit/credit calculation, as well as add for a messy decommissioning.

Regards,
Pat

Patricia Pilz
Pilz & Co, LLC
656 San Miguel Way
Sacramento, CA 95819
(T) 916-456-7651
(M) 916-803-0602

Permanent facilities footprint

Component	Area of Footprint Each	Number of Units	Total Footprint (acres)
Turbine pads	1,187 sq ft	303 WTGs	8.257
Turbine turnouts	495 sq ft	303 WTGs	3.443
Substations	2.3 acres	2	4.591
Freestanding medium-voltage power poles	7 sq ft	971	0.158
High-voltage power poles	14 sq ft	586	0.190
Field workshop north	70,000 sq ft	1	1.607
Field workshop south	61,720 sq ft	1	1.417
Meteorological towers	15 sq ft	6	0.002
Expansion of existing roads	42,240 sq ft/mile	30 miles	29.311
New roads	95,040 sq ft/mile	57 miles	123.681
Total			**172.657**

Temporary project facilities footprint, construction

Component	Area of Footprint Each	Number of Units	Total Footprint (acres)
Turbine pads (including laydown areas)	7,650 sq ft	303 WTGs	53.213
Turbine turnouts	0 sq ft	303 WTGs	0
Substations	0.460 acres	2	0.919
Freestanding medium-voltage power poles	200 sq ft	971	4.458
High-voltage power poles	400 sq ft	586	5.385
Off-road trenching	15,840 sq ft/mile	17 miles	6.279
Meteorological towers	1,585 sq ft	6	0.218
Staging and storage north[1]	0 sq ft	1	0
Staging and storage south[1]	0 sq ft	1	0
Temporary expansion of existing roads	52,800 sq ft/mile	30 miles	36.630
Temporary width of new roads	52,800 sq ft/mile	56.7 miles	68.712
Total			**175.814**

1. Construction staging and storage uses the field workshop permanent footprints

Temporary project facilities footprint, decommissioning

Component	Area of Footprint Each	Number of Units	Total Footprint (acres)
Turbine components	26,328 sq ft	303 WTGs	183.136
Turbine & transformer pads	2,799 sq ft	303 WTGs	19.470
Turbine turnouts	770 sq ft	303 WTGs	5.356
Substations	2.8 acres	2	5.510
Freestanding medium-voltage power poles	207 sq ft	971	4.614
High-voltage power poles	414 sq ft	586	5.573
Off-road trenching	15,840 sq ft/mile	17 miles	6.279
Meteorological towers	1,600 sq ft	6	0.220
Field workshop north	76,650 sq ft	1	1.560
Field workshop south	67,956 sq ft	1	1.560
Removal of cable along existing roads	52,800 sq ft/mile	6.0 miles	7.321
Removal of new roads	147,840 sq ft/mile	56.7 miles	192.476
Total			**433.274**

Decommissioning assumptions:

Removal of turbine components: The turbine towers are cut at the base and the tower, including the nacelle, hub and blades, is pushed over. The disturbance caused by impact of the tower, nacelle and blades is the product of their length × width, and the hub disturbance is the area of the circle calculated from the hub radius ($\pi \times r^2$). For removal of components, it is assumed that a specialized crane capable of removing components from the top of the tower is not necessary. A crane capable of removing component pieces from the ground and loading them into trucks is assumed to require a road with of 15 ft. A 15 ft road for trucks upon which components will be loaded is also included. The length of these roads at each turbine is the tower height plus the rotor diameter, which should allow for retrieval of blade pieces.

Power poles: The sum of the permanent and temporary construction footprints has been used.

Other components: The permanent component footprint plus graveled area has been used. An additional 10 ft has been added to the length and width of the graveled areas (roads, turbine and transformer pads, turbine turnout and workshop shirts) for gravel removal. This will also allow for removal of communication cables and conductors buried along new roads.

Existing roads: The improvements to roads currently existing will not be removed; the disturbance estimate is only for removal of adjacent conductors. The estimated length of buried conductors along existing roads is approximately 6 miles.

D1

Describe Caithness Energy's (CE's) direct experience in the design, construction and operation of wind energy facilities. In particular, describe the "375 MW of wind projects." If Caithness Shepherds Flat (CSF) or CE would rely on the direct experience of CE's "affiliates" for expertise in constructing or operating a wind energy facility, please identify those "affiliates" and describe their expertise. OAR 345-021-0010(1)(d)(A)

WIND ENERGY EXPERIENCE

Caithness Energy LLC is one of the largest producers of renewable energy in the United States, and has specialized for more than twenty-five years in the development and management of independent power generating facilities. Caithness is currently developing or managing energy facilities in twelve states. Caithness plants produce 360 MW of geothermal power, 160 MW of solar power, and 345 MW of wind power inside the United States.

Caithness Energy's current wind power concerns include: 60 MW, 47 MW, 38 MW, 23 MW, 18.4 MW, and 6.75 MW facilities at Tehachapi, CA; a 2 MW facility at Buffalo Ridge, MN; a 30 MW facility at Peetz, CO; a 43 MW facility at San Gorgonio, CA; a 34 MW facility at Big Springs, TX; and 25 MW, 17 MW, and 2 MW facilities at Carbon County, CO. Seven of these projects -- for a total of 220 MW -- are wholly operated by Caithness through its affiliate and subsidiary Caithness Operating Company, LLC.

RAI#3, D1: ORGANIZATIONAL EXPERTISE

(Follow-up) Of the 345 MW of wind power projects that Caithness Energy is "currently developing of managing," how many projects – and how many total MW – has the company had direct responsibility for permitting, design and construction? We note that the largest wind project that the company lists as "current wind power concerns" is a 60-MW project and that 10 of the 13 projects are smaller than 40 MW. Can you provide any further assurance to the Council that the applicant has the organizational expertise to permit, design, build and operate a facility of up to 909 MW of wind power?

Please discuss the recently-announced sale by Caithness Energy of most of the wind power generation projects listed in your response to RAI D1. After the sale of these assets to ArcLight Capital Partners or its affiliates, what wind power facilities will Caithness still own and operate?

ORGANIZATIONAL EXPERTISE

First, to clarify the facts stated in your first question, Caithness Energy currently owns 345MWs of currently operating wind projects. Additionally, Caithness has in excess of 1,500 MW of renewable projects under development. As of September 2005, Caithness was the 4th largest wind company in the U.S.A.

Second, you have asked about Caithness Energy's track record of permitting, designing and constructing projects. Caithness Energy has a proven development track record which has resulted in one of the most diverse portfolios of power projects of any private power developer in the United States. Specifically, Caithness Energy has been directly responsible for the permitting, design and construction of well over 2,000MWs of projects of various fuel types throughout the United States. These include (a) **3** wind projects ranging from 25 to 60MWs each in size, located in California; although these projects are in fact smaller than our proposed development at Shepherds Flat, each was of a typical size when developed and presented a number of development, permitting and construction complexities typical for wind projects and which Caithness Energy was able to successfully address; (b) the 300MW COSO project, one of the largest geothermal projects in the United States located in California, (c) the 350MW (Combined Cycle) Caithness Long Island Energy Center, the largest energy infrastructure project located on Long Island, New York, which was fully permitted after a **4** year development effort and is currently under construction, and (d**)** 67 MW of Wind Repowered Projects scheduled for commercial operation in Tehachapi, California by mid 2008.

Third, you have asked about the organizational expertise which Caithness Energy possesses which will enable it to complete its proposed Shepherds Flat Wind Project. Caithness Energy's development team is one of the industry's most experienced and includes amongst others:

- **Les Gelber**, President and CEO. Les has over 30 years of utility and independent power development experience, including as Senior Executive of FPL Group, President and CEO of ESI Energy and President and CEO of FPL Energy the largest wind development company in the U.S.A. President of Cogentrix

- **Ross Ain,** Sr VP Development**.** Ross is a veteran developer and IPP regulatory specialist, with over 28 years of experience developing fossil and renewable projects. Ross worked at FERC for several years and while serving as counsel to Congress drafted the PERPA legislation.
- **Ken Hoffman,** Sr VP Asset Management. Ken has over 35 years of utility and IPP asset management experience including as Senior VP Business Management of FPL Energy's renewable and fossil portfolio.
- **Derrel Grant**, General Manager Special Projects. Derrel is also a veteran power plant developer, with over 25 years of experience, including the development of greenfield, the repowering of several wind projects and greenfield development of fossil projects and geothermal projects both in the United States and internationally. Prior to Caithness Energy, Derrel was a Vice President Development at FPL Energy.
- **Dean Landon**, Operations Manager – Wind Assets. Dean has over 25 years of experience operating & maintaining wind farms. Prior to Caithness Energy, Dean was FPL Energy's West Coast Manager, Wind Assets, and prior manager at Sea West
- **Mitchell Garber,** Construction Manager – 10 years IPP construction management at New York Power Authority and El Paso Merchant. Mitch received his early introduction to power plants at Consolidated Edison of New York

Finally, you asked about the recently-announced sale by Caithness Energy to Arclight Capital Partners of most of the wind power generation projects owned by Caithness Energy. After the proposed sale is completed, Caithness Energy's wind portfolio will be owned by Arclight Capital Partners. Caithness Energy, however, will continue to be a partner in Arclight Capital Partners in all of its funds and will continue to develop, own and operate new projects, including wind projects throughout the United States. Under the terms of the proposed transaction with Arclight Capital Partners, Caithness Energy will retain its key development personnel, including those listed in our response to your previous question. In addition, while Caithness operation and maintenance personnel will move over to Arclight Capital Partners, under the terms of the transaction, Caithness Energy will have shared access to all such personnel as may be needed in connection with its ongoing development activities.

D2

Please identify the key personnel who would be responsible for constructing and operating the facility and describe their qualifications. OAR 345-021-0010(1)(d)(B)

KEY PERSONNEL

For the construction of the Shepherds Flat wind power facility, Caithness Energy will employ one of several well-known, major U.S.-based construction firms with direct experience in wind facility construction.

In the initial two to five years, maintenance and service for the facility will be provided by the turbine manufacturer ("Original Equipment Manufacturer", or OEM), under the terms of a conventional Warranty, Maintenance, and Service Agreement.

Following this initial period, responsibility for facility operations will be assumed by Caithness Energy affiliate and subsidiary Caithness Operating Company, LLC. A facility manager with appropriate experience and qualifications in the operation and maintenance of wind power facilities will be designated for the Shepherds Flat facility.

RAI#3, D2: ORGANIZATIONAL EXPERTISE

(Follow-Up) The second paragraph of your response states that "maintenance and service" of the facility would be provided by the turbine manufacturer "in the initial two to five years." The next paragraph states that "Caithness Operating Company LLC" would "assume" responsibility for facility operation "following this initial period." Please explain who would be responsible for operating the facility during the first five years after construction of each phase of the project.

[Comment: Note that the site certificate applicant is "Caithness Shepherds Flat, LLC." If ownership and control of the facility is transferred to "Caithness Operating Company LLC" in the future, then a site certificate amendment will be necessary (OAR 345-027-0100).]

OPERATING RESPONSIBILITY

Caithness Shepherds Flat, LLC will own and control the Shepherds Flat Wind Farm during the first five years after construction of the project. As is customary under the original equipment manufacturers' warranty, turbine manufacturer personnel will be on-site during the warranty period. Control of the facility, however, will remain with Caithness Shepherds Flat, LLC.

Following the warranty period, Applicant intends to enter into a comprehensive Operations and Maintenance Services Agreement with a Caithness Energy affiliate, Caithness Operating Company. Ownership and control of the facility will remain with Caithness Shepherds Flat, LLC. The Operations and Maintenance Services Agreement with Caithness Operating Company will simply be an agreement between the entities outlining the technical scope of work associated with maintaining the turbine and balance of plant equipment.

D3

Describe the past performance of CSF, including but not limited to the number and severity of any regulatory citations in constructing and operating a facility similar to the proposed SFWF. OAR 345-021-0010(1)(d)(D)

REGULATORY CITATIONS

Caithness's record in developing, managing, and operating wind power facilities in the U.S. is exemplary. Caithness has not received any regulatory citations in the course of its lengthy engagement in wind power facility development, management, and operation.

D4

If CSF has no previous experience in constructing or operating a wind energy facility, provide other evidence that CSF can successfully construct and operate the proposed facility. OAR 345-021-0010(1)(d)(E)

NOT APPLICABLE

As noted in RAI#2 D1, Caithness has substantial experience in the successful construction and operation of wind power facilities.

D4(A)

Respond to OAR 345-021-0010(1)(d)(G).

MITIGATION EXPERIENCE

Caithness Energy plans to undertake mitigation at the Shepherds Flat wind power facility site such that construction of the facility has no net negative impact on local wildlife habitat(s). This mitigation will be planned and executed in consultation with experienced, qualified professionals with academic expertise in local wildlife and habitat issues.

Caithness Energy has undertaken similar environmental mitigation projects successfully at other wind energy facility sites developed and/or operated by Caithness, with examples including the 60MW Cameron Ridge and 47MW Pacific Crest wind projects located in Tehachapi California.

RAI#3, D4A: ORGANIZATIONAL EXPERTISE

Please describe in more detail the habitat and wildlife impact mitigation projects that Caithness Energy has successfully undertaken at other wind projects. How were these projects similar to – and how were they different from – the mitigation proposed for the SFWF?

MITIGATION AND COMPLIANCE EXPERIENCE

Caithness Energy does not directly employ biologists, botanists or other field-survey personnel, but rather engages experienced environmental firms to undertake its habitat and wildlife impact mitigation and compliance fieldwork. All such work and reporting are under the supervision of Ted DeRocher, Caithness Director of Environmental Compliance.

Work and reporting similar to that proposed for the Shepherds Flat Wind Farm include:

- Avian incident reporting to the California Department of Fish and Game for California wind facilities;

- Annual Vegetation Monitoring Report, submitted to the California Energy Commission for California geothermal facilities;

- Annual Erosion Control and Re-vegetation Report, integrating Engineering and Biological assessments, submitted to the California Energy Commission for California geothermal facilities; and

- Mohave Ground Squirrel Monitoring Study (also covering any impact on other species, including the desert tortoise and desert kit fox), summary report submitted every five years to the California Energy Commission for California geothermal facilities.

For the Shepherds Flat Wind Farm, Applicant proposes to engage environmental services firms with both wind industry and Pacific Northwest regional experience. Western EcoSystems Technology, Inc., and Curry and Kerlinger, LLC are examples of firms who will be considered for post-construction avian carcass searches. Energy Northwest Environmental Services, with its monitoring responsibility for evaluation of energy facility impacts to habitats in a large portion of the Hanford Reach National Monument, will be considered for habitat mitigation plan fieldwork. Similarly, Steven O. Link, Ph.D., an acknowledged expert in Pacific Northwest native plants, will be considered for revegetation assessment.

E1

You state that the field workshops will have septic tanks for wastewater disposal. Will WPCF permits or local on-site sewage disposal permits be needed to construct or operate wastewater disposal facilities at the field workshops?

WASTEWATER DISPOSAL PERMITS

A Water Pollution Control Facilities (WPCF) permit is required to operate any system with a total sewage flow design capacity that is greater than 2,500 gallons per day. Total water usage (maximum sewage flow) at the northern field workshop is calculated to be 500 gallons per day, and total water usage (maximum sewage flow) at the southern field workshop is calculated to be 140 gallons per day. Applicant's sewage flow design capacity will not exceed the WPCF threshold, therefore no WPCF permit is required.

The Oregon Department of Environmental Quality (DEQ) administers the On-site Sewage Treatment and Disposal System (septic system) program in both Gilliam and Morrow Counties; and both counties are served by the DEQ office in Pendleton. When the field workshops are sited, Applicant will apply for a Site Evaluation, and comply with all DEQ construction requirements.

F1

Confirm that Exhibit F identifies all property owners, as shown on the most recent property tax assessment roll, within the proposed site boundary and within 500 feet of the proposed site boundary, including the transmission line corridor to the point of interconnection with the BPA Slatt Switching Station.

PROPERTY OWNERS OF RECORD

The following table contains all property owners, as shown on the most recent property tax assessment roll, within the proposed site boundary and within 500 feet of the proposed site boundary, including the transmission line corridor to the point of interconnection with the BPA Slatt Switching Station. This revised list considers changes in the site boundary made since the original Application date.

Owner Name	Mailing Address
United States of America Bureau of Land Management	PO Box 550 Prineville, OR 97754
J. R. Krebs	PO Box 8 Arlington, OR 97812
Geo. G. & Lorene Griffith	68474 Hwy. 74 Ione, OR 97843
Eugene S. Logan, Jr.	75396 Hwy. 74 Ione, OR 97843
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
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
Robert & Itha Pepperling	PO Box 27 Arlington, OR 97812

Owner Name	Mailing Address
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
Keven & Linda Haguewood et al.	PO Box 195 Ione, OR 97843
USA-Bonneville Power Administration	P.O. Box 3621 Portland, OR 97208-3621
Andre Meyer & Kathleen Stein-Meyer	PO Box 459 Lexington, OR 97839
Jerry Carr & Christie Fischer	69838 W. Wilson Rd. Boardman, OR 97818
Willow Farms, LLC	415 E Mill Plain Blvd. Vancouver, WA 98660
Woodrow Ice, et al.	68809 Four Mile Canyon Ione, OR 97843
Barbara A. Nelson	72521 Tutuilla Creek Rd Pendleton, OR 97801
Pete & Laurel Cannon	PO Box 255 Ione, OR 97843
Mary Knowles, Trustee	67207 Little Butter Creek Heppner, OR 97836
Terri Schaber, Trustee	PO Box 147 Ione, OR 97843
J.P. Sullivan	PO Box 362 Ione, OR 97843

Owner Name	Mailing Address
Four Mile Land Co.	68809 Four Mile Canyon Rd. Ione, OR 97843
Nathan R & Brandi L Heideman	68944 Palmateer Road Ione, OR 97843

G1

Provide an inventory, including estimated quantities and descriptions, of substantial quantities of industrial materials flowing into and out of the proposed facility during construction and operation.

INDUSTRIAL MATERIALS

Inflow During Construction

Material	Per	Measure		Quantity		Total Volume	
Concrete in WTG and transformer foundation	WTG	583	cu yds	303	WTGs	176,528	cu yds
Foundation materials (bolts, rebar, cans)	WTG	28	tons	303	WTGs	8,333	tons
Concrete in met tower foundation	met	8	cu yds	6	mets	46	cu yds
Rock/gravel for roads	mile	1,760	cu yds	87	miles	153,120	cu yds
Cable (electrical and fiber optic)	mile	583	miles	583	miles	339,889	miles
Metals in tower	WTG	314	tons	303	WTGs	95,142	tons
Metals in nacelle	WTG	77	tons	303	WTGs	23,331	tons
Electrical transformer	each	2	tons	303	each	606	tons

Outflow During Construction

Outflow of materials during construction will be limited to scrap (ends of cable, wood forms, packaging waste, etc.). Amounts are not expected to be substantial.

Inflow During Operation

Industrial materials flowing into the facility during operation will consist of repair parts and maintenance supplies. Amounts are not expected to be substantial.

Outflow During Operation

Outflow of materials during construction will be limited to packaging and other waste and discarded parts. Amounts are not expected to be substantial.

G2

Where will lubricants, oils, greases, antifreeze, cleansers, degreasers and hydraulic fluids be stored on-site? List representative types of these materials that are likely to be used or stored on-site.

STORAGE OF MAINTENANCE SUPPLIES

Lubricants, oils, greases, antifreeze, cleansers, degreasers, hydraulic fluids and similar supplies used in the operation of the Shepherds Flat Wind Farm will be stored in the field workshops.

Representative types of these materials used in operating wind facilities are:

Oil - transformers and switches:	Non-PCB mineral oil
Lubricating oil – gear boxes and transmissions:	Mobilube HD 80W-90 Mobil SHC 632 Mobile SHC 630 Castrol Tribol 1100/320 Gear Oil
Hydraulic oil – brakes and blade orientation motor (some turbines use air brakes and non-hydraulic orientation motors):	Mobil DTE 11M Mobil DTE 13M
Grease – yaw gears:	Mobillith SHC 460 Castrol Molub-alloy BRB 572 grease Mobilgrease HP 222
Cleaners:	Simple Green
Cleaning solvents:	Safety-kleen acetone mineral spirits 66

G3

What quantity of diesel fuel will be stored on-site during construction? Describe how this fuel will be stored.

FUELING SERVICE

No diesel fuel or gasoline will be stored on-site during construction. Rather, a fueling service will be engaged to refuel equipment that cannot be refueled off-site. This activity typically takes place at the end of each work-day.

RAI#3, G3: MATERIALS ANALYSIS

(Follow-Up) Would it be feasible (by site certificate condition) to limit the location or locations where refueling would occur on-site? For example, could refueling be limited to the sites of the northern and southern field workshops?

REFUELING

Applicant agrees that limitations on refueling locations is feasible, and proposes the following:

- Rubber tire vehicles (pickup and other service vehicles that might be fueled on-site) will be refueled at the sites of the northern and southern field workshops;
- Cranes and other crawler vehicles will be fueled in place (as more damage is likely be caused by extra trips than by a fuel spill); and
- Earthmoving and other off-road equipment will be fueled within the footprint of the finished facility roads (due to the time and distance required for refueling trips to a central location).

H1

Respond to OAR 345-021-0010(1)(h)(A). Have you consulted with DOGAMI regarding what level of site characterization is needed (including any site-specific subsurface investigation) for the Department to find the application to be complete?

DOGAMI CONSULTATION

On May 17, 2007, a Shannon & Wilson, Inc. geotechnical engineer and an Oregon licensed geologist met with Mr. Clark Neiwendorp from the Oregon Department of Geology and Mineral Industries (DOGAMI) in Portland, Oregon. The purpose of the meeting was to determine the level of site characterization DOGAMI would require for the proposed project. Mr. Neiwendorp indicated that he was not aware of any statutory requirements for DOGAMI to review the project. He indicated, however, that his primary responsibility was for mineral protection.

Mineral extraction permits are required if the site is located on State of Oregon land or if the quantity of material removed exceeds the casual use allowance. Gravel or rock may be removed from a 1-acre site without permitting if the total volume removed is less than 5,000 cubic yards. Such operations may continue up to 5 years. The permit application requires developing a mining and reclamation plan prior to initiating activities. Geotechnical explorations required for the permitting include proving-out sufficient quantities of extractable materials and slope stability analyses for slopes created by the mining and for the reclaimed areas. Extracting gravel and/or rock from the facility site is not planned, therefore permitting will not be required.

Mr. Neiwendorp also provided information regarding seismic activity and geologic hazards in the project area. Seismic activity in the project area is minor. No large-magnitude earthquakes have been registered within a 10-mile radius of any project feature. Additional seismic hazard analysis is addressed in Applicant's response to RAI#2 H-5.

RAI#3, H1: GEOLOGIC AND SOIL STABILITY

(Follow-Up) Based on a copy of letter dated June 12, 2007, to CFS from your geotechnical consultant, we understand that you have consulted with DOGAMI regarding the necessary level of site characterization (including any site-specific subsurface investigation) for the Department to find the application complete. The letter refers to DOGAMI's request for a "specific approach to addressing the Exhibit H requirements." The letter also refers to a "May 23, 2007, Exploration Plan," although it is not clear whether this plan constitutes a response to DOGAMI's request. In any case, we have not received the plan.

[Comment: Note that under the amended Council's rules, RAI H1 addresses OAR 345-021-0010(1)(h)(A) and (C).]

EXPLORATION PLAN

The project geotechnical engineer, Shannon & Wilson, Inc., consulted with Mr. Bill Burns from DOGAMI regarding site characterization requirements on June 11, 2007. Based on that conversation, we concluded that the May 23, 2007 Exploration Plan provides a framework for any site specific subsurface investigations that may be required. A copy of the June 12, 2007 letter documenting the consultation with Mr. Burns is enclosed.

A copy of the Exploration Plan is also enclosed. This plan details the proposed explorations for:

1. Wind turbine generator (WTG) sites.
   a. Section 2.2.2 – WTG Sites – South Unit
   b. Section 2.2.3 – WTG Sites – North Unit
2. Electrical transmission lines – Section 2.2.4 – Transmission Lines.
3. Access Roads – Section 2.2.5 – Roads, Substations, and Operation Facilities.

The geotechnical engineering report will describe the soil conditions and geology at the WTG sites, along road and transmission line alignments, and at the substation and operation facility sites. The report will address:

- International Building Code seismic design criteria;
- Groundwater depth, if encountered;
- General earthwork recommendations;
- Roadway cut and fill slope stability;
- WTG foundation bearing capcity;
- WTG foundation allowable shaft skin friction;
- Estimated WTG tower settlement;
- Transmission line pole or tower foundation design recommendations;
- Dynamic soil design properties, and;
- Substation and operation facility foundation design recommendations.

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

50 Years

June 12, 2007

Caithness Shepherd Flats WP, LLC
565 Fifth Avenue, 29th Floor
New York, New York 10017

Attn: Mr. Derrel Grant

RE: CONSULTATION WITH OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES (DOGAMI); SHEPHERDS FLAT WIND PROJECT, ARLINGTON, OREGON

On June 11, 2007, Shannon & Wilson, Inc. contacted Mr. Bill Burns at DOGAMI regarding Oregon Department of Energy (ODE) comments provided by Pat Pilz. Mr. Burns and I discussed the Exhibit H requirements and expectations, and items required to complete the application. Based on Mr. Burn's comments, we understand that he will be satisfied if we provide a specific approach to addressing the Exhibit H requirements. In our opinion, the May 23, 2007, Exploration Plan provides the required framework for answering the Exhibit H questions.

We understand that the seismic hazard analysis (Exhibit H – (F)) and soil-related hazards analysis (Exhibit H – (G)) must be completed prior to ODE accepting the application as complete. We are starting those analyses and anticipate completing them in approximately one week.

We trust this information meets your current needs. If you have any questions or need additional information, please contact our office.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Burrie, P.E.
Branch Manager

DJB:LJR/djb

cc: Pat Pilz

06-12-2007/22-1-02474-001.SFWP.Burnsltr.doc/cvm

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22-1-02474-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

50 Years

May 23, 2007

Caithness Shepherd Flats WP, LLC
565 Fifth Avenue, 29th Floor
New York, New York 10017

Attn: Mr. Derrel Grant

RE: GEOTECHNICAL ENGINEERING STUDY EXPLORATION PLAN; SHEPHERDS FLAT WIND PROJECT, ARLINGTON, OREGON

At your request, Shannon & Wilson, Inc. prepared the enclosed Geotechnical Engineering Study Exploration Plan for the proposed Shepherds Flat Wind Project near Arlington, Oregon. The work was conducted in accordance with our May 7, 2007 proposal.

The Exploration Plan addresses comments from the Oregon Energy Facilities Siting Council (EFSC) regarding project permit application Exhibit H.

The Shepherds Flat Wind Project consists of 303 wind turbine generator (WTG) units with a combined electrical output of 454.5 to 909 megawatts. Two new substations and approximately 38 miles of new overhead transmission lines are included in the project.

We trust this information meets your current needs. If you have any questions or need additional information, please contact our office.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Burrie, P.E.
Branch Manager

DJB:LJR/djb

Enclosures: Geotechnical Engineering Study Exploration Plan

05-23-2007/22-1-02474-001.SFWP Ex Plan.cvrltr.doc/cvm

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22-1-02474-001

EXPLORATION PLAN FOR SHEPHERDS FLATS WIND PROJECT GEOTECHNICAL ENGINEERING STUDIES

1.0 INTRODUCTION

The purpose of this Exploration Plan is to address Oregon Energy Facilities Siting Counsel (EFSC) comments on the project application. Responses are listed by comment numbers and refer to Exhibit H to the application.

2.0 GEOTECHNICAL STUDIES

2.1 Project Description

The Shepherds Flat Wind Project consists of 303 wind turbine generator (WTG) units with a combined electrical output of 454.5 to 909 megawatts. The project is located in western Morrow County and eastern Gilliam County near Arlington, Oregon. The project includes two distinctive units.

The approximately 100-WTG south unit includes a project formerly known as the Shepherds Ridge project. The southern unit is primarily located in T1N, R22E, in Gilliam County, T1N, R23E and T2N, R23E, WM in Morrow County, Oregon.

The area around the southern unit is primarily cultivated farmland with some unused areas. Preliminary borings at 6 locations in this unit indicate the soil is 6 to 25 feet deep. Very dense gravel and basalt bedrock are found below the silt soils.

The approximately 200-WTG northern unit is primarily located in the Hurlbert Flat area of T2N and T3N, R22E WM in northeastern Gilliam County. Land use in the project area is primarily grazing. Little cultivated cropland is present within the northern unit project area. Five major electrical transmission lines cross the northern unit. The assumed subsurface profile consists of a thin mantle of silty soil overlying heavily cemented soil and gravel (caliche) and shallow basalt bedrock.

The project includes approximately 38 miles of new overhead transmission lines and two new substations. Operation facilities and new roads are also included in the project development plans.

The following sections address the Application Review comments regarding pre-construction geotechnical investigations.

2.2 Geotechnical Explorations (Comment H1)

On May 17, 2007, a Shannon & Wilson, Inc. geotechnical engineer and an Oregon licensed geologist met with Mr. Clark Niewendorp from the Oregon Department of Geology and Mineral Industries (DOGAMI) in Portland, Oregon. The purpose of the meeting was to determine the level of site characterization DOGAMI would require for the proposed project. Mr. Neiwendorp indicated that he was not aware of any statutory requirements for DOGAMI to review the project. He indicated, however, that his primary responsibility was for mineral protection.

Mineral extraction permits are required if the site is located on State of Oregon land or if the quantity of material removed exceeds the casual-use allowance. Gravel or rock may be removed from a 1-acre site without permitting if the total volume removed is less than 5,000 cubic yards. Such operations may continue up to 5 years. The permit application requires developing a mining and reclamation plan prior to initiating activities. Geotechnical explorations required for permitting include proving-out sufficient quantities of extractable materials, and slope stability analyses for active mine slopes and reclaimed areas. Extracting gravel and/or rock from project lands is not planned for this project; therefore, permitting will not be required.

Mr. Niewendorp also provided information regarding seismic activity and geologic hazards in the project area. Seismic activity in the project area is minor. No large-magnitude earthquakes have been registered within a 10-mile radius of any project feature. Additional seismic hazard analysis will be addressed in a later section of this Exploration Plan.

2.2.1 WTG Sites – Preliminary Study (Comment H2)

A preliminary geotechnical engineering study was conducted for the former Shepherds Ridge project in April 2004. That study included borings at six WTG locations. Four of the borings were located within the current project area. Those four boring locations are indicated on the attached Figure C-2 from the application package. The study consisted of drilling and sampling the borings. Disturbed samples were obtained in conjunction with Standard Penetration Tests (SPT) as described in the American Society for Testing and Materials (ASTM) Designation: D 1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils*. Relatively undisturbed samples were obtained in accordance with ASTM Designation D 1587 *Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils.* Representative samples were tested in the laboratory to determine index and strength properties. Based on the observed field conditions and the laboratory testing, engineering analyses were conducted to develop preliminary recommendations for WTG foundation design and construction. The observations, test results and engineering analyses were summarized in a preliminary geotechnical engineering report. That report was submitted with the application.

2.2.2 WTG Sites South Unit (Comment H3)

The preliminary report indicates relatively deep soil overlies bedrock. In some areas, it is likely the foundations will be completely within the soil layer. A structural concern for deep soil foundations is the rotational stiffness of the tower to foundation connection. The rotational stiffness calculation requires that Young's modulus be determined. Young's modulus is calculated from the soil shear modulus and Poisson's ratio.

To effectively investigation the deep soil locations, a combination of exploration methods will be employed. The primary method will be to drill with hollow-stem auger equipment to facilitate SPT testing at 5-foot intervals within the soil layers. SPT test results can be correlated to shear wave velocity and thus shear modulus used in the rotational stiffness calculation. In addition to the SPT tests, shear wave velocity will be determined using the refraction microtremor (ReMi™) method. This method provides one-dimensional shear wave velocity profiles and site-specific NEHRP soil classification data. If appropriate, seismic cone penetrometer soundings will be made at selected deep soil WTG sites to develop more refined shear wave data.

Each WTG site will be drilled to a minimum 40-foot depth using hollow-stem auger equipment and/or coring equipment in the bedrock. SPT tests will be conducted at 5-foot depth intervals in the soil. At selected locations, thin-wall (Shelby tube) samples will be obtained, where feasible. Where rock is encountered above the target depth, diamond bit coring equipment will be used to advance the boring to the required depth.

Each boring will be logged by a qualified geotechnical engineer or geologist. Selected samples will be testing in the laboratory to determine index and strength properties such as gradation, moisture content, and internal friction angle from direct shear tests. Core will be logged and photographed after it is placed in the core box. The Rock Quality Designation (RQD) will be determined for each 5-foot run. Selected samples will be tested in the laboratory to determine rock strength and the approximate internal friction (shear) angle.

In situ soil resistivity tests will be conducted at each WTG site using the Wenner 4-probe method. Resistivity measurements indicate the relative ability of a soil to carry electrical currents. Measured resistivity is dependant upon the degree of compaction, moisture content, constituent solubility, and temperature.

Samples for thermal resistivity (Rho) testing will be collected at one WTG site in each string from hand-auger borings or grab samples from the drill cuttings. Corrosivity testing (CL, S, and pH) will be conducted on select samples.

Because of the steep hillsides and deep soil conditions, track-mounted drill rigs will be employed during the field explorations.

2.2.3 WTG Sites – North Unit (Comment H3)

The geologic maps and observed conditions indicate that the soil mantle at the approximately 200 WTG sites comprising the north or Hulbert Flats unit will be relatively thin. Field explorations for these sites will be conducted using a combination of percussion drill test holes and coring. A percussion drill (air-track) hole will be advanced at each WTG site to determine the relative quality of the underlying rock. Each test hole will be logged by a qualified geotechnical engineer or geologist. The drill penetration rate will be logged (time vs. depth drilled) as the work advances. This rate will be plotted graphically to indicate the relative rock strength profile.

A seismic refraction survey will be conducted at each core site using the refraction microtremor (ReMi^{TM}) method. This method provides one-dimensional shear wave velocity profiles and site-specific NEHRP soil classification data.

After reviewing the air-track logs, approximately 10 to 20 percent of the WTG sites will be selected for coring. The core holes will be drilled adjacent to the air-track holes and the core will be correlated to the penetration rate profile. A minimum of one core hole will be drilled on each WTG line. A qualified geotechnical engineer or geologist will log and photograph the core after it is placed in the core box. The Rock Quality Designation (RQD) will be determined for each 5-foot run. Selected core samples will be tested in the laboratory to determine rock strength and the approximate internal friction (shear) angle. Additional core holes will be drilled and samples tested, as necessary to establish rock strength correlations.

In situ soil resistivity tests will be conducted at each core site using the Wenner 4-probe method. Resistivity measurements indicate the relative ability of a soil to carry electrical currents. Measured resistivity is dependant upon the degree of compaction, moisture content, constituent solubility, and temperature.

Samples for thermal resistivity (Rho) testing will be collected at one WTG site in each string from hand-auger borings or grab samples from the drill cuttings. Corrosivity testing (CL, S, pH) will be conducted on select samples.

Truck-mounted drill rigs will be used on the north unit because the terrain is more level and access is expected to be less difficult than on the south unit.

2.2.4 Transmission Lines (Comment H4)

The project includes approximately 38 miles of new overhead transmission lines and buried electrical lines between WTG units. Geologic reconnaissance will be conducted along the proposed transmission line alignments to determine if landslides or marginally stable slopes exist that could be made unstable by the proposed construction. If areas of concern are identified, additional explorations will be conducted at the specific locations.

Generally, exploration along the overhead transmission lines will consist of SPT borings to determine the bedrock depth. Borings will be located at each major angle point or corner, both sides of each major stream or road crossing, at terminal points and end structures, and at approximately ½-mile intervals along straight alignments. The boring spacing may be modified to include specific features observed in the field.

Each boring will be drilled to 20 feet below the existing surface elevation or auger refusal, whichever is first encountered. Disturbed samples will be obtained in conjunction will STP tests at 5-foot depth intervals. Index property tests such as gradation and moisture content will be conducted on selected samples in the laboratory. Coring will be conducted only at the terminal structures and road or stream crossing locations if rock is encountered at less than 20 feet below the surface.

2.2.5 Roads, Substations, and Operation Facilities (Comment H3)

Geologic reconnaissance will be conducted along the proposed road alignments to determine if landslides or marginally stable slopes exist that could be made unstable by the proposed construction. If areas of concern are identified, additional explorations will be conducted at the specific locations.

In general, roads will be constructed in areas where minimal grading and hillside disturbance will be necessary. However, some significant cuts, fills, and hillside grading may be necessary. Test pits will be excavated at selected locations along road alignments to determine the subsurface soil profile and material properties. Major cuts over 20 feet deep will be drilled to a depth 5 feet below the subgrade elevation. Test pits will be excavated in major fill areas to assess settlement potential. During the excavation process, the relative soil consistency will be measured using a dynamic, mini-cone penetrometer. The mini-cone uses a slide hammer to drive a conical tip into the soil. The number of hammer blows required to drive the cone 1¾-inch increments is roughly equivalent to a Standard Penetration Test (SPT) blow count. The blows per increment provide an indication of the relative soil density.

Cut and fill slope inclinations, drainage and slope protection recommendations, and surfacing sections including paved and/or gravel sections will be designed based on the geologic reconnaissance and exploratory test pit/boring information.

Two SPT borings will be drilled at each substation and operations facility location. Borings will be advanced to a minimum 15 feet below the existing surface elevation or auger refusal, which ever is first encountered. Foundation design and construction recommendations will be provided for each structure.

2.3 Seismic Hazard Assessment (Comment H5)

The project geotechnical engineers (Shannon & Wilson, Inc.) will research published seismic hazard information by the United States Geologic Survey Earthquake Hazards Program, the Oregon

Department of Geology and Mineral Industries and others that is currently available for the site location. An assessment that includes the following will be provided.

- Description of all recorded earthquakes within 50 miles of the site and any greater than 50 miles from the site that caused ground shaking at the site greater than Modified Mercalli Intensity of III.
- Characterization of the local tectonic setting, including identifying all known earthquake sources capable of generating peak ground accelerations greater than 0.05g on rock at the site;
- For each earthquake source, an estimate of the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE) and the maximum probable earthquake (MPE) will be provided. For this assessment, the MPE is defined as the maximum earthquake with a 10 percent probability of exceedance in 50 years.
- Calculation of the median ground response spectrum from the MCE and the MPE and identification of spectral accelerations greater than the Oregon Building Code design spectrum. Description of anticipated behavior of the subsurface soils, amplification levels of motion through the subsurface soils, and any topographic or special subsurface site response effects that would produce ground motions greater than those prescribed in the 2003 IBC.
- IBC seismic design criteria, including the short-period mapped spectral response acceleration (S_s), 1-second mapped spectral response acceleration (S_1), site coefficients (F_a and F_v). For such a large site, more than one criteria set is possible;
- Evaluation of the possibility of other seismically induced hazards occurring during reasonably probable seismic events. These potential hazards include liquefaction, lateral spreading, tsunami, fault displacement, subsidence, and landslides.

2.4 Soil-Related Hazard Assessment (Comments H6, H7, and H8)

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 will be conducted in conjunction with the explorations described in the above sections. The geologic reconnaissance conducted along road and transmission line alignments, at WTG sites and potential gravel mine or rock quarry sites will identify potential hazard areas. The subsurface explorations will be tailored and conducted to address concerns identified.

Project features will be engineered to mitigate potential hazards through design modifications, rerouting roads or transmission line alignments if necessary, or constructing engineered features such as slope protection, water retention basins, or armored ditches. Wind and water erosion protection will be provided to protect cut and fill slopes during construction and operation. Erosion protection may include slope vegetation or armor where needed. Landslides will be avoided where possible or stabilized if necessary. Road alignments (horizontal and vertical) will be designed to reduce erosion potential by maintaining minimum grades, where feasible. Road alignments must be designed to accommodate the long truckloads associated with WTG construction; therefore, road curve radii are of necessity longer.

Dangers to human safety resulting from seismic or non-seismic geologic hazards will be addressed by the design through compliance with applicable codes and good engineering practice. Every attempt will be made to avoid potential geologic hazards, where possible. However, if unavoidable, aggressive engineering solutions will be employed to protect human safety.

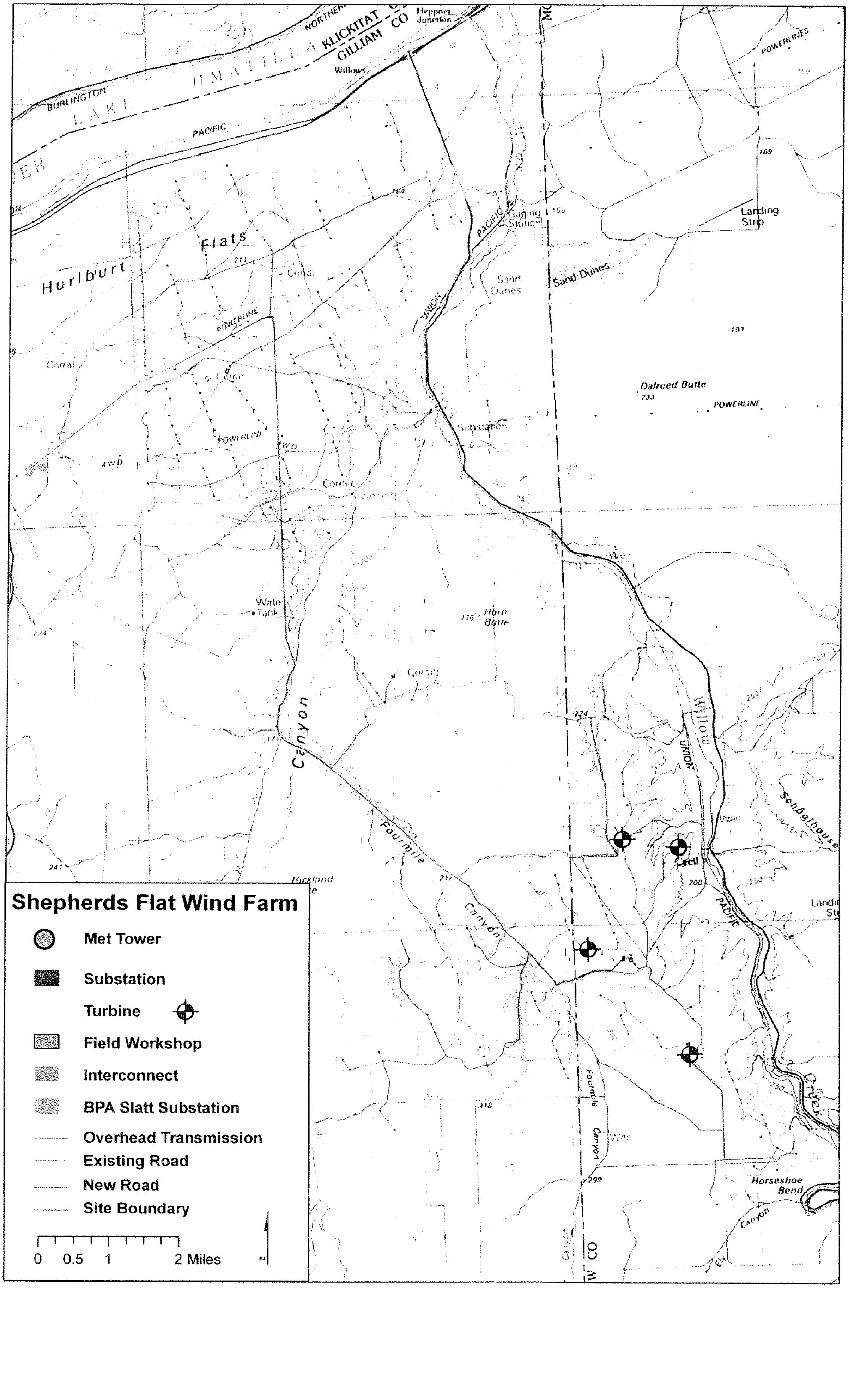
2.5 Geotechnical Engineering Report

The results of geologic reconnaissance, explorations, laboratory testing, and engineering analyses will be presented in a geotechnical engineering report, stamped by a professional engineer licensed in Oregon. The report will describe the soil conditions and geology at the WTG sites, road and transmission line alignments, and the substation and operation facilities sites.

The report will address:

- Geologic Hazard identification;
- Geologic Hazard mitigation recommendations, if required;
- IBC Seismic design criteria;
- Groundwater, if encountered;
- General earthwork recommendations;
- Roadway cut and fill slope stability;
- WTG foundation bearing capacity;
- WTG foundation allowable shaft skin friction;
- Estimated WTG tower settlement;
- Soil shear modulus,
- Poisson's ratio, and;
- Young's modulus.

Figure C-2


Shepherds Flat Wind Farm
Met Tower
Substation
Turbine
Field Workshop
Interconnect
BPA Slatt Substation
Overhead Transmission
Existing Road
New Road
Site Boundary
0 0.5 1 2 Miles
N
KLICKITAT CO
GILLIAM CO
Heppner Junction
Willows
BURLINGTON
UMATILLA
LAKE
PACIFIC
Hurlburt Flats
Corral
POWERLINE
4WD
Water Tank
Canyon
Fourmile Canyon
Horn Butte
Substation
Gaging Station
Sand Dunes
Dalreed Butte
POWERLINES
Landing Strip
Willow
UNION
PACIFIC
Schoolhouse
Cecil
Horseshoe Bend
Canyon

H2

Attachment H describes the "Shepherds Ridge Wind Project" in an area that is mostly or entirely outside the proposed site boundary for the SFWF. Attachment H does not address the northern project area at all and it is unclear whether it addresses any part of the southern project area. What on-site geotechnical assessment has been done within the proposed site boundary?

EARLY SURVEY WORK

A preliminary geotechnical engineering study was conducted for the former Shepherds Ridge project in April 2004. That study included borings at six wind turbine generator (WTG) locations. Four of the borings were located within the current site boundary. Those four boring locations are indicated on the attached Figure C-2 from the original report. The study consisted of drilling and sampling the borings. Disturbed samples were obtained in conjunction with Standard Penetration Tests (SPT) as described in the American Society for Testing and Materials (ASTM) Designation: D 1586 *Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.* Relatively undisturbed samples were obtained in accordance with ASTM Designation D 1587 *Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils*. Representative samples were tested in the laboratory to determine index and strength properties. Based on the observed field conditions and the laboratory testing, engineering analyses were conducted to develop preliminary recommendations for WTG foundation design and construction. The observations, test results and engineering analyses were summarized in a preliminary geotechnical engineering report (Attachment H).

H3

Please respond to OAR 345-021-0010(1)(h)(B). What specific pre-construction geotechnical investigation would be performed?

GEOTECHNICAL STUDIES

South Facility Area

The preliminary report indicates relatively deep soil overlies bedrock. In some areas, it is likely the foundations will be completely within the soil layer. A structural concern for deep soil foundations is the rotational stiffness of the tower to foundation connection. The rotational stiffness calculation requires that Young's modulus be determined. Young's modulus is calculated from the soil shear modulus and Poisson's ratio.

To effectively investigation the deep soil locations, a combination of exploration methods will be employed. The primary method will be to drill with hollow-stem auger equipment to facilitate SPT testing at 5-foot intervals within the soil layers. SPT test results can be correlated to shear wave velocity and thus shear modulus used in the rotational stiffness calculation. In addition to the SPT tests, shear wave velocity will be determined using the refraction microtremor (ReMi™) method. This method provides one-dimensional shear wave velocity profiles and site-specific NEHRP soil classification data. If appropriate, seismic cone penetrometer soundings will be made at selected deep soil WTG sites to develop more refined shear wave data.

Each WTG site will be drilled to a minimum 40-foot depth using hollow-stem auger equipment and/or coring equipment in the bedrock. SPT tests will be conducted at 5-foot depth intervals in the soil. At selected locations, thin-wall (Shelby tube) samples will be obtained, where feasible. Where rock is encountered above the target depth, diamond bit coring equipment will be used to advance the boring to the required depth.

Each boring will be logged by a qualified geotechnical engineer or geologist. Selected samples will be tested in the laboratory to determine index and strength properties such as gradation, moisture content, and internal friction angle from direct shear tests. The core will be logged and photographed after it is placed in the core box. The Rock Quality Designation (RQD) will be determined for each 5-foot run. Selected samples will be tested in the laboratory to determine rock strength and the approximate internal friction (shear) angle.

In situ soil resistivity tests will be conducted at each WTG site using the Wenner 4-probe method. Resistivity measurements indicate the relative ability of a soil to carry electrical currents. Measured resistivity is dependant upon the degree of compaction, moisture content, constituent solubility, and temperature.

Samples for thermal resistivity (Rho) testing will be collected at one WTG site in each string from hand-auger borings or grab samples from the drill cuttings. Corrosivity testing (CL, S, pH) will be conducted on select samples.

Because of the steep hillsides and deep soil conditions, track-mounted drill rigs will be employed during the field explorations.

North Facility Area

The geologic maps and observed conditions indicate that the soil mantle at the approximately 200 WTG sites comprising the north or Hulbert Flats unit will be relatively thin. Field explorations for these sites will be conducted using a combination of percussion drill test holes and coring. A percussion drill (air-track) hole will be advanced at each WTG site to determine the relative quality of the underlying rock. Each test hole will be logged by a qualified geotechnical engineer or geologist. The drill penetration rate will be logged (time vs. depth drilled) as the work advances. This rate will be plotted graphically to indicate the relative rock strength profile.

A seismic refraction survey will be conducted at each core site using the refraction microtremor (ReMi^{TM}) method. This method provides one-dimensional shear wave velocity profiles and site-specific NEHRP soil classification data.

After reviewing the air-track logs, approximately 10 to 20 percent of the WTG sites will be selected for coring. The core holes will be drilled adjacent to the air-track holes and the core will be correlated to the penetration rate profile. A minimum of one core hole will be drilled on each WTG line. A qualified geotechnical engineer or geologist will log and photograph the core after it is placed in the core box. The Rock Quality Designation (RQD) will be determined for each 5-foot run. Selected core samples will be tested in the laboratory to determine rock strength and the approximate internal friction (shear) angle. Additional core holes will be drilled and samples tested, as necessary to establish rock strength correlations.

In situ soil resistivity tests will be conducted at each core site using the Wenner 4-probe method. Resistivity measurements indicate the relative ability of a soil to carry electrical currents. Measured resistivity is dependant upon the degree of compaction, moisture content, constituent solubility, and temperature.

Samples for thermal resistivity (Rho) testing will be collected at one WTG site in each string from hand-auger borings or grab samples from the drill cuttings. Corrosivity testing (CL, S, pH) will be conducted on select samples.

Truck-mounted drill rigs will be used on the north unit because the terrain is more level and access is expected to be less difficult than on the south unit.

RAI#3, H3: GEOLOGIC AND SOIL STABILITY

(Follow-Up) Your response describes several proposed geotechnical studies in both the northern and southern project areas. Please clarify when this work would be performed and when the results would be made available to DOGAMI and ODOE for each phase of construction.

[Comment: Note that under the amended Council's rules, RAI H3 addresses OAR 345-021-0010(1)(h)(B).]

GEOTECHNICAL STUDIES

The geotechnical engineering studies planned in the May 23, 2007 Exploration Plan would be conducted as the design progresses. Typically, preliminary geotechnical studies are done at approximately the 30% design stage; after the conceptual design has been fleshed out, but before detailed design begins. At the 30% design stage, the geotechnical study results can be incorporated into the final design and adjustments made to reflect specific site conditions. We anticipate similar timing for the Shepherd Flats project. Some preliminary work has been done on the south unit; however, additional studies are required to refine the designs over the expanded project area.

The Exploration Plan for the north unit describes a two step process that may need to be revised to three steps. A limited number of borings at approximately 10% of the WTG sites and along the roadways should be drilled at approximately the 30% design stage to provide preliminary design information and to identify limiting conditions. The second step would include more detailed investigations along road and electrical transmission line alignments to provide design information.

The final investigations should be completed at approximately the 85 – 90% design stage. By this time final WTG and facility locations should be selected and load criteria established. We anticipate borings at the WTG sites will be conducted at approximately the time final site adjustments are made. It is important to investigate the final WTG location prior to construction.

Information from the preliminary and final geotechnical studies can typically be provided to DOGAMI and ODOE approximately 30 to 45 days from field work completion. The geotechnical engineer will notify the owner and regulatory agencies immediately if usual conditions significantly impact the design are encountered.

H4

Respond to OAR 345-021-0010(1)(h)(C).

GEOTECHNICAL WORK FOR TRANSMISSION LINES

The project includes approximately 38 miles of new overhead transmission lines as well as buried electrical lines between WTG units. Geologic reconnaissance will be conducted along the proposed transmission line alignments to determine if landslides or marginally stable slopes exist that could be made unstable by the proposed construction. If areas of concern are identified, additional explorations will be conducted at the specific locations.

Generally, exploration along the overhead transmission lines will consist of SPT borings to determine the bedrock depth. Borings will be located at each major angle point or corner, both sides of each major stream or road crossing, at terminal points and end structures, and at approximately ½-mile intervals along straight alignments. The boring spacing may be modified to include specific features observed in the field.

Each boring will be drilled to 20 feet below the existing surface elevation or auger refusal, whichever is first encountered. Disturbed samples will be obtained in conjunction with STP tests at 5-foot depth intervals. Index property tests such as gradation and moisture content will be conducted on selected samples in the laboratory. Coring will be conducted only at the terminal structures and road or stream crossing locations if rock is encountered at less than 20 feet below the surface.

RAI#3, H4: GEOLOGIC AND SOIL STABILITY

(Follow-Up) Your response describes proposed geotechnical studies for transmission lines. Please clarify when this work would be performed and when the results would be made available to DOGAMI and ODOE for each phase of construction.

[Comment: Note that under the amended Council's rules, RAI H4 addresses OAR 345-021-0010(1)(h)(D).]

GEOTECHNICAL STUDIES FOR TRANSMISSION LINES

The geotechnical engineering studies planned in the May 23, 2007 Exploration Plan would be conducted as the design progresses. Typically, preliminary geotechnical studies are done at approximately the 30% design stage; after the conceptual design has been fleshed out, but before detailed design begins. At the 30% design stage, the geotechnical study results can be incorporated into the final design and adjustments made to reflect specific site conditions. We anticipate similar timing for the Shepherd Flats project transmission lines.

The final investigations should be completed at approximately the 85 – 90% design stage. Information from the preliminary and final geotechnical studies can typically be provided to DOGAMI and ODOE approximately 30 to 45 days from field work completion. The geotechnical engineer will notify the owner and regulatory agencies immediately if usual conditions significantly impact the design are encountered.

H5

Respond to OAR 345-021-0010(1)(h)(F). [Note that since adoption of the 2003 International Building Code, Oregon no longer identifies a seismic zone designation. In response to OAR 345-021-0010(1)(h)(F)(i), provide the applicable 2003 IBC design parameters.]

SEISMIC HAZARDS ASSESSMENT

Project geotechnical engineers, Shannon & Wilson, Inc., will research seismic hazard information published by the United States Geologic Survey Earthquake Hazards Program, the Oregon Department of Geology and Mineral Industries and others currently available for the site location. An assessment will be prepared to include:

- Description of all recorded earthquakes within 50 miles of the site and any greater than 50 miles from the site that caused ground shaking at the site greater than Modified Mercalli Intensity of III.
- Characterization of the local tectonic setting, including identifying all known earthquake sources capable of generating peak ground accelerations greater than 0.05g on rock at the site;
- For each earthquake source, estimation of the magnitude and minimum epicentral distance of the maximum credible earthquake (MCE) and the maximum probable earthquake (MPE). For this assessment, the MPE is defined as the maximum earthquake with a 10 percent probability of exceedance in 50 years.
- Calculation of the median ground response spectrum from the MCE and the MPE and identification of spectral accelerations greater than the Oregon Building Code design spectrum. Description of anticipated behavior of the subsurface soils, amplification levels of motion through the subsurface soils, and any topographic or special subsurface site response effects that would produce ground motions greater than those prescribed in the 2003 IBC.
- IBC seismic design criteria, including the short-period mapped spectral response acceleration (S_s), 1-second mapped spectral response acceleration (S_1), site coefficients (F_a and F_v). For such a large site, more than one criteria set is possible;
- Evaluation of the possibility of other seismically induced hazards occurring during reasonably probable seismic events. These potential hazards include liquefaction, lateral spreading, tsunami, fault displacement, subsidence, and landslides.

RAI#3, H5: GEOLOGIC AND SOIL STABILITY

(Follow-Up) The June 12 letter (see H1 above) also refers to a seismic hazard analysis. Please provide the results of that analysis. Explain how the facility would be designed to avoid dangers to human safety from identified seismic hazards.

[Comment: Note that under the amended Council's rules, RAI H5 addresses OAR 345-021-0010(1)(h)(F) and H.]

SEISMIC HAZARD ANALYSIS

The attached Seismic Hazard Analysis Report dated September 5, 2007, addresses seismic hazards at the project site. Based on the analysis, risks to human safety resulting from seismic activity are considered low. Site features and facilities engineered to current code requirements and the recommendations contained in this report will provide adequate protections. No additional limitations are anticipated.

Seismic Hazard Assessment
Shepherd Flats Wind Project
Arlington, Oregon

September 2007

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

At Shannon & Wilson, our mission is to be a progressive, well-managed professional consulting firm in the fields of engineering and applied earth sciences. Our goal is to perform our services with the highest degree of professionalism with due consideration to the best interests of the public, our clients, and our employees.

Submitted To:

Attn: Mr. Derrel Grant
Caithness Shepherd Flats WP, LLC
565 Fifth Avenue, 29th Floor
New York, New York 10017

By:
Shannon & Wilson, Inc.
303 Wellsian Way
Richland, Washington 99352

22-1-02474-002

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

50 Years 1954–2004

September 5, 2007

Caithness Shepherd Flats WP, LLC
565 Fifth Avenue, 29th Floor
New York, New York 10017

Attn: Mr. Derrel Grant

RE: SEISMIC HAZARD ASSESSMENT; SHEPHERD FLATS WIND PROJECT; ARLINGTON, OREGON

Shannon & Wilson, Inc. is pleased to present this seismic hazard assessment for the Shepherd Flats Wind Project near Arlington, Oregon. We conducted the assessment in general accordance with our proposal dated June 13, 2007.

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 further service to you, please contact us.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Burrie, P.E.
Branch Manager

KPC:WJP:DJB/kpc

09-05-2007/22-1-02474-002.SFWP Seismic Hazards.rpt/evm

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SHEPHERD FLATS WIND PROJECT
ARLINGTON, OREGON

1.0 INTRODUCTION

This report presents our seismic hazard assessment for the proposed Shepherd Flats Wind Project near Arlington, Oregon. We understand that a seismic hazard assessment is required by the Oregon Department of Energy to continue the project application process. To provide the required seismic hazard assessment, our scope of work for this report includes:

- description of the historic seismicity in the vicinity of the site,
- characterization of the tectonic setting and potential seismogenic sources that may pose a ground shaking hazard to the site,
- calculation of maximum credible earthquake (MCE), maximum probable earthquake (MPE), and International Building Code (IBC) seismic design spectra for the site, and
- evaluation of earthquake-induced geologic hazards.

This work is based primarily on a literature review of published studies and maps and was performed in general accordance with our proposal dated June 13, 2007.

2.0 SITE DESCRIPTION

The Shepherd Flats Wind Project is located in western Morrow County and eastern Gilliam County near Arlington, Oregon. The site topography is characterized as gently rolling uplands dissected by Eight- and Four-mile canyons and smaller drainages into these canyons and Willow Creek along the east edge of the site. Canyon and drainage wall slopes are typically moderate (5-15 percent) to steep (>15 percent).

The project is divided into a northern and southern unit. The south unit consists of approximately 100 wind turbines and includes a project formerly known as the Shepherds Ridge project. The southern unit is primarily located in T1N, R22E, in Gilliam County, T1N, R23E and T2N, R23E, WM in Morrow County. The area around the southern unit is primarily cultivated farmland with some undeveloped areas. The north unit consists of approximately 200 wind turbines and is located primarily in the Hurlburt Flats area of T2N and T3N, R22E WM in northeastern Gilliam

County. Land use in the north unit area is primarily grazing. Little cultivated cropland is present within the northern unit project area.

3.0 LOCAL GEOLOGY AND SUBSURFACE CONDITIONS

Based on maps from the Oregon Geologic Data Collection project and the Oregon Department of Geology and Mineral Industries' *Geologic and Neotectonic Evaluation of North-Central Oregon: The Dalles 1° x 2° Quadrangle* (GMS-27), the site is underlain by loess, Missoula Flood Sediments, and deposits from the Dalles Group overlying Elephant Mountain and Pomona members of the Saddle Mountain Basalt. Minor alluvial fill in stream valleys also occurs. The presence of loess, underlain by Missoula Flood Sediments or deposits from the Dalles Group, in turn underlain by Saddle Mountain Basalt in the southern unit was confirmed by a preliminary geotechnical engineering study by Shannon & Wilson, Inc. in April 2004. Based on this study, a typical subsurface profile consists of about 6 to 25 feet of silt (loess), underlain by very dense gravel (Missoula Flood Sediments or deposits from the Dalles Group). The base of the gravel is often cemented, forming a layer of caliche. We interpret subangular gravel cuttings observed in the borings to be weathered Basalt rock beneath the silt and gravel soils at depths of about 27 feet or greater. Based on our observations and review of the available geologic data, it is likely that the subsurface profile in the north unit is similar to the south and consists of a thin mantle of silty soil overlying heavily cemented soil, gravel (caliche), and shallow basalt bedrock.

4.0 HISTORIC SEISMICITY

The project site is located in a moderately active tectonic region that has been subjected to numerous earthquakes of low to moderate strength and occasional strong shocks during the brief, 170-year historical record in the Pacific Northwest (see Figure 2). The largest historic earthquakes in Washington and Oregon, beginning in 1872, are listed in Table 1 (Goter 1994, Pacific Northwest Seismic Network). The largest of these include the 1872 magnitude 6.8 North Cascades, the1918 magnitude 7.2 Central Vancouver Island, and the 1949 magnitude 7.1 Olympia earthquakes.

The 1872 magnitude 6.8 North Cascades earthquake is estimated to have occurred near the southeast end of Lake Chelan, Washington (Bakun et al., 2002) with a maximum intensity of VIII on the Modified Mercalli Intensity (MMI) scale. The MMI scale goes up to XII and is based on reports of people who felt the earthquake. For comparison, the largest earthquake recorded by seismograms occurred in Chile in 1960 (magnitude 9.5) with a maximum MMI=X.

TABLE 1

NOTABLE WASHINGTON AND OREGON EARTHQUAKES 1872-PRESENT	
Earthquake	**Magnitude**
North Cascades, December 15, 1872	6.8
Southwest Oregon, November 23, 1873	6.8
Portland, Oregon, October 12, 1877	5.5
Central Vancouver Island, December 6, 1918	7.2
Milton-Freewater, July 16, 1936	6.1
Central Puget Sound, November 13, 1939	5.8
Northern Idaho, November 1, 1942	5.5
Central Puget Sound, February 15, 1946	6.1
Olympia, Washington, April 13, 1949	7.1
Portland, Oregon, November 6, 1962	5.2
Seattle-Tacoma, April 29, 1965	6.5
Elk Lake (SW Washington), February 14, 1981	5.5
Scotts Mills, Oregon, March 25, 1993	5.6
Klamath Falls, Oregon, September 21, 1993 (double event)	5.9, 6.0
Satsop, Washington, July 3, 1999	5.8
Nisqually, Washington, February 28, 2001	6.8

For this study, we searched multiple earthquake catalogs and developed a list of magnitude 2.0 or greater earthquakes within approximately 50 miles of the site. The following is a list of catalogs included in the earthquake search:

1. University of Washington (1969-1996)
2. California-Nevada General Catalogs, Reno (1860-1993)
3. Montana Bureau of Mines (1989-1995)
4. National Geodetic Data Center (NGDC), U.S. General Data for the 1990's (1990-1996)
5. U.S.G.S. U.S. Earthquake History (1568-1989)
6. University of Washington (1995-May 1996)
7. Decade of North American Geology (DNAG)

A list of earthquakes within 50 miles of the site is presented in Appendix A. The list contains 896 earthquakes between 1866 and 2007. Beginning in about 1970, there were enough seismographs in the region to accurately detect and measure most significant earthquakes. This explains the limited earthquake data reflected in the list prior to 1969. The largest recorded earthquake within 50 miles of the site is 4.8, recorded for 3 events on the same day in 1976.

In addition to the list of earthquakes within 50 miles of the site, we provide a list of all historic earthquakes that caused shaking at the site greater than MMI III. We identified MMI shaking intensities at the site from published isoseismal maps if they were available. Where we did not find isoseismal maps, we relied on published written accounts and estimates of MMI for nearby cities and towns. From our search of the literature and seismic catalogs we identified 10 earthquakes, listed in Table A-2, which resulted in MMI III ground shaking or greater. As shown on this table, the maximum site MMI was estimated to be V from the 1872 magnitude 6.8 North Cascades and the 1936 magnitude 5.8 Southeastern Washington earthquakes, and represents the greatest historic ground shaking at the site.

5.0 TECTONICS AND SEISMOGENIC SOURCES

The tectonics and seismicity of the region are the result of ongoing, oblique, relatively northeastward subduction of the Juan de Fuca Plate beneath the North American Plate along the Cascadia Subduction Zone (CSZ). The subduction zone extends from Northern California to central Vancouver Island in British Columbia along the Pacific coast (see Figure 3). The forearc of the subduction zone consists of sedimentary and volcanic rocks in an accreted outer-arc high of (i.e., Coast Range) and forearc basin (i.e., Willamette Valleys) in front of a landward, mountainous, active volcanic arc (Cascade Mountains). North-central Oregon and the site are located in the Columbia Plateau physiographic province, within the continental backarc of the subduction zone immediately behind the forearc. The Columbia Plateau is a vast sequence of flood basalts deposited by volcanic eruption during the Miocene in northeastern Oregon, eastern Washington, and western Idaho.

The convergence of the Juan de Fuca and North American Plates not only results in east-west compressive strain, but also results in dextral shear, and clockwise rotation of crustal blocks in the fore-, volcanic-, and backarc regions of the North American Plate (Wells et al., 1998). The shear and clockwise rotation results in extension in the southern portion of the backarc and is manifest in the basin and range extensional faulting in southeast Oregon. Farther north in north-central Oregon and central Washington, the rotation results in north-south directed compression on the order of 1 to 2 mm per year (McCaffrey et al., 2007) and southwest to northwest trending folds and faults (see Figure 4).

Within the present understanding of the regional tectonic framework and historical seismicity, three broad seismogenic sources have been identified:

- A mega-thrust source at in interface between the North American and Juan de Fuca plates in the CSZ.
- A deep subcrustal zone (intraslab) in the subducted Juan de Fuca Plate and Gorda plates in the CSZ.
- A shallow crustal zone within the North American Plate.

These broad seismogenic source zones are illustrated on Figure 3.
The seismic hazard assessment required by the Oregon Department of Energy includes identification of potential seismogenic sources capable of producing a peak ground acceleration (PGA) for rock conditions of 0.05g or greater. Therefore, PGA for rock conditions at the site from these seismogenic sources is presented in the following discussion of each source.

5.1 Cascadia Subduction Zone Mega-Thrust

CSZ mega-thrust earthquakes would occur at the interface between the subducting Juan de Fuca and North American Plates along the Pacific Northwest coast line (see Figure 3). No large earthquakes have occurred in this zone during historical times (170 years). Geologic evidence suggests that coastal estuaries have experienced rapid subsidence at various times within the last 2,000 years (e.g., Atwater, 1987, and Atwater and Hemphill-Haley, 1997) as a result of tectonic movement associated with mega-thrust earthquakes on the CSZ. It appears that ruptures of this zone have occurred at irregular intervals, spanning about 100 to more than 1,200 years with an average recurrence interval of about 400 to 600 years (Atwater and Hemphill-Haley, 1997). Rupture of this zone could result in earthquakes with magnitudes on the order of 8½ to 9. Based on historical tsunami records in Japan (Satake and others, 1996; Satake and others, 2003), the most recent interplate event on the CSZ was a magnitude 9 event on January 26, 1700. Because of the significant uncertainty pertaining to the landward extent of a potential rupture surface, estimates of the closest distance between the project and potential rupture surface range from about 290 to 350 km.

The estimated mean PGA at the site for rock conditions for a magnitude 9 and distance of 290 km is approximately 0.05g, based on the ground motion attenuation relationship by Atkinson and Boore (2003).

5.2 Cascadia Subduction Zone Intraslab

Deep, subcrustal, intraslab earthquakes can occur in the subducted portions of the Juan de Fuca Plate beneath the North American Plate (see Figure 3), typically at depths of 25 to 38 miles. Earthquakes within this zone are associated with tensional forces that develop in the subducted plate because of mineralogical and density changes in the plates at depth. The largest historical earthquakes from this source include the magnitude (M_s) 7.1 Olympia earthquake of April 13, 1949; the magnitude (m_b) 6.5 Seattle-Tacoma earthquake of April 29, 1965; and the recent February 28, 2001, magnitude (M_W) 6.8 Nisqually earthquake. All three of these events were located in the subducted Juan de Fuca slab beneath western Washington at depths of 32 miles and greater. Ludwin and others (1991) estimate that the maximum magnitude from this source zone would be about 7.5.

The estimated mean PGA at the site for rock conditions for a magnitude 7.5 and distance of 290 km is approximately 0.01g, based on the ground motion attenuation relationship by Atkinson and Boore (2003) and is lower than the 0.05g criteria in the required state assessment. In our opinion, the ground shaking from this source does not pose a significant hazard, and no further consideration is given for this source in this report.

5.3 Shallow Crustal Faults

Shallow, crustal earthquakes within the backarc have historically occurred in a diffuse pattern (see Figure 2). The largest historical event is the 1872 North Cascades earthquake (estimated magnitude about 6.8 in the vicinity of Lake Chelan, approximately 230 km north of the site). However, surface rupture from this large event or other historical shallow crustal earthquakes in the Columbia Plateau has not been observed.

To estimate the mean PGA at the site from the shallow crustal faults, we first identified mapped crustal faults within approximately 200 km of the site. We estimated the fault magnitudes based on relationships by Wells and Coppersmith (1994). The fault traces provided in the US Geolgocial Survey (USGS) fault database (USGS, 2006) were used to determine the distance between each fault and the site. The calculated magnitude and distance for each fault was used in attenuation relationships by Abrahamson and Silva (1997), Boore et al. (1997), Campbell and Bozorgnia (2003), and Sadigh et al. (1997) for rock site conditions to determine the mean PGA. We identified eleven faults capable of producing peak ground accelerations greater than 0.05g on rock at the site. These sources are summarized in Table 2.

TABLE 2

Earthquake Source	U.S.G.S. ID	Location, County & State	Slip Mechanism	Fault Length (km)	Minimum Epicentral Distance (km)	Magnitude	Calculated pga (g) on Rock
Ahtanum Ridge	564a&b	Yakima, WA	Thrust	59.7	84.9	7.2	0.06
Arlington-Shutler Buttes	847	Yakima & Klickitat, WA Gilliam, OR	Strike slip	52	0	7.1	0.64
Columbia Hills structures	568	Klickitat & Benton, WA	Thrust	161	5.8	7.7	0.68
Faults near The Dalles	580	Klickitat, WA Wasco & Sherman, OR	Strike slip	54	55.4	7.1	0.08
Horse Heaven Hills structures	567	Yakima, Klickitat, & Benton, WA	Thrust	179	60.6	7.7	0.09
Luna Butte	579	Klickitat, WA & Gilliam, OR	Strike slip	31	25.4	6.8	0.13
Mill Creek	566a&b	Yakima, WA	Thrust	56.5	51.5	7.0	0.09
Rattlesnake Hills structures	565	Yakima & Benton, WA	Thrust	108	78.2	7.5	0.06
Saddle Mountain	562a&b	Kittitas, Grant, Adams, Franklin, WA	Thrust	90.9	105.6	7.2	0.05
Unnamed near Tygh Ridge	850	Wasco, OR	Normal	26	64.1	6.7	0.05
Unnamed northwest of Condon	814	Sherman & Gilliam, OR	Normal	22	28.3	6.6	0.11

The earthquake magnitudes listed on Table 2 are conservatively based on rupture of the entire length of the fault and that the faults are not segmented. Because of the conservatism in the maximum magnitude estimate, the mean PGA estimated from the magnitude may also be conservative.

Slip rates for each fault on Table 2 are also provided by the USGS (USGS, 2006). The reported slip rates for all faults on Table 2 are less than 0.2 mm per year, with the exception of Saddle Mountain which is reported between 0.2 and 1.0 mm per year. For the estimated earthquake magnitudes, these slip rates imply that the recurrence interval for large earthquakes on these faults would be on the order of several thousand years. The USGS also provides direct estimates of the potential range of earthquake recurrence intervals for Ahtanum Ridge, Horse Heaven Hills, Mill Creek, Rattlesnake Hills, and Saddle Mountain Faults. The average earthquake recurrence intervals (based on the reported range) for the individual faults vary from about 4,400 years (Mill Creek Fault) to 25,000 years (Ahtanum Ridge and Horse Heaven Hills Fault).

6.0 GROUND MOTION COMPARISON

We present ground motions in accordance with current building codes (IBC 2003 and 2006). We also calculated response spectra at the site for the Maximum Credible Earthquake (MCE) for each of the eleven crustal faults identified in Table 2 and for the CSZ mega-thrust and provided ground motions for a Maximum Probable Earthquake (MPE) defined in the Oregon Department of Energy requirements as ground motions with a 10 percent probability of exceedance in 50 years (about a 500-year return period). As required by the Oregon Department of Energy, we compared MCE and MPE ground motions to current building codes and identified spectra that are greater than those prescribed in the building code. The building code, MCE and MPE response spectra were developed for expected site soil conditions, i.e. IBC Site Class D.

6.1 Oregon Building Code

Computation of forces used for seismic design for the IBC 2003 and 2006 codes are based on seismological input and site soil response factors.

The seismological inputs are short period spectral acceleration, S_S, and spectral acceleration at the 1 second period, S_1, shown on Figure 1615 in the code. S_S and S_1 are for a maximum considered earthquake, which correspond to ground motions with a 2 percent probability of exceedance in 50 years or about a 2,500 year return period (with a deterministic maximum cap in some regions). The spectral acceleration maps (i.e., S_S and S_1) have recently been updated in the 2006 IBC and are about 10 percent higher than the 2003 values in the project vicinity. The 2006 IBC mapped S_S and S_1 values in the project vicinity are 0.46g and 0.15g, respectively.

The site soil response factors are based on determination of the Site Classification. Based on the likely subsurface conditions at the site, it is our opinion that the site is best classified as Site Class D. The F_a value corresponding to Site Class D and S_S of 0.46g is 1.43. The F_v value corresponding to Site Class D and S_1 of 0.15g is 2.22.

The S_S, S_1, F_a, and F_v corresponding values are used to characterize a "Maximum Considered Earthquake," which, as previously described, corresponds to ground motions with about a 2,500 year return period. The design spectrum defined in the IBC is 2/3rds of the "Maximum Considered Earthquake" spectrum. The corresponding 2006 IBC design response spectrum is shown on Figure 5.

6.2 Maximum Credible Earthquake

Ground motion attenuation relationships for soil conditions were used to calculate MCE ground motions at the site for each of the eleven crustal faults listed in Table 2 and for a mega-thrust event on the CSZ using the maximum magnitudes and site-to-source distances described in this report. The relationships for the crustal faults are those by Abrahamson and Silva (1997), Boore et al. (1997), Campbell and Bozorgnia (2003), and Sadigh et al. (1997). The ground motion attenuation relationship by Atkinson and Boore (2003) was used for the CSZ. The calculated response spectra are presented on Figure 6 for periods up to 4 seconds.

The 2006 IBC is also plotted on Figure 6 for comparison. The IBC spectrum is greater than all MCE spectra with the exception of the Columbia Hills and Arlington-Shutler Buttes shallow crustal sources at all periods, Horse Heaven Hills source at periods between about 1.3 and 3.7 seconds, and the CSZ mega-thrust at periods between about 0.5 and 3 seconds. The CSZ mega-thrust exceeds the IBC by a factor of up to about 2 and the Horse Heaven Hills source exceeds the IBC by about 10% or less. The Columbia Hills and Arlington-Shutler Buttes MCE spectra are greater than the IBC spectra by a factor of about 3 to 5 (depending on period). While the MCE spectra for these crustal sources are significantly greater than the 2006 IBC spectrum, the estimated earthquake recurrence interval for large earthquakes on these structures is on the order of several thousands of years and significantly longer than the 2,500 year ground motion return period explicit in the 2006 IBC code.

6.3 Maximum Probable Earthquake

MPE ground motions (10 percent probability of exceedance in 50 years) are plotted on Figure 7. This spectrum was calculated by using the procedure outlined in the 2003 IBC Sections 1615.1.2 through 1615.1.4 for Site Class D but with the short period spectral acceleration (S_S) and the spectral acceleration at the 1 second period (S_1) corresponding to 10 percent probability of exceedance in 50 years. The 10-percent-probability-of-exceedance-in-50-years S_S and S_1 values were obtained from the USGS National Seismic Hazard Mapping project (USGS, 2007) and are 0.20g and 0.07g, respectively.

The 2006 IBC is also plotted on Figure 7 for comparison. As expected, the MPE spectrum is less than the 2006 IBC spectrum at all periods.

7.0 DESIGN SPECTRUM

We understand that the project will be designed in accordance with the provisions in the 2006 IBC. For preliminary seismic design, the 2006 IBC spectrum presented in section 6.1 of this report and shown on Figure 5 may be used.

The Site Class D spectrum should be considered preliminary as it is based on assumed subsurface site conditions that, in fact, may vary somewhat across the site. We anticipate further explorations could result in revision to the assumed IBC site classification in some areas of the site. In our opinion, if the site classification changes in some areas, it would most likely change from Site Class D to a stiffer Site Class C; it is unlikely to change to a less stiff Site Class E.

We understand that the wind turbines structures may have a fundamental period on the order of 3 to 4 seconds. As noted in section 5.3 of this report, the MCE spectrum for the CSZ mega-thrust is significantly greater than the 2006 IBC design spectrum for periods between about 0.5 and 3 seconds. Because the average recurrence interval for earthquakes from this source is about 500 years (the 2006 design spectrum is based on ground motions with a return period of 2,500 years), we recommend that the owner consider modifying the design spectrum by increasing the spectral values for periods between 0.5 and 3 seconds to the CSZ mega-thrust MCE values.

8.0 EARTHQUAKE-INDUCED GEOLOGIC HAZARDS

Earthquake-induced geologic hazards that may affect a given site include landsliding, fault rupture, settlement, tsunami or seiche, and liquefaction and associated effects (loss of shear strength, bearing capacity failures, loss of lateral support, ground oscillation, lateral spreading, etc.). In our opinion, the potential occurrence of these hazards at the site is relatively low.

With regard to earthquake-induced landsliding, we visited the site and have reviewed USGS topographic maps, aerial photos of the site, geologic maps, and the logs of the limited subsurface explorations. The subsurface soils and rock are relatively competent, and with the relatively flat upland topography over much of the site, pose a relatively low hazard of landsliding. The landslide hazard may be somewhat greater along the steep valley walls. Based on our experience, we would anticipate that instability along the valley walls would be relatively shallow, potentially consisting of rock and soil falls and topples.

With regard to fault rupture, The Arlington-Shutler Buttes fault approaches the site relatively closely. While this fault may pose a ground rupture hazard, in our opinion, the hazard is very low as the recurrence interval for large earthquakes on this fault appears to be on the order of several thousands years.

The potential for earthquake-induced water waves (i.e., tsunami or seiche) is very low as the nearest significant body of water is the Columbia River, and the site is several hundred feet above the river elevation.

In our opinion, the potential for earthquake-induced settlement and liquefaction is relatively low. Earthquake-induced settlement and liquefaction typically occur in loose, saturated (in the case of liquefaction) cohesionless soils. Our preliminary borings indicate that the site is underlain by silt over very dense gravel. We anticipate that groundwater is relatively deep at the site and below the silt. Therefore, the liquefaction potential in the silt at the site is very low. The gravels that may potentially be saturated at depth are sufficiently dense to preclude liquefaction for the design ground motions.

We trust that this information meets your needs for this project at this time. Please contact us if you have questions, comments, or if we can be of further assistance in any way.

SHANNON & WILSON, INC.

Kenneth P. Cecil, P.E.
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
14,357
OREGON
MAY 30, 1989
DEE J. BURRIE

9/5/07

Dee J. Burrie, P.E.
Vice President

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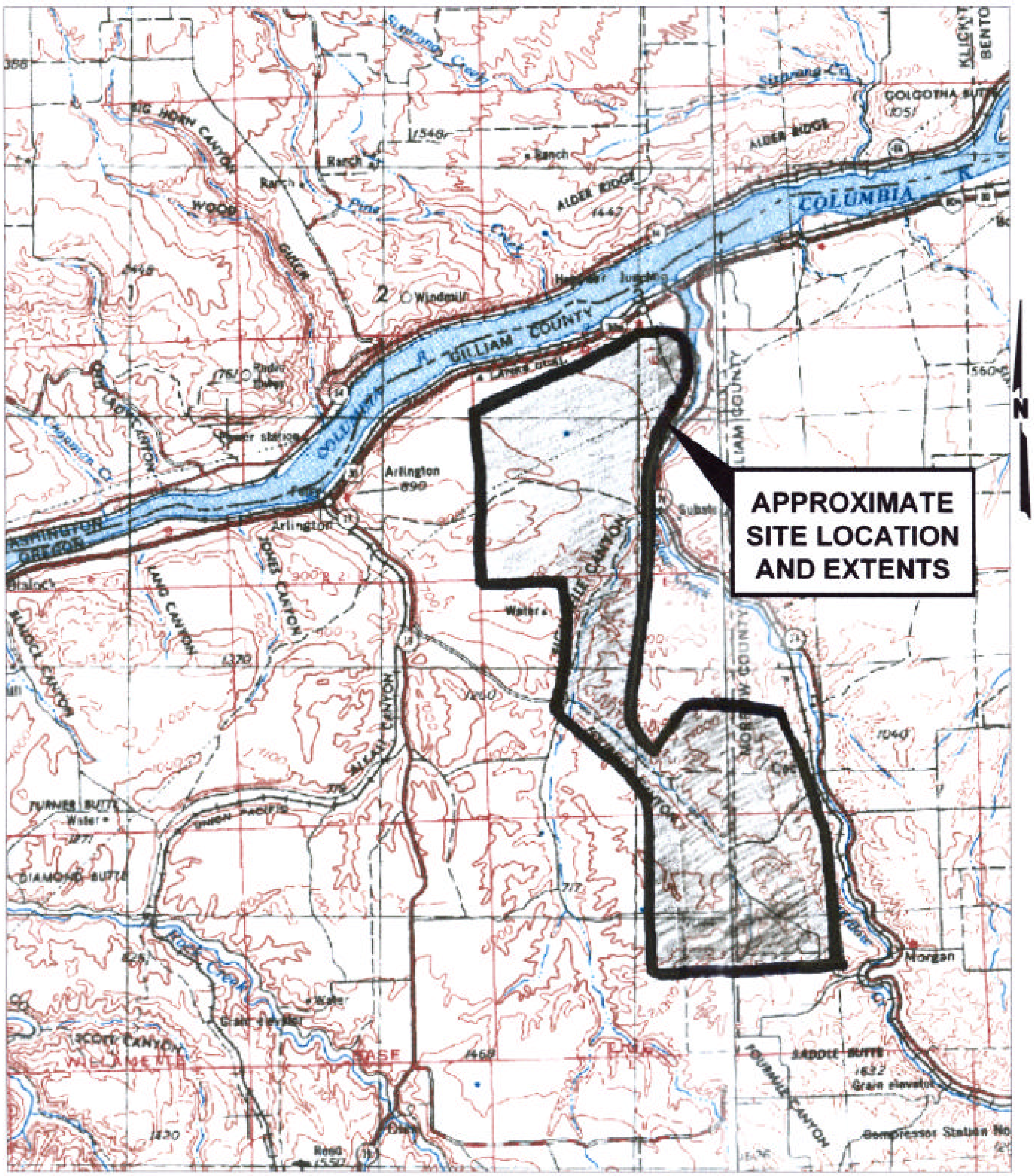
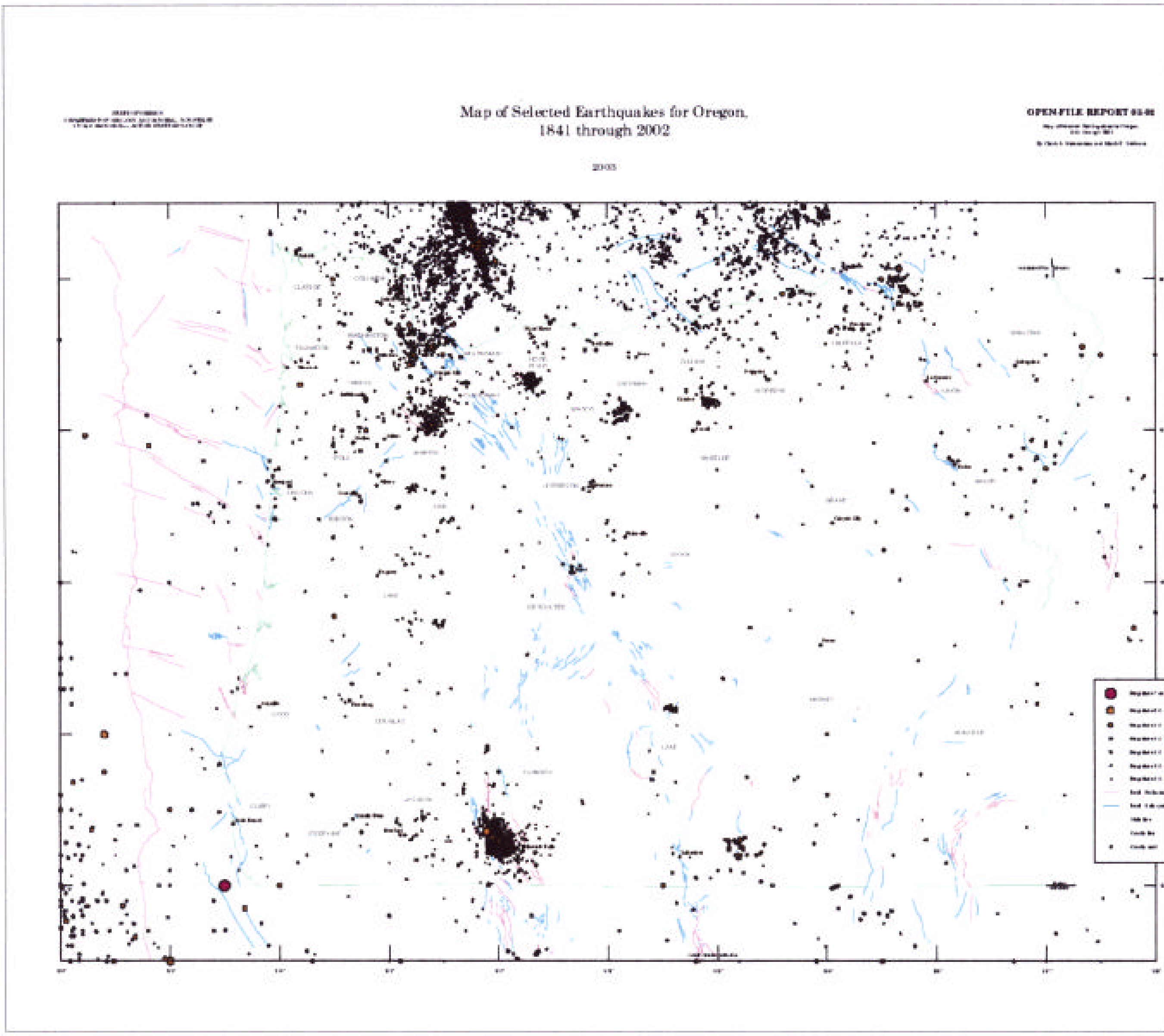


<u>NOT TO SCALE</u>

Map adapted from 1:250,000 USGS topographic maps of The Dalles (1953, photorevised 1971) and Pendleton (1953, photorevised 1971), OR and WA.

Shepherd Flats Wind Project Morrow and Gilliam Counties, Oregon	
VICINITY MAP	
August 2007	22-1-02474-002
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. 1**



NOT TO SCALE

Map from Oregon Department of Geology and Mineral Industries OFR 03-02 (2003).

Shepherd Flats Wind Project
Morrow and Gilliam Counties, Oregon

OREGON SEISMICITY MAP

August 2007 | 22-1-02474-002

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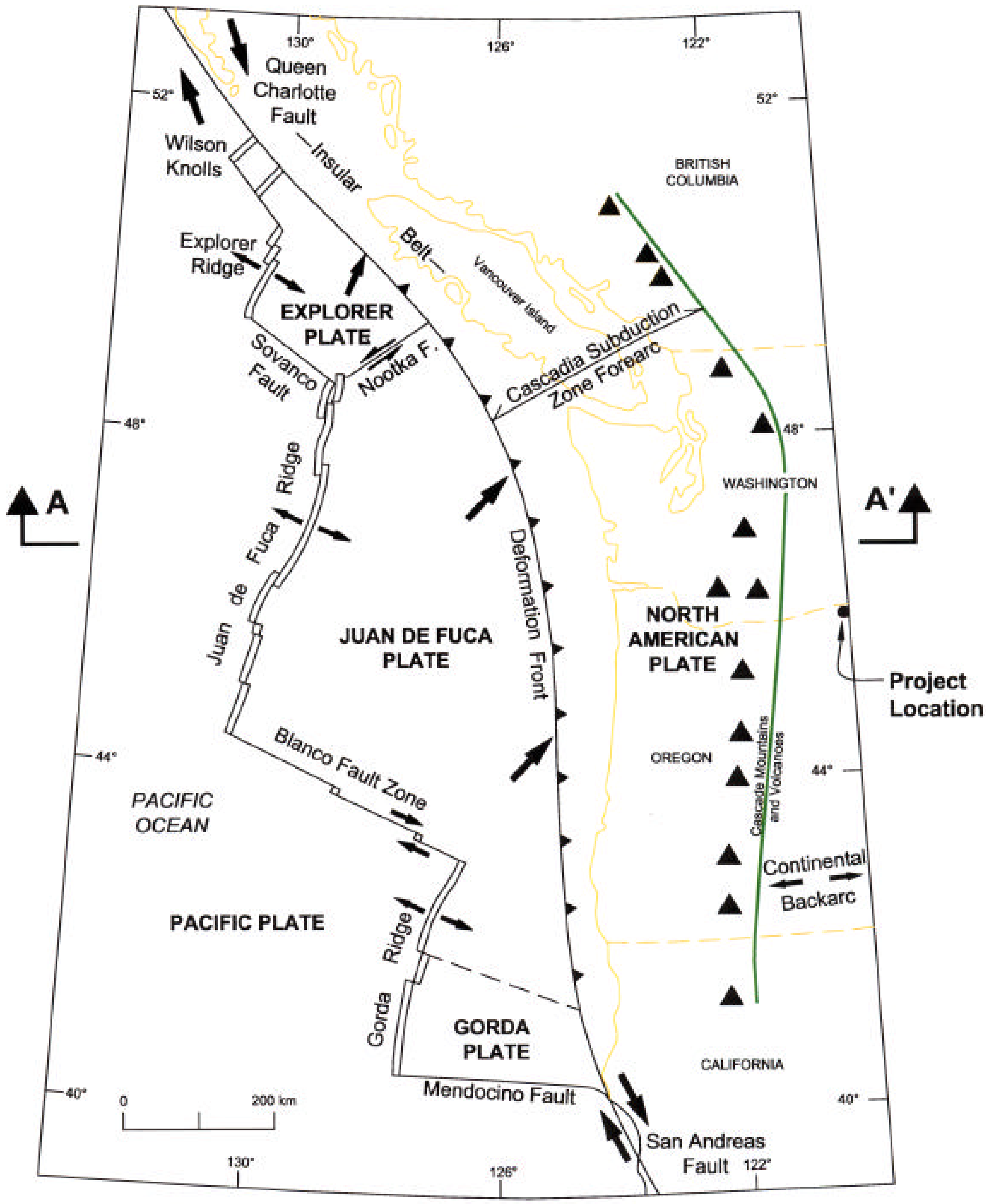
FIG. 2



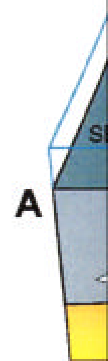
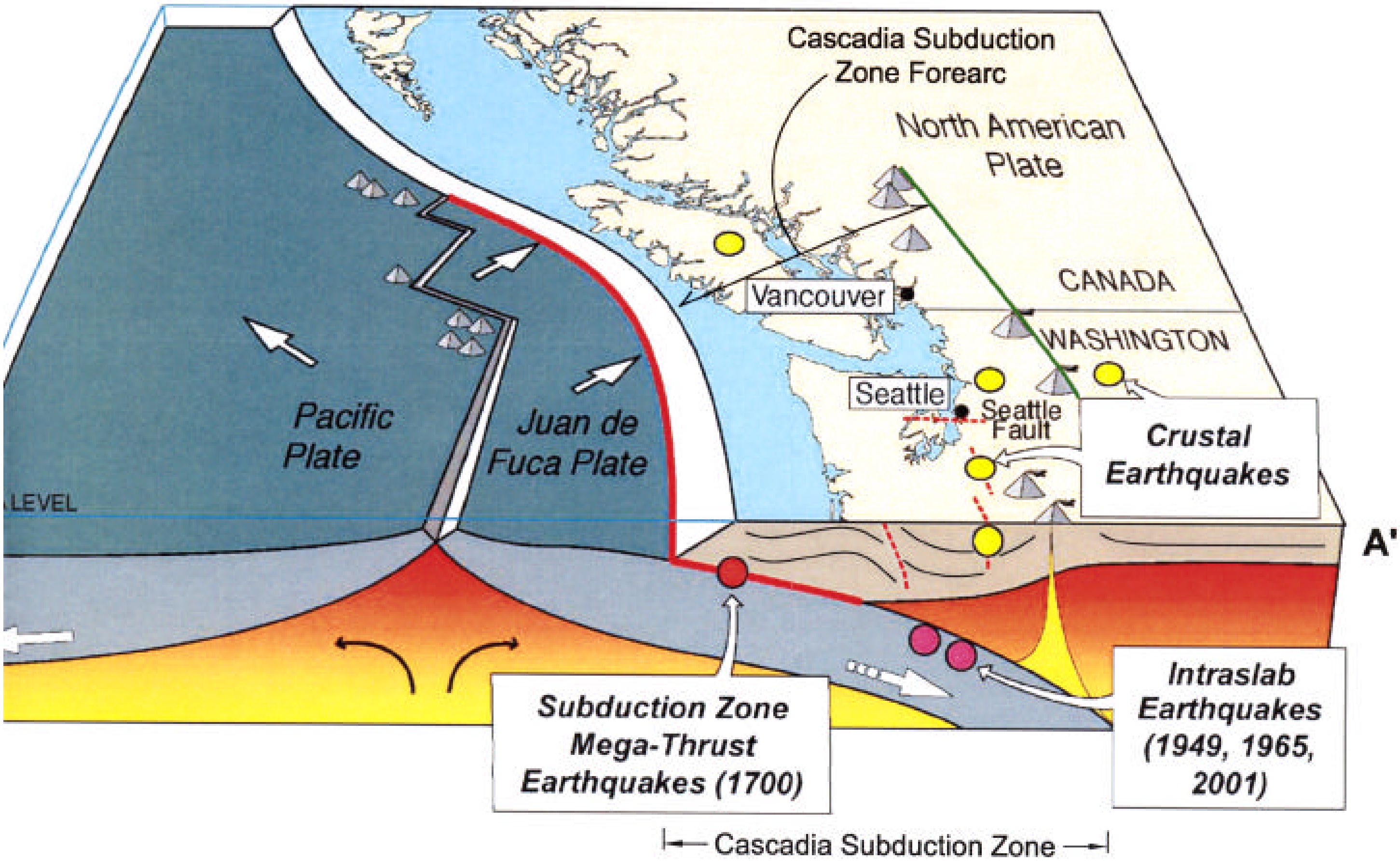


PLATE BOUNDARIES

LEGEND

A — Typical Geologic Cross Section Location

Filename: J:\221\02474-002\22-1-02474-002 Fig 3.dwg Date: 08-23-2006 Login: CNT



TYPICAL GEOLOGIC CROSS SECTION

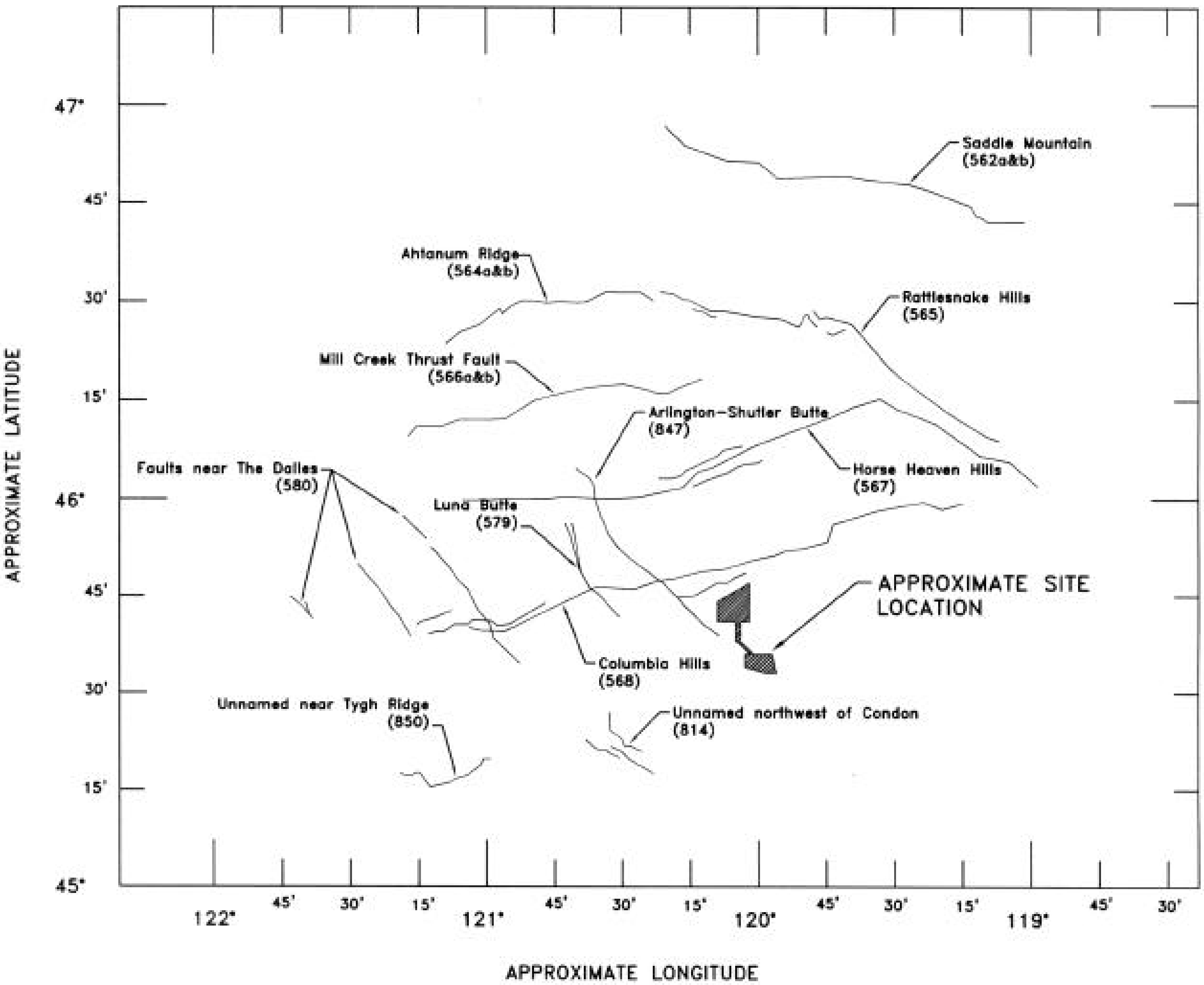
Not to Scale

NOTES

1. Plate boundaries map based on Hyndman and Wang (1993), Peterson et al. (1993), and Geomatrix (1995), Stanley et. al, (1999).

2. Typical geologic cross section figure adapted from USGS Pacific Northwest Geologic Mapping and Urban Hazards.

Shepherds Flat Wind Project Morrow and Gilliam Counties, Oregon	
CASCADIA SUBDUCTION ZONE	
August 2007	22-1-02474-002
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	**FIG. 3**



NOTE: LOCATION OF FAULTS BASED ON USGS 1° X 2° YAKIMA, WALLA WALLA, THE DALLES, AND PENDLETON A.M.S. SHEETS .

Shepherd Flats Wind Project
Morrow and Gilliam Counties, Oregon

SHALLOW CRUSTAL FAULT MAP

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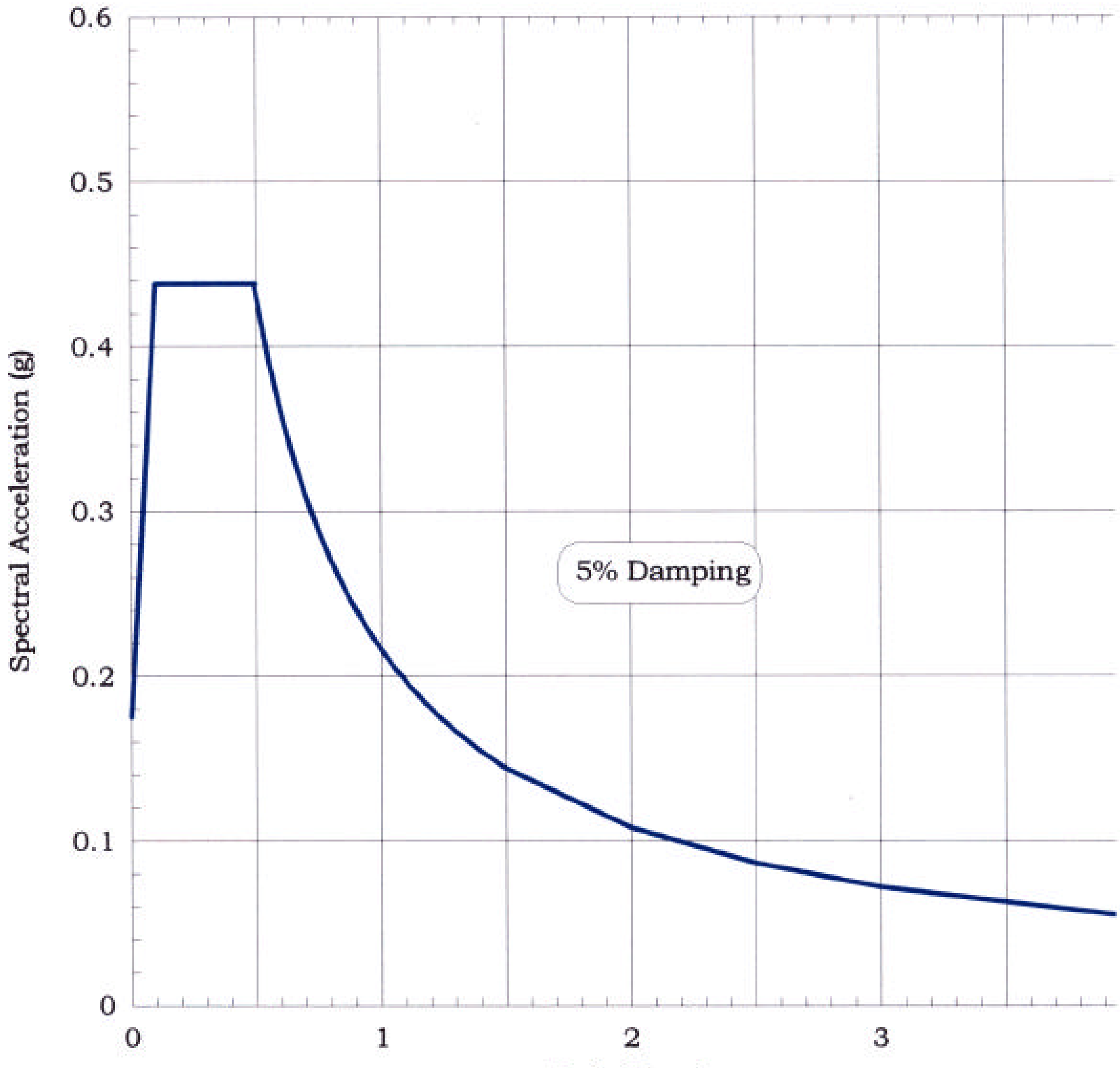
FIG. 4



Shepherd Flats Wind Project
Morrow and Gilliam Counties, Oregon

2006 IBC RESPONSE SPECTRUM

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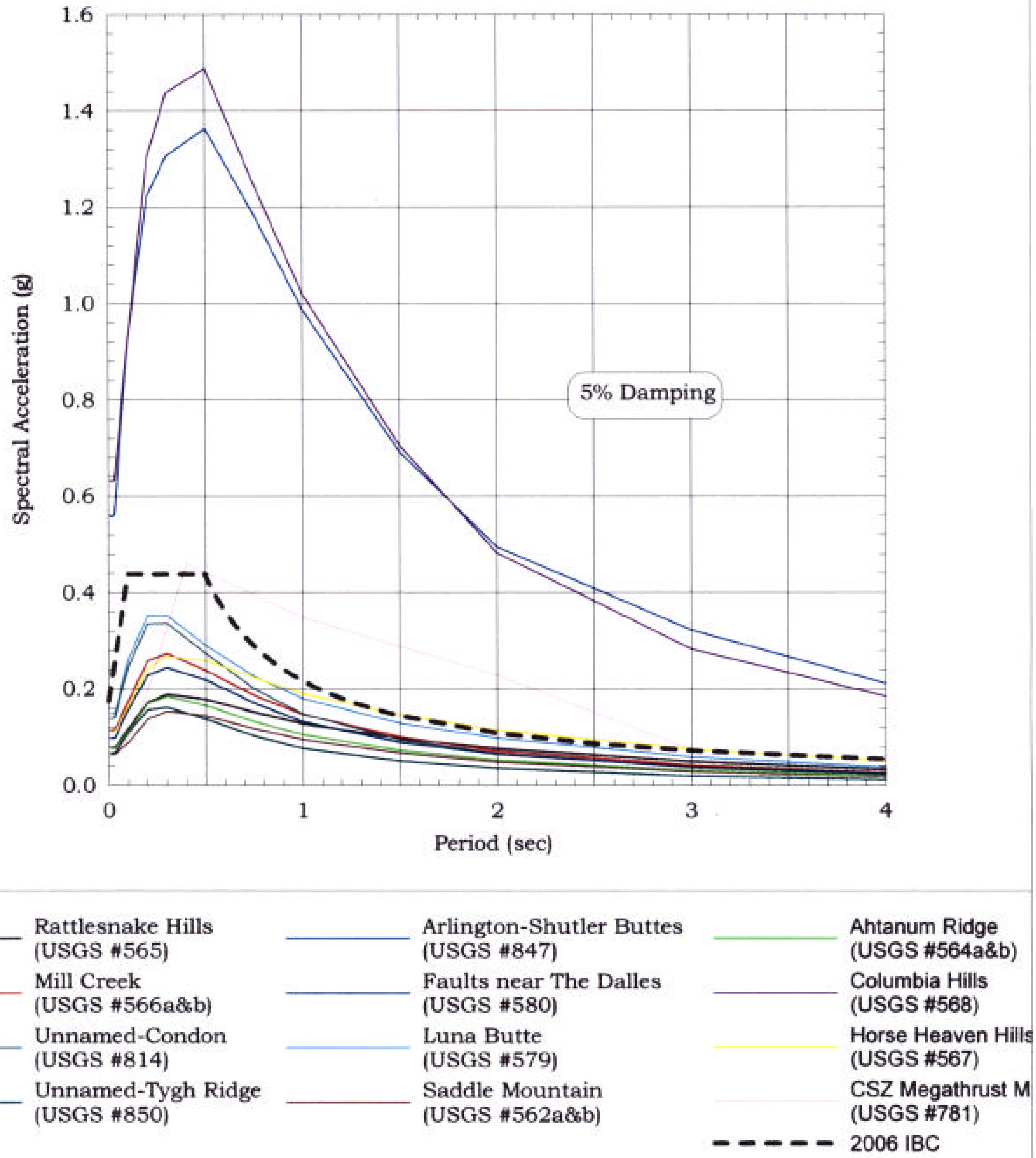
FIG. 5



NOTE: THIS FIGURE PRESENTS GROUND SURFACE ACCELERATION RESPONSE SPECTRA AT THE SITE FOR ALL FAULTS IDENTIFIED IN THE STUDY AS CAPABLE OF PRODUCING A PGA ON ROCK GREATER THAN 0.05g.

Shepherd Flats Wind Project
Morrow and Gilliam Counties, Oregon

MCE RESPONSE SPECTRA

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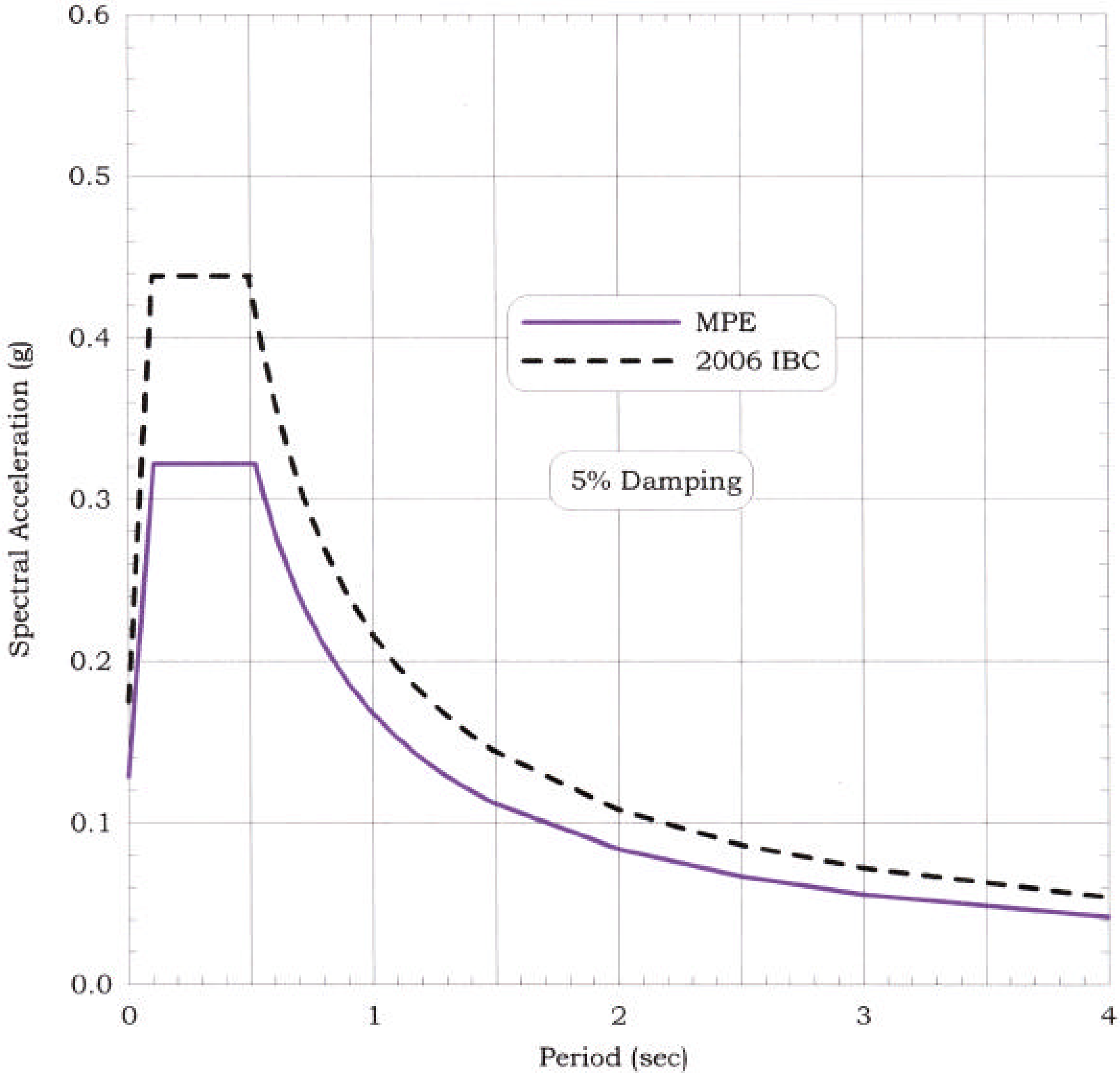
FIG. 6



Shepherd Flats Wind Project
Morrow and Gilliam Counties, Oregon

MPE RESPONSE SPECTRUM

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FIG. 7

APPENDIX A

HISTORIC EARTHQUAKES

Table A-1. Historic Earthquakes within 50 miles of the site.

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1866	11	24	45°32.0'	121°12.0'	Not Available
1866	12	-	45°32.0'	121° 6.0'	Not Available
1874	1	17	46°35.0'	120°30.0'	Not Available
1874	1	-	46°36.0'	120°31.0'	Not Available
1875	5	6	46°36.0'	120°31.0'	Not Available
1875	5	7	46°36.0'	120°31.0'	Not Available
1892	2	29	45°32.0'	121° 6.0'	Not Available
1893	3	7	45°54.0'	119°24.0'	Not Available
1918	2	28	46°30.0'	120°30.0'	4.3
1922	10	16	45°50.0'	119°14.0'	Not Available
1922	12	12	45°40.0'	118°45.0'	Not Available
1936	7	16	45°54.0'	119° 6.0'	Not Available
1936	7	17	45°56.0'	119°18.0'	Not Available
1936	8	4	45°55.0'	118°47.0'	Not Available
1944	1	9	46°36.0'	120°31.0'	Not Available
1948	12	20	45° 3.0'	120°10.0'	Not Available
1949	2	6	46°27.0'	120°25.0'	Not Available
1951	1	7	45°55.0'	119°14.0'	Not Available
1959	11	9	45°20.0'	119°32.0'	Not Available
1961	9	9	45°42.0'	120°12.0'	Not Available
1962	11	13	45°44.0'	120°26.0'	2.9
1963	1	17	44°57.0'	120°48.0'	3.0
1963	4	1	44°44.0'	119°13.0'	2.9
1964	1	15	45°54.0'	120° 0.0'	Not Available
1967	2	13	46°10.0'	119°50.0'	Not Available
1967	8	5	46° 6.0'	120° 0.0'	Not Available
1969	4	19	45°53.85'	119°42.21'	2.8
1969	4	19	45°47.0'	119°42.0'	3.2
1969	4	22	46°36.0'	119° 9.0'	2.3
1969	6	10	46°25.36'	119°17.07'	2.2
1969	6	10	46°25.0'	119°17.0'	2.5
1969	7	15	46°25.25'	119°16.76'	2.1
1969	7	15	46°25.0'	119°16.0'	2.2
1969	7	15	46°25.0'	119°15.0'	2.4
1969	7	24	46°25.0'	119°17.0'	2.1
1969	7	31	46°25.37'	119°16.87'	2.1
1969	7	31	46°25.0'	119°17.0'	2.4
1969	7	31	46°25.11'	119°17.07'	2.6
1969	7	31	46°25.0'	119°17.0'	2.9
1969	8	1	46°25.0'	119°17.0'	2.0
1969	8	1	46°25.54'	119°16.83'	2.1
1969	8	1	46°26.0'	119°16.0'	2.4
1969	8	2	46°25.0'	119°17.0'	2.2
1969	8	11	46°26.0'	119°16.0'	2.1
1969	8	15	46°25.27'	119°17.51'	2.3
1969	8	15	46°25.0'	119°17.0'	2.7
1969	8	21	46°26.0'	119°15.0'	2.0

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1969	8	22	46°25.49'	119°16.10'	2.0
1969	8	22	46°26.0'	119°15.0'	2.3
1969	8	31	46°25.44'	119°18.12'	2.3
1969	8	31	46°25.75'	119°17.50'	2.5
1969	8	31	46°25.0'	119°17.0'	2.6
1969	8	31	46°23.05'	120°56.98'	2.7
1969	8	31	46°26.0'	119°17.0'	2.8
1969	8	31	46°17.0'	120°44.0'	3.1
1969	9	2	46°27.09'	119°15.61'	2.1
1969	9	2	46°25.0'	119°16.0'	2.2
1969	9	2	46°26.0'	119°17.0'	2.4
1969	9	4	46°25.46'	119°16.01'	2.0
1969	9	4	46°25.0'	119°15.0'	2.3
1969	9	6	46°25.44'	119°16.19'	2.1
1969	9	6	46°26.0'	119°16.0'	2.4
1969	10	2	46°26.0'	119°16.0'	2.1
1969	11	10	46°33.0'	119°39.0'	2.2
1970	1	20	46°25.65'	119°18.21'	2.0
1970	1	20	46°26.0'	119°18.0'	2.3
1970	1	24	46°26.0'	119°18.0'	2.1
1970	1	30	46°26.0'	119°16.0'	2.1
1970	2	5	46°25.71'	119°17.99'	2.0
1970	2	5	46°26.0'	119°18.0'	2.3
1970	2	7	46°26.0'	119°18.0'	2.1
1970	2	8	46°26.0'	119°15.0'	2.2
1970	2	11	46°26.02'	119°15.57'	2.3
1970	2	11	46°26.0'	119°15.0'	2.6
1970	2	17	46°26.0'	119°17.0'	2.2
1970	3	3	46°26.0'	119°15.0'	2.0
1970	3	12	46°14.91'	119°34.68'	2.1
1970	3	12	46°17.0'	119°33.0'	2.4
1970	3	16	46°31.10'	119°34.08'	2.1
1970	3	16	46°32.0'	119°33.0'	2.4
1970	3	31	46°26.0'	119°17.0'	2.1
1970	4	4	46°26.0'	119°16.0'	2.2
1970	4	4	46°13.70'	120° 4.80'	2.7
1970	4	4	46°18.0'	119°54.0'	3.0
1970	4	22	46°17.93'	120° 9.31'	2.6
1970	4	22	46°18.0'	120° 8.0'	3.0
1970	4	25	46°26.0'	119°17.0'	2.2
1970	4	29	46°17.98'	120° 8.27'	2.5
1970	4	29	46°20.0'	120° 0.0'	2.8
1970	5	8	46°26.0'	119°18.0'	2.0
1970	5	8	46°21.94'	120° 4.05'	2.1
1970	5	8	46°22.0'	120° 5.0'	2.4
1970	5	18	46°25.0'	119°15.0'	2.1
1970	5	20	46°22.0'	120° 6.0'	2.2
1970	5	24	46°25.27'	119°18.35'	2.1

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1970	5	24	46°26.0'	119°18.0'	2.4
1970	5	29	46°25.86'	119°18.88'	2.0
1970	5	29	46°26.0'	119°18.0'	2.3
1970	6	19	46°18.14'	119°58.70'	2.1
1970	6	19	46°18.0'	119°58.0'	2.5
1970	6	22	46°25.71'	120° 9.06'	2.8
1970	6	22	46°28.0'	120° 1.0'	3.1
1970	6	24	46°14.96'	119° 6.95'	2.4
1970	6	24	46°13.0'	119° 5.0'	2.7
1970	6	26	46°15.0'	119° 7.0'	2.0
1970	6	26	46°25.0'	119°14.0'	2.0
1970	8	14	45°50.0'	119° 3.0'	2.3
1970	9	29	45°45.63'	119° 8.73'	2.5
1970	9	29	45°51.0'	119° 9.0'	2.7
1970	10	2	45°42.73'	120°38.41'	2.7
1970	10	2	45°46.0'	120°34.0'	3.0
1970	10	7	46°13.0'	119°35.0'	2.1
1970	11	7	46°25.45'	119°18.20'	2.0
1970	11	7	46°26.52'	119°17.49'	2.9
1970	11	8	46°24.17'	118°59.94'	2.0
1970	11	8	46°24.0'	119° 0.0'	2.1
1970	11	14	46°26.0'	119°18.0'	2.6
1970	11	14	46°25.79'	119°17.94'	2.9
1970	11	22	46°25.54'	119°17.93'	2.1
1970	11	27	46°26.42'	119°16.43'	2.0
1970	11	27	46°26.0'	119°15.0'	2.1
1970	11	27	46°26.52'	119°16.24'	2.3
1970	11	29	46°13.51'	120° 6.92'	3.0
1970	11	29	46°12.0'	120° 6.0'	3.0
1970	12	9	46°16.21'	119°57.07'	2.8
1970	12	9	46°16.0'	119°58.0'	2.9
1971	1	4	46°13.85'	119°21.79'	3.1
1971	1	4	46°13.0'	119°21.0'	3.1
1971	1	22	46°17.0'	120°23.0'	3.3
1971	2	12	46°16.07'	120°21.63'	2.4
1971	2	12	46°16.0'	120°23.0'	2.8
1971	4	29	46°11.0'	119°34.0'	2.1
1971	5	11	46°22.0'	119° 5.0'	2.0
1971	5	11	46°22.0'	119° 6.0'	2.0
1971	6	20	46°17.52'	119°24.08'	2.2
1971	8	20	46°16.18'	119°36.27'	2.2
1971	8	20	46°17.0'	119°35.0'	2.5
1971	10	6	46°17.49'	119°44.43'	2.1
1971	10	6	46°19.0'	119°42.0'	2.4
1971	10	11	46°27.0'	120°23.0'	2.1
1971	10	11	46°26.0'	120°24.0'	2.1
1971	10	14	46° 5.18'	120°35.87'	2.0
1971	10	14	46° 7.0'	120°35.0'	2.7

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1971	12	28	46°32.0'	120°10.0'	2.2
1972	1	22	46°19.79'	119°23.64'	2.3
1972	1	22	46°20.0'	119°23.0'	2.4
1972	2	4	45°42.58'	120° 4.41'	2.2
1972	2	4	45°40.0'	120°13.0'	2.5
1972	6	12	46°19.0'	119°34.0'	2.0
1972	8	20	45°35.42'	120° .87'	2.0
1972	8	20	45°33.74'	120° 1.07'	2.3
1972	8	20	45°35.0'	120° 3.0'	2.5
1972	8	20	45°38.0'	119°55.0'	2.7
1972	8	21	45°34.51'	119°59.34'	2.6
1972	8	21	45°38.0'	119°56.0'	2.9
1972	8	25	45°44.36'	119°54.89'	2.1
1972	8	25	45°31.0'	119°59.0'	2.4
1972	8	27	45°31.97'	120° .97'	2.5
1972	8	27	45°37.0'	119°53.0'	2.8
1972	10	19	45°47.0'	118°49.0'	2.2
1972	11	4	45°58.0'	120°54.0'	2.5
1972	11	28	45°44.0'	118°50.0'	2.1
1972	12	9	46°25.13'	119° 1.83'	2.6
1972	12	9	46°25.0'	119° 1.0'	2.7
1973	3	2	46°10.0'	119°27.0'	2.0
1973	7	9	46°29.0'	120°50.0'	2.1
1973	7	21	46°25.21'	119° 2.06'	2.3
1973	7	21	46°25.0'	119° 1.0'	2.6
1973	9	10	46°36.0'	120°24.0'	2.1
1973	12	29	46° 2.38'	119°40.41'	2.0
1973	12	29	46° 2.59'	119°40.45'	2.3
1973	12	29	46° 3.0'	119°40.0'	2.3
1973	12	29	46° 3.0'	119°41.0'	2.5
1973	12	29	46° 2.93'	119°39.48'	2.8
1973	12	29	46° 3.0'	119°39.0'	3.0
1974	2	15	46°14.14'	119°43.75'	2.3
1974	2	15	46°15.0'	119°43.0'	2.3
1974	2	20	46°14.05'	119°43.74'	2.2
1974	2	20	46°15.0'	119°44.0'	2.4
1974	2	27	46° 3.03'	119°48.01'	2.3
1974	2	27	46° 4.0'	119°47.0'	2.4
1974	5	10	46°15.0'	119°43.0'	2.1
1974	12	29	46°24.0'	119°10.0'	2.0
1975	4	22	46°26.30'	119°15.34'	2.0
1975	4	22	46°26.0'	119°15.0'	2.0
1975	4	29	45°34.85'	118°58.33'	2.2
1975	4	29	45°49.0'	119° 4.0'	2.2
1975	5	5	46°25.92'	119°15.26'	2.0
1975	5	5	46°26.0'	119°15.0'	2.0
1975	5	9	46°25.86'	119°15.60'	2.8
1975	5	9	46°26.0'	119°16.0'	2.8

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1975	5	11	46°25.69'	119°15.94'	2.3
1975	5	11	46°26.0'	119°16.0'	2.3
1975	5	14	46°26.35'	119°15.77'	2.1
1975	5	14	46°26.0'	119°15.0'	2.1
1975	5	18	46°25.80'	119°16.17'	2.1
1975	5	18	46°26.0'	119°16.0'	2.1
1975	5	21	46°26.13'	119°15.90'	2.0
1975	5	21	46°26.17'	119°16.04'	2.2
1975	5	21	46°26.0'	119°16.0'	2.2
1975	5	22	46°23.51'	119°10.74'	2.8
1975	5	22	46°24.0'	119°10.0'	2.8
1975	5	25	46° 6.13'	119°36.68'	2.2
1975	5	25	46° 5.0'	119°37.0'	2.2
1975	6	3	46°26.0'	119°16.0'	2.1
1975	6	3	46°25.99'	119°16.66'	2.2
1975	6	7	46°25.78'	119°16.17'	2.3
1975	6	7	46°26.0'	119°16.0'	2.3
1975	6	15	46°26.0'	119°17.0'	2.0
1975	6	15	46°26.48'	119°17.10'	2.1
1975	6	15	46°26.35'	119°16.82'	2.3
1975	6	15	46°14.04'	119° 6.79'	3.1
1975	6	15	46°14.0'	119° 6.0'	3.1
1975	6	15	46°27.0'	119°17.0'	4.3
1975	6	17	46°14.37'	119° 5.75'	2.1
1975	6	17	46°14.0'	119° 6.0'	2.1
1975	6	28	46° 9.54'	119°38.47'	2.0
1975	6	28	46° 7.85'	119°40.28'	2.0
1975	6	28	46° 8.0'	119°41.0'	2.0
1975	6	28	46° 6.04'	119°42.37'	2.4
1975	6	28	46° 7.0'	119°42.0'	2.4
1975	6	28	46° 5.53'	119°43.33'	2.7
1975	6	28	46° 6.32'	119°42.22'	3.3
1975	6	28	46° 8.0'	119°42.0'	3.3
1975	6	28	46°14.4'	119°42.6'	3.7
1975	6	28	46° 5.94'	119°42.36'	3.8
1975	6	28	46° 5.9'	119°42.4'	3.8
1975	6	28	46° 8.0'	119°42.0'	4.3
1975	6	29	46° 5.22'	119°42.95'	2.2
1975	6	29	46° 4.35'	119°44.47'	2.2
1975	6	29	46° 6.0'	119°43.0'	2.2
1975	6	29	46° 5.0'	119°45.0'	2.2
1975	7	1	45°37.8'	120° 0'	3.5
1975	7	1	45°36.32'	120° .97'	3.6
1975	7	1	45°36.3'	120° 1.0'	3.6
1975	7	17	46°26.31'	119°17.59'	2.2
1975	7	17	46°26.0'	119°17.0'	2.2
1975	7	23	46°16.10'	119°23.50'	2.2
1975	7	23	46°16.0'	119°24.0'	2.2

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1975	8	22	45°54.73'	119° 9.28'	2.1
1975	8	22	45°54.0'	119°11.0'	2.1
1975	9	5	46°14.65'	119°29.65'	2.0
1975	9	5	46°15.0'	119°29.0'	2.0
1975	9	8	46° 7.97'	119°39.78'	2.0
1975	12	3	45°38.0'	118°54.0'	Not Available
1975	12	22	45°39.52'	118°56.61'	2.1
1975	12	22	45°39.0'	118°57.0'	2.1
1976	1	22	45°39.45'	118°56.75'	2.0
1976	1	22	45°40.0'	118°57.0'	2.0
1976	1	29	46°25.81'	119°15.18'	2.1
1976	1	29	46°26.0'	119°15.0'	2.1
1976	2	12	46° 7.52'	119°28.05'	2.0
1976	2	12	46° 8.0'	119°28.0'	2.0
1976	2	23	46° 7.53'	119°27.40'	2.0
1976	3	1	45°36.0'	119°41.0'	2.2
1976	3	29	45° 7.33'	120°53.42'	3.0
1976	3	29	45° 3.0'	120°56.0'	3.0
1976	4	2	45° 8.0'	120°53.0'	3.2
1976	4	6	45° 9.0'	120°48.0'	3.2
1976	4	6	45° 6.0'	120°43.0'	3.4
1976	4	8	45° 9.3'	120°48.1'	3.8
1976	4	9	45°12.5'	120°53.2'	3.5
1976	4	13	45° 9.0'	120°52.0'	3.1
1976	4	13	45°11.0'	121° 1.0'	3.3
1976	4	13	45° 7.0'	120°54.0'	3.4
1976	4	13	45° 4.54'	120°51.53'	4.6
1976	4	13	45° 4.6'	120°51.5'	4.6
1976	4	13	45°12.10'	120°77.10'	4.8
1976	4	13	45°13.42'	120°46.44'	4.8
1976	4	13	45°13.2'	120°46.2'	4.8
1976	4	17	45° 9.5'	120°50.8'	4.0
1976	4	17	45° 4.8'	120° 48'	4.2
1976	4	25	45°53.0'	119°43.0'	2.1
1976	4	25	45°45.0'	120° 9.0'	2.1
1976	5	10	45°36.0'	119°48.0'	2.1
1976	5	25	46°16.04'	120°23.14'	2.3
1976	5	25	46°16.0'	120°20.0'	2.3
1976	7	17	46° 5.0'	118°45.0'	2.4
1976	7	23	46° 5.0'	118°45.0'	3.0
1976	7	26	45°38.81'	119°58.43'	2.9
1976	7	26	45°40.0'	119°56.0'	2.9
1976	8	17	45°54.43'	119°18.93'	2.4
1976	8	17	45°54.0'	119°20.0'	2.4
1976	8	25	45° 1.91'	120°58.60'	2.7
1976	8	25	45° 9.0'	120°54.0'	2.7
1976	8	28	45°38.0'	121° 6.0'	3.6
1976	9	4	45° 8.43'	120°55.30'	2.9

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1976	9	4	45° 8.0'	120°52.0'	2.9
1976	9	17	45°48.16'	120° .22'	2.4
1976	9	17	45°48.0'	120° 0.0'	2.4
1976	10	10	46° 8.82'	119°11.62'	2.0
1976	10	10	46° 9.0'	119°11.0'	2.0
1976	10	10	45°16.22'	120°29.97'	3.6
1976	10	31	45°59.34'	120°47.98'	2.7
1976	10	31	45°58.0'	120°49.0'	2.7
1976	10	31	46° 0.6'	120°49.25'	2.9
1976	10	31	46° 1.0'	120°50.0'	2.9
1976	11	19	45° 5.19'	120°55.49'	3.1
1976	11	19	45° 4.0'	120°55.0'	3.1
1976	11	23	45°49.0'	120° 3.0'	2.3
1976	11	23	45°50.0'	120° 3.0'	2.9
1976	11	24	45° 8.0'	120°47.0'	3.3
1976	11	27	45°48.0'	120° 1.0'	2.3
1976	12	1	45°48.0'	120° 1.0'	2.2
1976	12	1	45°48.0'	120° 2.0'	2.3
1976	12	12	45° 4.0'	120°49.0'	2.8
1976	12	13	45°10.0'	120°52.0'	2.7
1976	12	15	45°14.0'	120°59.0'	3.0
1977	1	2	45°11.0'	120°50.0'	2.6
1977	1	10	45°51.0'	119°59.0'	2.1
1977	1	10	45°51.0'	120° 1.0'	2.9
1977	2	14	45°42.0'	119°59.0'	2.5
1977	2	15	45°36.0'	119°54.0'	2.4
1977	2	15	45°43.0'	119°58.0'	2.9
1977	2	15	45°44.0'	119°59.0'	3.3
1977	3	11	45°53.95'	119°39.94'	3.1
1977	3	11	45°54.0'	119°41.0'	3.1
1977	3	31	45°54.11'	119°39.25'	2.9
1977	3	31	45°54.0'	119°40.0'	2.9
1977	4	11	45°31.0'	120°48.0'	2.6
1977	4	14	45° 6.37'	120°56.73'	2.8
1977	4	14	45° 7.0'	120°53.0'	2.8
1977	4	26	46°17.0'	119°25.0'	2.1
1977	4	26	46°16.38'	119°25.18'	2.2
1977	5	10	46°16.27'	119°25.44'	2.1
1977	5	10	46°17.0'	119°25.0'	2.1
1977	7	10	45°49.0'	120°27.0'	2.3
1977	7	17	46° 7.71'	119°27.46'	2.2
1977	7	17	46° 8.0'	119°28.0'	2.2
1977	7	21	46° 7.85'	119°27.57'	2.2
1977	7	21	46° 8.0'	119°27.0'	2.2
1977	8	15	45° 9.0'	120°51.0'	3.4
1977	8	22	45°11.0'	120°52.0'	3.0
1977	9	22	45°54.36'	119°19.01'	2.2
1977	9	22	45°53.0'	119°19.0'	2.4

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1977	10	5	45° 8.0'	120°48.0'	2.7
1977	11	8	45°51.69'	119°43.98'	2.1
1977	11	8	45°52.0'	119°43.0'	2.1
1977	11	10	46° 4.67'	118°48.39'	2.0
1977	11	10	46° 5.0'	118°48.0'	2.0
1977	11	14	46°22.76'	119°27.00'	2.0
1977	11	14	46°22.0'	119°27.0'	2.0
1977	11	19	45°38.97'	118°55.83'	2.3
1977	11	19	45°41.0'	118°54.0'	2.3
1977	12	21	46°23.74'	119°25.88'	2.3
1977	12	21	46°24.0'	119°26.0'	2.3
1978	1	22	46°33.54'	118°59.14'	2.2
1978	1	22	46°34.0'	118°59.0'	2.2
1978	1	28	46°35.83'	118°56.47'	2.1
1978	1	28	46°36.0'	118°57.0'	2.1
1978	2	9	45°46.34'	120°14.52'	2.1
1978	2	9	45°42.0'	120°13.0'	2.1
1978	2	20	46°23.15'	119°25.45'	2.1
1978	2	20	46°23.0'	119°25.0'	2.1
1978	2	20	45°53.79'	119°39.00'	3.2
1978	2	20	45°54.0'	119°40.0'	3.2
1978	2	22	46°23.21'	119°25.58'	2.0
1978	2	22	46°23.0'	119°26.0'	2.0
1978	2	23	46°11.0'	120°38.0'	2.2
1978	2	23	46°20.38'	120°55.63'	2.4
1978	2	23	46°21.0'	120°55.0'	2.4
1978	2	28	46°12.73'	120°38.94'	2.2
1978	2	28	46°13.0'	120°41.0'	2.2
1978	3	4	46° 3.62'	118°51.33'	2.8
1978	3	4	46° 5.0'	118°50.0'	2.8
1978	5	1	45°29.0'	120°48.0'	2.8
1978	5	11	45°33.0'	120° 5.0'	2.4
1978	6	1	45°41.0'	120°32.0'	2.4
1978	6	3	45°52.0'	120°27.0'	2.1
1978	9	15	46°11.55'	120°43.14'	2.2
1978	12	22	45°51.18'	119°22.59'	2.6
1979	1	11	45°53.74'	119°18.63'	2.0
1979	1	19	45°54.19'	119°18.61'	2.1
1979	2	8	45°54.68'	119°51.31'	2.1
1979	2	15	45°56.14'	119°48.34'	2.1
1979	2	17	46° 9.8'	119°56.0'	3.6
1979	3	1	46° 2.85'	118°54.34'	2.7
1979	3	7	46°29.78'	120° 4.58'	2.0
1979	3	7	46°13.67'	119°46.77'	2.4
1979	3	9	46°32.35'	119°57.89'	2.2
1979	3	15	46°32.03'	119°58.80'	3.5
1979	3	23	46°31.66'	120° .27'	3.5
1979	3	27	45°32.07'	118°51.50'	2.2

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1979	3	28	45°37.03'	118°59.29'	2.1
1979	6	8	45°54.36'	119°10.12'	2.0
1979	6	25	46°25.75'	120° 7.57'	2.3
1979	7	3	46°31.37'	119°56.67'	2.0
1979	9	8	46°29.38'	119°38.82'	2.5
1979	9	9	46°29.66'	119°39.55'	2.1
1979	11	8	45°35.91'	118°52.63'	2.1
1979	12	17	46°35.55'	118°56.99'	2.0
1979	12	23	45°38.45'	118°56.35'	2.1
1980	1	28	46°17.34'	120°27.10'	2.6
1980	2	12	46°14.81'	118°52.30'	2.0
1980	2	28	46°19.24'	119°45.87'	2.0
1980	2	29	45°46.82'	119°23.54'	2.0
1980	3	4	45°56.40'	119°39.84'	2.6
1980	3	12	46° 7.48'	119° 1.54'	2.6
1980	3	25	46° 8.91'	119°11.44'	2.0
1980	3	28	45°54.09'	119°41.33'	2.4
1980	7	15	45°50.18'	120°35.36'	2.2
1980	7	24	46°16.96'	119°32.80'	2.3
1980	12	6	46°14.61'	118°56.36'	2.1
1980	12	16	46°13.44'	119°35.43'	2.2
1980	12	18	45°49.98'	120° .44'	2.8
1980	12	18	45°49.0'	119°59.0'	2.8
1981	1	30	45°49.61'	120° .94'	2.3
1981	2	2	46°15.77'	120°59.34'	4.0
1981	2	2	46°28.50'	120°87.70'	4.0
1981	2	2	46°16.8'	120°52.8'	4.0
1981	6	14	45° 57'	120°29.4'	3.1
1981	6	14	45°57.70'	120°30.42'	3.2
1981	6	14	45°57.0'	120°30.0'	3.3
1981	7	28	45°53.67'	119°41.79'	2.4
1981	8	11	45°33.75'	119°32.80'	2.3
1981	8	31	45°23.81'	119°40.15'	2.1
1981	9	20	46° 8.51'	119°27.16'	2.2
1981	9	23	46°31.34'	119°43.49'	2.3
1981	11	29	45°13.00'	120°53.19'	2.0
1982	4	1	46°17.62'	119°48.91'	2.1
1982	6	4	45° .11'	120°27.84'	2.1
1982	6	21	44°57.11'	120°44.19'	2.4
1982	7	20	46° 7.66'	120°29.30'	2.6
1982	8	19	45°24.37'	119°58.90'	2.0
1982	8	30	46° 4.51'	120°31.63'	2.6
1982	10	5	46° .4'	119°16.89'	2.1
1982	10	12	45°59.76'	119°17.29'	2.8
1982	10	15	45°54.29'	119°41.01'	2.4
1982	10	19	45°20.30'	120°43.59'	2.2
1982	10	19	46°11.13'	120°27.85'	2.7
1982	10	30	45°59.94'	119°17.25'	2.7

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1982	11	23	45°59.84'	119°17.32'	3.2
1982	12	2	45°53.30'	119°42.68'	2.2
1982	12	7	45°52.05'	119°42.64'	2.4
1982	12	29	46° 8.73'	119°12.33'	2.0
1983	1	4	46° 8.40'	119°12.29'	2.3
1983	1	11	46° 8.78'	119° 5.71'	2.2
1983	1	11	46° 8.51'	119°12.07'	2.2
1983	1	14	46°21.96'	120°35.82'	2.1
1983	1	17	46° 8.51'	119°12.10'	2.0
1983	5	2	46° 5.35'	119°35.23'	2.0
1983	5	13	46° 5.30'	119°36.29'	2.0
1983	5	13	45°54.28'	120° .92'	2.3
1983	6	17	46° 5.39'	119°39.18'	2.0
1983	6	21	45°54.02'	120° .47'	2.0
1983	7	6	46°24.33'	121° 3.27'	2.0
1983	8	13	46°13.35'	119°17.39'	2.0
1983	8	13	46°13.14'	119°17.24'	2.0
1983	9	27	46°11.61'	119°20.61'	2.3
1983	10	4	46°32.80'	119°19.33'	2.1
1983	10	5	46°31.53'	120°36.38'	2.4
1983	10	5	46°31.48'	120°37.45'	2.6
1983	10	7	46°10.81'	119°19.34'	2.1
1983	10	19	46°16.19'	119°23.27'	2.1
1983	10	21	45°39.60'	118°54.94'	2.7
1983	11	14	46°20.95'	120°43.45'	2.2
1983	11	16	46°20.74'	120°43.28'	2.3
1983	11	18	46°20.62'	120°43.31'	2.3
1983	11	20	45°58.43'	118°50.64'	2.1
1983	11	22	46°20.47'	120°44.88'	2.2
1983	11	23	46°10.94'	119°15.53'	2.2
1983	11	23	46°20.63'	120°43.16'	2.3
1983	12	2	46°10.61'	119°16.26'	2.0
1983	12	14	46°11.08'	119°16.11'	2.3
1983	12	21	46°11.11'	119°15.58'	2.2
1983	12	28	46°11.22'	119°16.18'	2.0
1984	1	4	46°10.81'	119°15.53'	2.1
1984	1	9	46°10.95'	119°16.09'	2.0
1984	1	12	46°25.60'	120° 9.09'	2.5
1984	1	18	45°21.59'	119°39.89'	2.5
1984	1	19	46°10.28'	119°17.14'	2.2
1984	2	8	46°10.81'	119°16.60'	2.2
1984	2	21	46°19.34'	119° 8.04'	2.0
1984	2	21	46°19.07'	119° 7.93'	2.0
1984	2	24	45°23.58'	120°48.42'	2.1
1984	3	15	46°11.53'	119°22.51'	2.3
1984	3	20	46°17.03'	119°32.81'	2.2
1984	3	23	45°59.76'	119°17.53'	3.3
1984	3	25	46° 9.41'	119°16.67'	2.1

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1984	4	30	46° 2.43'	119°52.69'	2.8
1984	5	2	45°40.58'	118°51.83'	2.1
1984	5	5	46°10.01'	119°14.70'	2.2
1984	5	7	46° 4.65'	119°15.80'	2.0
1984	5	14	46° 7.41'	119°12.28'	2.5
1984	5	18	46°16.85'	119°22.16'	2.0
1984	5	22	46°11.63'	119°14.97'	2.1
1984	5	25	45°53.23'	119°42.70'	2.1
1984	5	25	46°15.48'	119°17.28'	2.1
1984	6	2	46°12.93'	119°16.88'	2.3
1984	6	5	45°52.45'	119°42.47'	2.1
1984	6	7	46°12.95'	119°16.84'	2.1
1984	6	15	45°33.60'	119°27.33'	2.1
1984	6	18	46° 7.22'	119°12.87'	2.4
1984	6	20	45°52.67'	119°43.40'	2.1
1984	6	22	46° 7.21'	119°12.78'	2.4
1984	6	28	46°17.15'	119°22.97'	2.0
1984	7	3	46° 7.59'	119°12.32'	2.0
1984	7	13	46°19.16'	119°52.36'	2.1
1984	7	18	46°18.91'	119°53.06'	2.4
1984	7	20	46°19.05'	119°53.07'	2.3
1984	7	24	46°18.83'	119°53.51'	2.2
1984	7	28	46°35.71'	120°22.95'	2.7
1984	8	3	45°54.45'	119°10.42'	2.4
1984	8	10	46° 7.51'	119°47.27'	2.5
1984	8	18	45°52.21'	120°18.41'	2.0
1984	8	23	46°20.72'	119°49.62'	2.1
1984	8	23	45°51.79'	120°18.22'	2.1
1984	8	23	45°55.78'	120°14.79'	2.3
1984	8	24	46°10.80'	119°15.77'	2.1
1984	8	28	46° 4.21'	119°36.76'	2.2
1984	8	31	46°11.11'	119°15.91'	2.0
1984	9	7	46° 4.45'	119°36.42'	2.5
1984	9	11	46° 7.53'	119°47.22'	2.1
1984	9	14	46° 8.79'	119°13.63'	2.1
1984	9	24	46°10.05'	119°15.93'	2.3
1984	10	4	46° 6.33'	120° 1.54'	2.9
1984	10	10	45°54.65'	119° 8.84'	2.1
1984	12	1	46°14.68'	119°58.92'	2.1
1984	12	6	46°25.33'	120° 8.74'	2.6
1985	1	3	45°54.73'	119°50.87'	2.1
1985	1	25	46°29.99'	120°37.93'	3.1
1985	1	28	45°58.04'	119°54.66'	2.6
1985	1	29	46°23.41'	119°10.64'	2.2
1985	1	31	45°57.27'	118°50.21'	2.7
1985	1	31	45°57.87'	119°54.15'	2.8
1985	2	10	46°23.36'	119°36.57'	2.3
1985	2	10	45°85.80'	119°64.40'	3.7

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1985	2	10	45°51.6'	119°38.4'	3.7
1985	2	10	45°42.27'	119°38.07'	3.9
1985	2	27	45°57.68'	119°54.38'	2.6
1985	3	1	45°48.30'	119° .96'	2.6
1985	3	18	44°56.77'	120°40.12'	3.0
1985	3	20	46° 7.43'	119°27.73'	2.0
1985	3	20	45°57.79'	119°54.28'	3.1
1985	3	27	46° 7.39'	119°27.56'	2.1
1985	4	4	45°16.54'	120° 9.81'	2.1
1985	4	17	45°52.74'	119°18.92'	2.6
1985	4	27	45°32.25'	120°39.51'	2.2
1985	4	30	45°52.90'	119°19.23'	2.5
1985	5	21	45°45.33'	118°53.81'	2.4
1985	5	22	45°53.62'	119°18.68'	2.3
1985	5	29	46° 4.44'	119°36.13'	2.2
1985	6	11	45°53.40'	119°18.86'	2.3
1985	6	19	46°17.88'	120°20.29'	2.5
1985	6	21	46°18.13'	120°19.92'	2.5
1985	6	22	44°49.48'	121° 9.37'	2.8
1985	6	25	46°18.37'	120°19.52'	2.3
1985	6	27	46°18.09'	120°19.77'	2.4
1985	7	12	45°52.55'	119°42.97'	2.0
1985	7	16	46°11.36'	121° .53'	3.2
1985	7	18	45°53.25'	119°43.26'	2.0
1985	7	18	46°18.20'	120°19.96'	2.2
1985	7	22	45°53.20'	119°19.53'	2.1
1985	7	29	45°52.05'	119°41.80'	2.1
1985	7	30	45°53.29'	119°20.03'	2.0
1985	8	1	45°53.40'	119°42.97'	2.0
1985	8	2	46°18.25'	120°20.90'	2.3
1985	8	2	45°26.58'	119°57.20'	2.6
1985	8	21	45°50.61'	120°50.97'	2.2
1985	8	28	46°16.14'	120°21.60'	2.1
1985	8	30	46°18.06'	120°20.81'	2.2
1985	9	6	46°18.44'	120°20.43'	2.4
1985	9	17	46°18.55'	120°20.35'	2.1
1985	10	6	46°18.24'	120°20.62'	2.1
1985	10	25	46°17.27'	120°19.63'	2.0
1985	10	27	46°24.57'	119°10.88'	2.5
1985	10	27	46°23.93'	119°11.54'	2.8
1985	11	18	46°15.11'	119°37.10'	2.9
1985	12	3	46° 9.93'	119°36.20'	2.9
1985	12	6	46°25.09'	120° 8.73'	2.6
1985	12	13	46°15.35'	119°58.41'	2.2
1985	12	19	46°15.00'	119°36.81'	2.8
1986	1	4	45°44.95'	120°19.85'	2.3
1986	1	16	46°15.09'	119°37.08'	3.0
1986	1	22	46°27.57'	118°59.86'	2.6

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1986	1	28	46°28.90'	119°38.68'	2.0
1986	1	29	46°27.13'	119° .44'	2.6
1986	1	29	46°15.24'	119°36.93'	2.9
1986	2	1	46°27.14'	118°59.82'	2.6
1986	2	4	46° 2.64'	118°48.60'	3.2
1986	2	5	46°15.22'	119°36.98'	2.8
1986	2	11	46°25.10'	119° 1.56'	2.3
1986	2	14	45°53.13'	119°55.21'	2.4
1986	2	25	45°55.97'	120° 7.64'	2.1
1986	3	2	46°18.69'	119°47.03'	2.8
1986	3	11	46° 8.47'	119° 7.09'	2.1
1986	3	16	46°32.67'	120°26.46'	2.2
1986	4	9	45°50.41'	119°53.86'	2.3
1986	4	23	46°24.06'	120° 9.79'	2.2
1986	5	8	46°25.46'	120° 8.94'	2.3
1986	5	30	46°25.01'	120° 8.98'	2.3
1986	6	10	46°14.90'	119°36.46'	2.2
1986	6	20	46°28.20'	120°54.79'	2.8
1986	6	26	44°56.30'	119°10.66'	2.3
1986	6	27	46°15.05'	119°36.86'	2.3
1986	6	30	45°17.77'	119°38.77'	2.3
1986	11	10	45°11.98'	119°59.83'	2.5
1986	12	8	45°58.60'	118°57.18'	2.6
1987	1	15	46° 7.65'	119° 1.65'	2.3
1987	1	30	46°13.25'	120°42.03'	2.0
1987	1	31	45°52.84'	119°19.55'	2.1
1987	2	21	46°12.04'	120°59.76'	2.3
1987	5	28	45°36.48'	118°55.30'	2.3
1987	6	16	45°38.56'	119° 3.23'	2.3
1987	6	30	44°57.87'	120°59.57'	2.8
1987	7	27	45°35.89'	120°44.27'	2.4
1987	8	9	45° 8.67'	120°51.62'	2.4
1987	8	18	45° 8.63'	120°51.65'	2.1
1987	9	4	44°48.93'	119°41.08'	2.4
1987	9	8	45°11.47'	120° 4.32'	3.1
1987	9	8	45°10.8'	120° 4.8'	3.1
1987	9	9	45°11.13'	120° 2.21'	2.3
1987	9	9	45°11.68'	120° 3.87'	2.4
1987	9	29	45°10.57'	120° 3.67'	2.7
1987	9	29	45°11.4'	120° 6.6'	2.7
1987	10	7	46°20.58'	119°15.38'	2.0
1987	10	11	45°10.77'	120° 4.88'	2.0
1987	10	22	46° 1.38'	119°58.66'	2.2
1987	10	26	46° 1.20'	119°58.11'	2.2
1987	11	18	45°12.16'	120° 5.28'	2.3
1987	12	14	46° 1.24'	119°57.77'	2.0
1988	1	22	46°13.31'	119°53.58'	2.1
1988	1	25	46°13.75'	119°43.65'	2.1

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1988	2	3	46°13.38'	119°44.04'	2.5
1988	2	7	45°21.36'	119°37.30'	2.5
1988	2	9	45°50.19'	120°50.00'	2.1
1988	2	14	45°34.62'	120° 8.96'	2.5
1988	2	20	45°13.02'	120° 7.02'	2.1
1988	2	20	45°12.98'	120° 6.34'	2.7
1988	2	28	45°34.27'	119°53.08'	2.6
1988	3	17	46° 7.94'	119°46.98'	2.6
1988	3	18	46°21.03'	119°16.09'	2.5
1988	3	18	46°21.01'	119°15.95'	2.6
1988	4	18	45°53.81'	119°17.40'	2.1
1988	5	27	45° 7.73'	120° 3.45'	2.4
1988	6	9	45°12.50'	120° 5.93'	2.0
1988	6	11	46°31.84'	120°48.84'	2.3
1988	6	30	46°19.69'	119°52.59'	2.0
1988	7	1	45°15.09'	120° 7.00'	2.1
1988	7	3	45°15.38'	120° 8.10'	2.4
1988	7	4	45°14.70'	120° 6.06'	2.0
1988	7	9	45°15.03'	120° 6.25'	2.4
1988	7	11	45°15.08'	120° 7.44'	2.0
1988	7	11	45°15.21'	120° 7.84'	2.3
1988	7	11	45°14.68'	120° 8.53'	2.9
1988	7	11	45° 15'	120° 7.8'	2.9
1988	7	18	45°16.90'	119°40.38'	2.2
1988	7	23	45°15.61'	120° 7.97'	2.6
1988	8	6	45°26.10'	119°52.94'	2.5
1988	8	15	46° 4.59'	119°55.64'	2.4
1988	8	18	45°13.44'	120° 5.97'	2.7
1988	9	15	46° 7.33'	119°46.95'	2.4
1988	9	29	45°50.99'	120°15.58'	3.5
1988	9	29	45°51.0'	120°15.6'	3.5
1988	10	19	45° 8.38'	119° 8.32'	2.6
1988	10	26	45°51.68'	120°15.89'	2.0
1988	11	5	46°23.48'	119°16.24'	2.2
1988	11	20	46°28.86'	119°15.00'	2.1
1988	11	21	45°16.18'	119°56.65'	2.5
1988	12	15	46°27.53'	119°17.48'	2.0
1988	12	19	45°54.19'	119°16.97'	2.2
1989	1	12	46°23.51'	119°16.91'	2.1
1989	2	10	46° 6.83'	120° 1.47'	2.6
1989	2	11	46°27.33'	119°17.93'	2.2
1989	2	16	46°29.26'	119°15.41'	2.0
1989	2	21	45°44.33'	120° 1.85'	2.6
1989	3	7	46°24.75'	119°16.77'	2.2
1989	3	20	46°27.31'	119°33.79'	2.2
1989	3	24	46°29.33'	119°16.43'	2.1
1989	3	24	46°14.06'	120°41.94'	2.3
1989	3	27	45°48.95'	120°15.69'	3.1

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1989	4	3	46°29.21'	119°15.66'	2.5
1989	6	15	46°34.79'	118°51.85'	2.4
1989	7	22	45°24.08'	119°25.89'	2.3
1989	7	25	45°56.48'	119°56.23'	2.2
1989	8	18	45°16.47'	119°58.96'	2.7
1989	9	29	46° 7.99'	119°43.31'	2.1
1989	11	10	45°43.43'	120°15.90'	2.2
1989	12	5	45°29.35'	119°31.31'	2.3
1989	12	28	45°28.90'	119°29.35'	2.5
1990	1	12	46°19.77'	119°32.63'	2.4
1990	3	2	45°38.56'	118°55.70'	2.8
1990	3	16	46°15.04'	119°35.83'	2.1
1990	4	5	46° 8.45'	119°28.22'	2.2
1990	4	14	46° 9.53'	120°56.46'	2.3
1990	4	22	45°40.96'	120°11.73'	2.1
1990	4	22	46°32.65'	119°43.98'	3.3
1990	4	22	46°32.4'	119°43.8'	3.3
1990	6	19	45°35.99'	119°21.69'	2.4
1990	7	1	45° 1.20'	120°57.19'	2.4
1990	7	1	45° 1.19'	120°57.39'	2.4
1990	7	17	46°19.80'	120°23.90'	2.1
1990	8	15	45°15.33'	119° 4.30'	2.6
1990	8	29	46°33.02'	118°58.41'	2.1
1990	9	6	46° 5.76'	119°39.83'	2.1
1990	9	24	46°33.52'	118°59.20'	2.5
1990	9	25	46°34.33'	118°59.18'	2.2
1990	10	4	46°33.02'	118°58.34'	2.4
1990	10	8	46°33.16'	118°57.67'	2.0
1990	10	31	46° 8.67'	119° 2.22'	2.4
1990	11	2	46° 1.91'	120°20.28'	2.5
1990	11	20	46°34.98'	119°35.34'	2.1
1990	12	17	46° 1.91'	120°20.19'	2.5
1990	12	18	46°17.11'	119°31.90'	2.3
1991	1	18	45°41.25'	120°28.83'	2.2
1991	1	30	46°11.32'	119°21.77'	2.3
1991	3	6	46° 4.61'	119°36.34'	2.0
1991	3	25	46° 7.49'	119°48.06'	2.5
1991	4	4	46° 4.91'	118°50.01'	2.5
1991	4	4	46° 4.9'	118°50.0'	2.5
1991	4	11	45°53.74'	119° 6.08'	2.2
1991	4	16	45°55.05'	119° 4.72'	2.0
1991	4	16	46°35.56'	119°46.42'	2.9
1991	4	16	46°35.4'	119°46.2'	2.9
1991	4	16	46°35.6'	119°46.4'	2.9
1991	4	18	45°53.53'	119° 6.02'	2.0
1991	4	18	46°35.44'	119°46.43'	2.2
1991	4	18	46°35.5'	119°46.4'	2.2
1991	4	19	45°53.49'	119° 6.46'	2.1

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1991	4	20	45°20.67'	120° 8.27'	2.8
1991	4	20	45° 21'	120° 8.4'	2.8
1991	6	4	46° 4.6'	118°45.1'	2.1
1991	7	29	46°24.81'	120° 9.37'	2.2
1991	8	2	45°51.55'	119°35.34'	2.3
1991	8	7	46°24.55'	120° 9.91'	2.1
1991	8	14	46°24.46'	120° 9.28'	2.1
1991	8	20	46°17.65'	120°45.26'	2.0
1991	8	21	46°24.71'	120° 9.58'	2.1
1991	9	16	45°54.58'	119°18.40'	2.1
1991	9	25	45°55.77'	120°11.38'	2.0
1991	10	25	46° 7.43'	119°50.56'	2.2
1991	10	30	46° 7.50'	119°50.36'	2.1
1991	11	5	46° 7.41'	119°50.10'	2.0
1992	1	19	45° 1.25'	119°52.33'	2.3
1992	3	10	44°50.58'	119°19.70'	2.5
1992	4	23	46°14.3'	120°36.0'	2.4
1992	4	29	46° 4.5'	119°17.6'	Not Available
1992	5	18	44°58.98'	120°50.32'	2.0
1992	6	2	45°51.8'	119°35.2'	Not Available
1992	7	2	45°16.61'	120° 8.67'	2.4
1992	7	14	46°12.76'	120°26.91'	2.1
1992	7	17	46°12.67'	120°29.28'	2.2
1992	7	30	46°35.73'	120°29.61'	2.6
1992	8	4	46°20.21'	119°15.40'	2.3
1992	8	7	45°51.62'	119°35.37'	3.9
1992	8	24	46°20.2'	119°15.4'	2.3
1992	11	29	46°35.78'	118°54.33'	2.2
1993	1	10	45°25.32'	118°56.34'	Not available
1993	1	29	45°25.33'	118°56.34'	2.0
1993	4	7	45°39.90'	120°21.36'	Not available
1993	4	10	46°23.80'	119° 9.36'	2.2
1993	4	10	46°22.80'	119° 9.00'	Not available
1993	4	26	45°39.89'	120°21.36'	2.1
1993	4	26	46°23.82'	119° 9.36'	Not available
1993	4	26	45°39.00'	120°21.00'	Not available
1993	5	7	45°58.14'	121° 6.03'	2.1
1993	5	12	45°40.38'	120°21.26'	2.3
1993	5	22	45°40.38'	120°21.24'	Not available
1993	6	11	45°34.26'	119° 0.36'	Not available
1993	6	22	45°34.25'	119° .37'	2.2
1993	6	22	46°14.83'	119°36.99'	2.3
1993	9	11	46°35.06'	120°12.29'	2.4
1993	9	16	46°35.04'	120°12.30'	Not available
1993	9	23	46°34.3'	119° 6.2'	Not available
1993	12	16	45°11.75'	120° 5.39'	3.0
1993	12	18	45°11.51'	120° 4.39'	2.9
1993	12	18	45° 15'	120° 6.6'	3.1

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1993	12	18	45°11.76'	120° 5.40'	Not available
1994	1	8	46°14.40'	119°31.98'	Not available
1994	1	26	46° 6.29'	119°37.83'	2.3
1994	3	8	46°35.81'	119°44.76'	2.6
1994	3	10	46°35.75'	120°33.22'	2.1
1994	3	10	46°35.82'	119°44.76'	Not available
1994	3	13	46°10.44'	120°41.52'	Not available
1994	3	26	46°10.42'	120°41.51'	2.1
1994	3	26	46°35.76'	120°33.24'	Not available
1994	4	11	45°47.97'	120°10.78'	2.3
1994	4	13	45° 8.50'	120°50.88'	2.8
1994	4	13	45° 8.4'	120° 51'	2.8
1994	4	13	45° 8.52'	120°50.88'	Not available
1994	4	16	45° 8.17'	120°50.58'	2.6
1994	4	16	45° 8.4'	120°50.4'	2.6
1994	4	20	45° 8.98'	120°50.67'	2.5
1994	4	20	45° 8.16'	120°50.58'	Not available
1994	4	25	45° 9.00'	120°50.70'	Not available
1994	4	30	45°48.58'	120°11.27'	2.3
1994	5	11	45°48.77'	120°11.22'	2.3
1994	5	17	45°48.00'	120°11.22'	2.3
1994	5	24	45°48.78'	120°11.22'	Not available
1994	5	25	45°48.00'	120°11.20'	2.3
1994	5	25	45°48.59'	120°11.31'	2.6
1994	7	22	45°27.62'	119°22.58'	2.2
1994	7	29	45°54.20'	119°18.17'	2.3
1994	9	6	45°31.50'	118°48.78'	2.2
1994	9	22	45°41.49'	120° 9.80'	2.9
1994	9	22	45°41.4'	120° 9.6'	2.9
1994	9	25	45°31.48'	118°48.80'	2.2
1994	9	25	45°41.52'	120° 9.78'	2.9
1994	10	3	45°40.86'	120° 9.84'	2.7
1994	10	6	45°40.84'	120° 9.81'	2.7
1994	11	3	46°23.13'	119°15.51'	2.1
1994	11	3	46°23.16'	119°15.54'	2.1
1994	11	3	45°41.64'	120°10.31'	2.6
1994	11	9	46°24.99'	120° 8.20'	2.1
1994	11	9	45°41.64'	120°10.32'	2.6
1994	11	13	46°25.02'	120° 8.22'	2.1
1994	11	13	45°42.06'	120°10.68'	2.7
1994	11	13	46°35.49'	119°35.05'	3.3
1994	11	13	46°35.22'	119°35.40'	3.3
1994	11	13	46°35.4'	119°35.4'	3.3
1994	11	17	45°42.07'	120°10.65'	2.7
1994	11	17	45° 42'	120°10.8'	2.7
1994	11	17	46°35.22'	119°35.34'	3.3
1995	1	13	46°34.76'	120°42.66'	3.2
1995	1	13	46°34.68'	120°42.42'	3.2

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1995	1	13	46°34.8'	120°42.6'	3.2
1995	1	28	46°34.74'	120°42.66'	3.2
1995	3	19	44°46.63'	120°56.39'	2.0
1995	5	12	45°52.32'	120°23.04'	2.0
1995	5	19	45°52.30'	120°23.05'	2.0
1995	6	12	46°24.27'	119°15.77'	3.3
1995	6	29	46°24.30'	119°15.78'	3.3
1995	8	13	46°12.48'	119°54.36'	3.1
1995	8	29	46°12.49'	119°54.33'	3.1
1995	8	29	46°12.6'	119°54.6'	3.1
1995	9	3	45°59.22'	120°58.74'	2.0
1995	9	13	45°59.23'	120°58.72'	2.0
1995	10	2	46°21.36'	119°38.34'	2.3
1995	10	3	46°21.33'	119°38.34'	2.3
1995	11	2	46° 9.00'	119°33.86'	3.1
1995	11	13	46°30.85'	120°28.97'	2.6
1995	11	20	46° 9.00'	119°33.84'	3.1
1996	2	13	45°31.80'	119°36.39'	2.9
1996	2	16	46° 7.36'	120°30.42'	2.1
1996	2	16	45°31.80'	119°36.42'	2.9
1996	5	23	46°24.29'	119°15.16'	2.0
1997	3	22	45° 12'	120° 4.2'	2.7
1997	3	22	45°11.4'	120° 4.2'	3.9
1997	3	23	45° 12'	120° 4.2'	3.4
1997	3	28	45° 12'	120° 3.6'	2.6
1997	4	17	45°11.4'	120° 4.8'	3.2
1997	8	17	45° 39'	120°11.4'	2.8
1997	9	10	45° 39'	120° 12'	2.7
1997	10	13	46° 6'	120°21.6'	3.3
1997	11	6	46°31.8'	119°42.6'	3.3
1997	11	9	46°32.4'	119° 42'	2.7
1997	11	11	45° 51'	120°34.2'	2.8
1997	11	18	46° 7.8'	120°27.6'	2.5
1997	11	18	46° 8.4'	120°27.6'	3.3
1997	11	18	46° 8.4'	120°28.2'	3.8
1997	12	21	45°40.2'	118°49.8'	2.6
1998	1	21	46° 9'	120°27.6'	2.7
1998	2	3	45°48.6'	120° 12'	3.1
1998	3	23	46°21.6'	118° 51'	2.7
1998	4	13	45° 54'	119°19.2'	2.6
1998	4	14	45°28.8'	119°32.4'	2.6
1998	4	28	45°15.6'	120°16.8'	2.7
1998	8	12	45°10.2'	120° 1.8'	2.8
1998	9	5	45° 39'	119°29.4'	2.9
1998	10	9	46° 12'	120°42.6'	4.0
1998	10	10	46° 12'	120° 42'	3.2
1998	10	31	45° 6'	120°49.2'	2.7
1998	11	1	45° 6'	120°49.8'	2.9

Year	Month	Day	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Magnitude
1999	8	31	45°11.4'	120° 5.4'	3.2
1999	9	4	45°10.8'	120° 4.8'	2.9
1999	9	19	46°26.4'	119°37.8'	3.1
1999	9	19	46°23.4'	120° 6.6'	3.2
2000	1	5	45° 42'	120° 3'	2.8
2000	1	30	45°10.8'	120° 6.6'	2.8
2000	1	30	45°11.4'	120° 6'	3.4
2000	1	30	45° 12'	120° 7.2'	4.1
2000	2	1	45°11.4'	120° 7.2'	2.8
2000	2	1	45°11.4'	120° 6.6'	3.6
2000	7	28	45°10.2'	120° 8.4'	2.6
2000	8	3	45°12.6'	120° 4.2'	2.8
2000	8	17	45°18.6'	120° 2.4'	3.2
2000	12	29	45°53.4'	119°42.6'	2.6
2001	3	21	46°12.6'	121° 1.2'	2.9
2002	1	31	45°41.4'	120°10.2'	2.7
2002	10	25	45°11.4'	120° 5.4'	2.7
2003	6	1	45°11.4'	120° 6.6'	2.8
2003	9	12	45°26.4'	118°51.6'	2.8
2004	2	28	46° 2.4'	119° 1.2'	3.3
2006	12	30	45° 7.2'	120°56.4'	2.6
2007	1	1	45° 7.2'	120°55.8'	2.5
2007	1	4	45° 7.2'	120°56.4'	3.0
2007	1	20	45° 7.2'	120°56.4'	3.0
2007	2	13	45° 7.2'	120°55.8'	2.7
2007	2	13	45° 7.2'	120°56.4'	2.9
2007	3	1	45° 7.2'	120°55.8'	3.6
2007	4	1	45° 7.8'	120° 57'	2.6
2007	4	8	45° 7.8'	120°56.4'	3.1
2007	5	2	45° 7.8'	120°56.4'	3.3
2007	6	3	45° 7.8'	120°57.6'	2.7
2007	6	14	45° 7.8'	120°56.4'	3.9

Table A-2. Historic Earthquakes Greater than 50 miles from the site, Causing MMI>III Shaking.

Year	Month	Day	Location	North Latitude (Degrees and Minutes)	West Longitude (Degrees and Minutes)	Site MMI	Magnitude
1872	12	14	North Cascades	47°45'	119°52'	V	6.8
1893	3	6	Southeastern Washington	45°54'	119°24'	>III	4.7
1936	7	15	Southeastern Washington	46°00'	118°18'	V	5.8
1946	2	14	Puget Sound	47°18'	122°54'	>III	6.3
1949	4	13	Puget Sound	47°06'	122°42'	>III	7.1
1962	11	5	Portland	45°36'	122°36'	IV	5.5
1965	4	29	Puget Sound	47°24'	122°24'	IV	6.5
1976	5	16	Friday Harbor, WA	48°46'	123°20'	IV	5.1
1981	2	13	South Cascades	46°21'	122°15'	IV	5.5
1999	7	2	Satsop, WA	47°05'	123°28'	IV	5.8

APPENDIX B

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H6

Respond to OAR 345-021-0010(1)(h)(G).

ASSESSMENT OF SOIL-RELATED HAZARDS

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 will be conducted in conjunction with the explorations described in RAI#2 responses H-2 through H-5. The geologic reconnaissance conducted along road and transmission line alignments, at WTG sites and potential gravel mine or rock quarry sites will identify potential hazard areas. The subsurface explorations will be tailored and conducted to address concerns identified.

RAI#3, H6: GEOLOGIC AND SOIL STABILITY

(Follow-Up) To find the application complete, the Department must find that CSF has included in the application an assessment of soil-related hazards. Please provide the required assessment. Explain how the facility would be designed to avoid dangers to human safety from identified soil-related hazards.

[Comment: Note that under the amended Council's rules, RAI H6 addresses OAR 345-021-0010(1)(h)(G) and (I).]

SOIL RELATED HAZARDS

Soil related hazards were addressed in the enclosed June 28, 2007 letter to Caithness Shepherd Flats WP, LLC. Based on Shannon & Wilson's review of available data and geologic reconnaissance, the potential for non-seismic soil-related instability is considered low. Additionally, since the WTG units, substations, and operational facilities will be constructed at higher elevations, the potential for flooding is limited. Electrical transmission line towers or poles placed in or adjacent to drainages should be designed to withstand flood damage.

The roads will be engineered to provide adequate stormwater handling facilities including roadside ditches and infiltration swales, culverts under approaches and crossings, and retention basins, as necessary. An erosion control and construction stormwater pollution prevention plan (SWPPP) will be developed for the project to reduce the potential for erosion during construction and long-term operation. The rational method will be used for stormwater calculations based on a 25-year storm event.

WTG units and access roads will be located to reduce the potential for soil related hazards. Typically, WTG units are located near ridge crests. Set back limits will be determined from the geotechnical engineering studies. Access roads will be designed to reduce the cut and fill sections, where possible. Cut and fill slopes will be designed for minimum 1.5 safety factors and must be protected from wind and water erosion through vegetative cover or armoring.

June 29, 2007

Caithness Shepherd Flats WP, LLC
565 Fifth Avenue, 29th Floor
New York, New York 10017

Attn: Mr. Derrel Grant

RE: RESPONSE TO OREGON EFSC COMMENT H6; SOIL-RELATED HAZARD ASSESSMENT; SHEPHERD FLATS WIND PROJECT, ARLINGTON, OREGON

At your request, Shannon & Wilson, Inc. conducted an assessment of the potential soil-related hazards associated with constructing the proposed Shepherd Flats Wind Project near Arlington, Oregon.

Our geologist reviewed the recent aerial photographs of the project area provided by Pat Pilz. We also reviewed and used selected available historical photographs and data regarding the project area in our assessment. On June 23, 2007, our geologist visited the site to observe current site conditions.

We based our stratigraphic descriptions on maps from the Oregon Geologic Data Collection project and the Oregon Department of Geology and Mineral Industries (DOGAMI) GMS-27; *Geologic and Neotectonic Evaluation of North-Central Oregon: The Dalles 1° X 2° Quadrangle* map. The stratigraphy within the project area consists of loess, Missoula Flood Sediments, and deposits from the Dalles Group overlying Elephant Mountain and Pomona members of the Saddle Mountain Basalt. Minor alluvial fill in stream valleys also occur.

Photographs 1 through 6, illustrate typical site topography and conditions. The site topography consists of sparsely vegetated and gently rolling uplands dissected by narrow drainages and alluvial valleys (Photos 1 - 3). The valley wall slopes vary from steep (Photo 4) to moderate and result from erosion-resistant basalt flows forming ledges with colluvium built up from the slope bases (Photos 5 and 6).

Based on our aerial photograph review and site observations, it is our opinion that non-seismic soil-related slope instability potential at this site is low. We observed one small landslide associated with very steeply sloped surfaces where the toe had been removed by quarry operations (Photos 4 and 7). The lack of landslide scars and boulder fields on the aerial photographs and the condition of observed road cut slopes further reinforce this opinion.

303 WELLSIAN WAY · P.O. BOX 967
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Construction activities too close to fractured basalt cliffs could result in rockfall if excessive blasting occurs. Wind turbine generator (WTG) unit placement adjacent to fractured basalt cliffs should be considered carefully in the design. Additionally, the design must consider road placement and drainage to avoid creating hazards.

If the facility engineering incorporates the applicable design standards regarding roadway construction, drainage, and slope protection, the risk for soil erosion is considered low. The erosion control plan should address mitigation measures to prevent excessive erosion during construction and long-term operation. Flooding of project features is unlikely because most structures and facilities will be placed at higher elevations. Those features such as transmission line towers that must be placed within drainages should be designed to withstand flood damage should it occur.

We trust this information meets your current needs. If you have any questions or need additional information, please contact our office.

Sincerely,

SHANNON & WILSON, INC.

Dee J. Burrie, P.E.
Branch Manager

DJB:LJR:PWB/djb

Enclosures: Photographs 1 thru 7

cc: Pat Pilz

06-28-2007/22-1-02474-002.Soil-related Hazard.ltr.doc/cvm

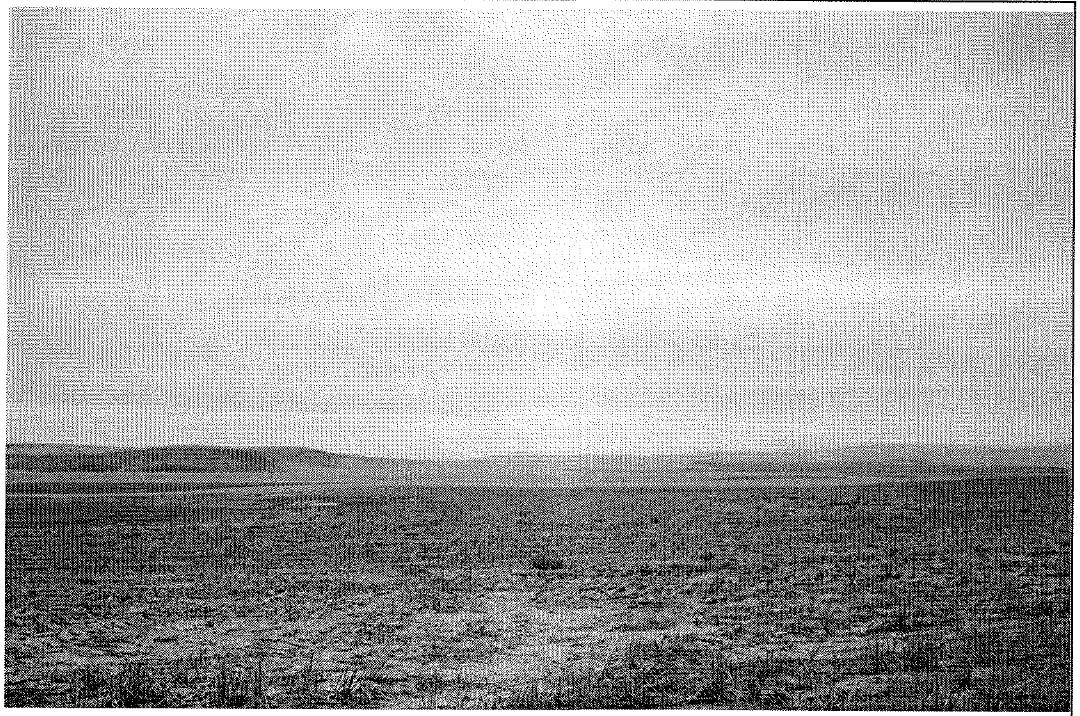


Photo 1 – General topographic view looking WNW; location is SW NW NW Sec 21 T1N R23E view over Sec. 20.

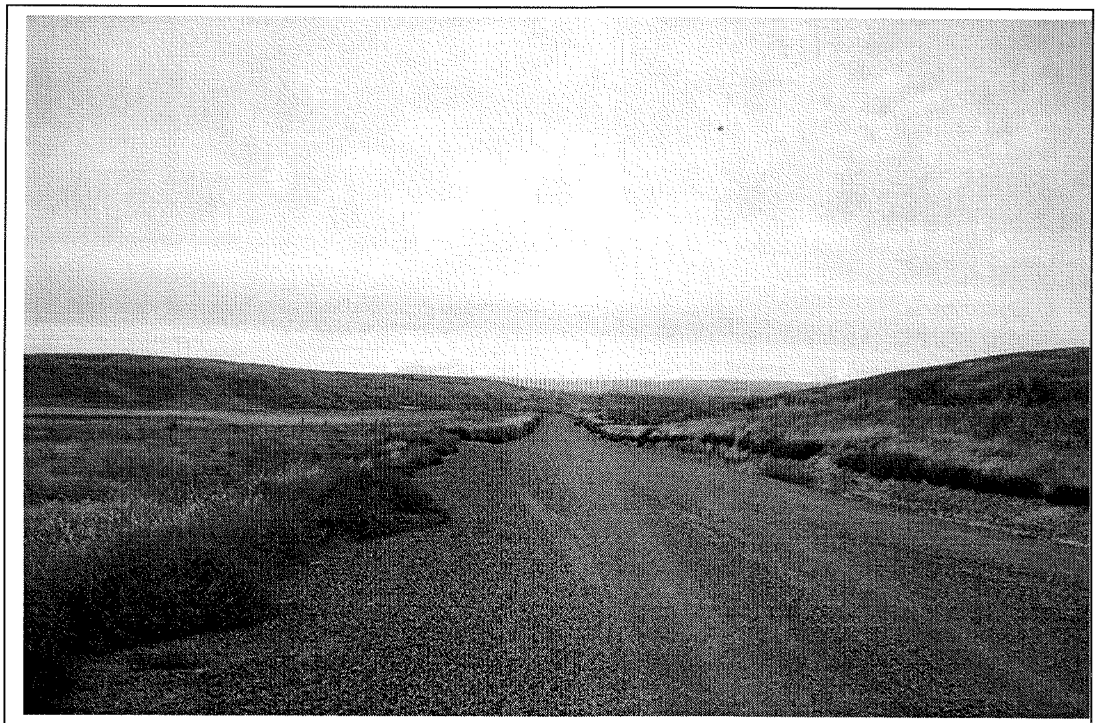


Photo 2 – General topographic view to S along 4 Mile Canyon Road – NW Sec 35 T2N R22E.

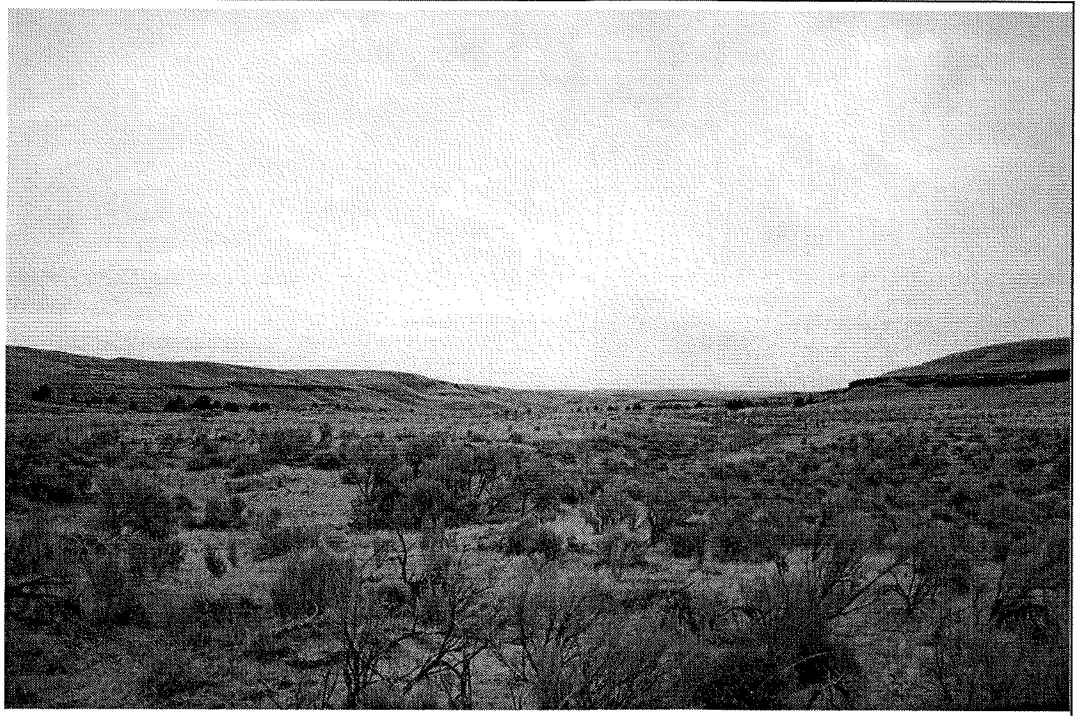


Photo 3 – General topography and geology to north at intersection of 4 Mile and 8 Miles Canyons – NE NE Sec 20 T2n R22E.

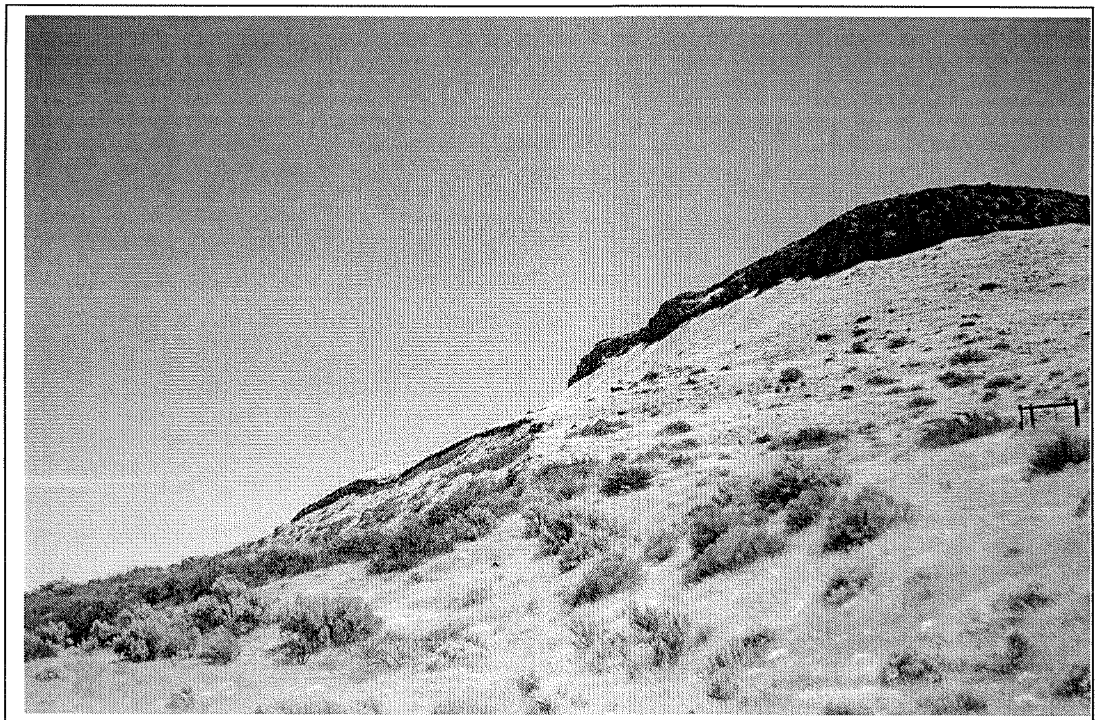


Photo 4 – Fractured basalt cap rock and underlying stratigraphy – approximately 7 miles west of I-84 and Rte. 74, view to SE.

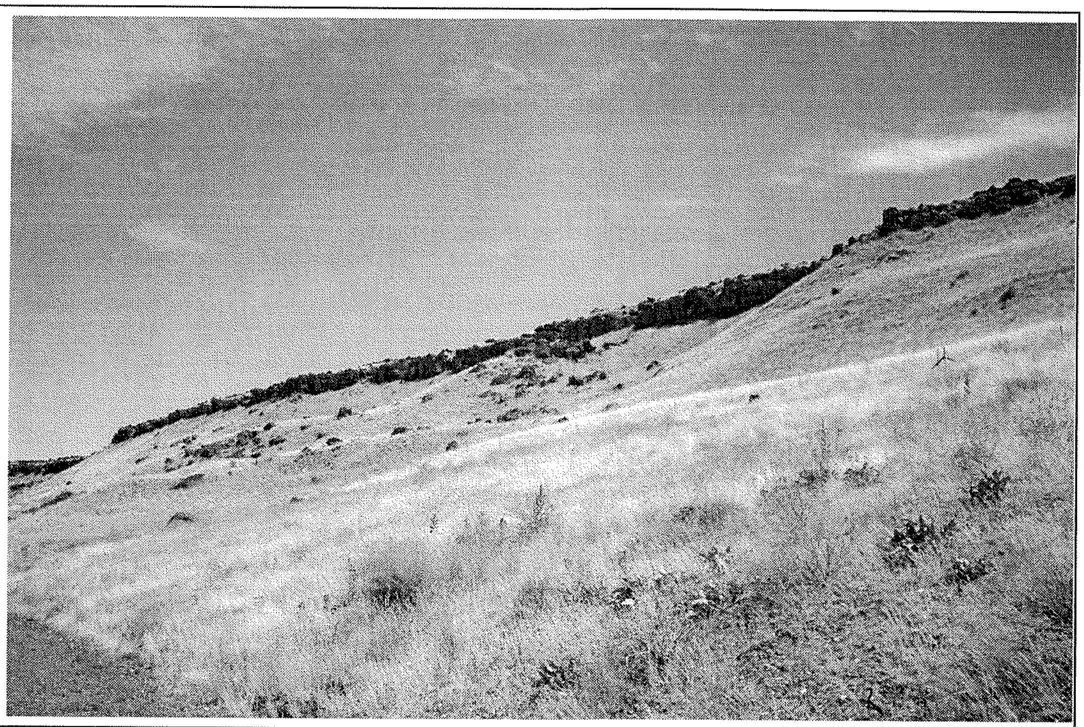


Photo 5 – Fractured basalt caprock, slope, and basalt boulders – fractures trend roughly NW-SE – approximately 1.7 miles west of I-84 and Rte. 74, view to SE.

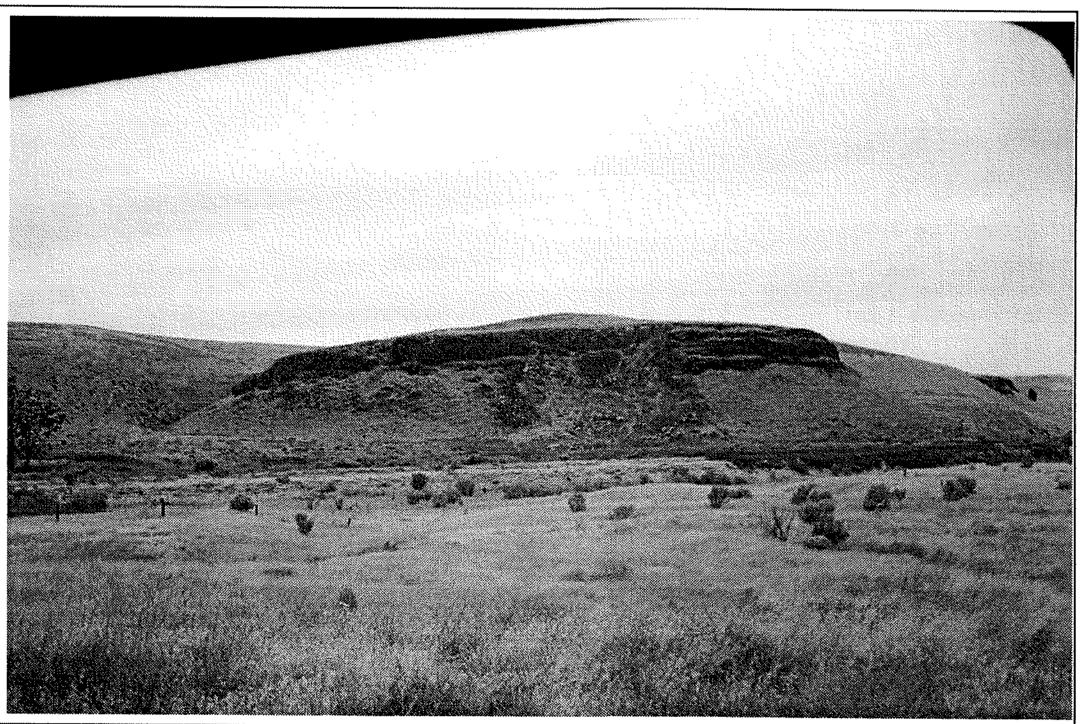


Photo 6 – Talus slope of basalt caprock boulders – approximately 6.3 miles south of I-84 and Rte. 74, view to west.

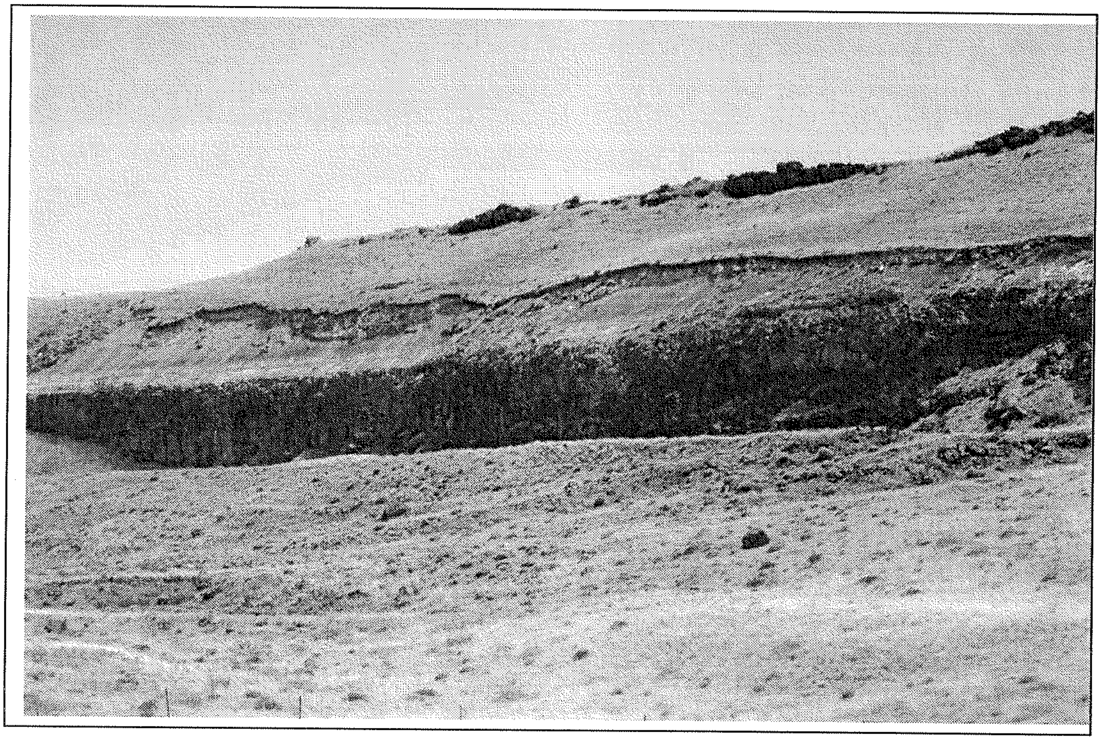


Photo 7 – Fractured basalt caprock, basalt boulders, slope and scarp below; slope failure above quarried area – approximately 3 miles west of I-84 and Rte. 74, view to SE.

H7

Respond to OAR 345-021-0010(1)(h)(H)

FACILITY DESIGN

Project features will be engineered to mitigate potential seismic hazards through design modifications, rerouting roads or transmission line alignments if necessary, or constructing engineered features such as slope protection, water retention basins, or armored ditches. Wind and water erosion protection will be provided to protect cut and fill slopes during construction and operation. Erosion protection may include slope vegetation or armor where needed. Landslides will be avoided where possible or stabilized if necessary. Road alignments (horizontal and vertical) will be designed to reduce erosion potential by maintaining minimum grades, where feasible. Road alignments must be designed to accommodate the long truckloads associated with WTG construction; therefore, road curve radii are of necessity longer.

H8

Respond to OAR 345-021-0010(1)(h)(I)

FACILITY DESIGN

Dangers to human safety resulting from seismic or non-seismic geologic hazards will be addressed by the design through compliance with applicable codes and good engineering practice. Every attempt will be made to avoid potential geologic hazards. However, if hazards are unavoidable, aggressive engineering solutions will be employed to protect human safety.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]

Sent: Tuesday, October 09, 2007 5:24 PM

To: 'John White'; 'jflarson@PacificEnergySystems.com'

Subject: FW: Shepherds Flat

Well, this was supposed to be in plain English, but it is not. I told you earlier today that it was OK to use the S&W seismic language in question, but after reading this, I think I would prefer that you use their exact language...that "the owner consider....."

I say this because Shelton is the guy from whom S&W got their load information. S&W was asked to consider seismic issues...and (to the extent you can get through Shelton's analysis) other issues will govern as well.

Please let me know if you need me to get more clarification.

-----Original Message-----
From: Shelton Stringer [mailto:sstringer@earthsys.com]
Sent: Tuesday, October 09, 2007 10:53 AM
To: 'Allan Henderson'
Subject: RE: Shepherds Flat

Hi Allan:

I believe I can assist interpreting this information into “plain English”. In short, this recommendation is likely benign and not to have any real impact on design or construction of the wind turbine towers or foundations, in that seismic hazard despite the statement below is relatively low and wind loading will almost certainly govern.

Wind turbine structures are “in tune” to low frequency ground motion originating from earthquakes that can be quite distant. MCE refers to “maximum considered earthquake” ground motion of low probability (2% risk in 50 years or approximate 1 in 2500 year recurrence interval). However normal structures including wind turbines are NOT required to be designed to this extreme unlikely event, especially since the design life of wind turbines is typically 20 years. Rather, the International Building Code (IBC) allows a design based on 2/3 of the MCE seismic forces to adjust to design levels. Moreover wind industry standards, namely IEC 61400-1 requires design by local codes (2006 IBC) and if not available use a higher probability (lower ground motion) of 475 year recurrence (Ref: IEC 61400-1 Section11.6) that in part is the reason for the 2/3 factor.

CSZ mega thrust refers to the distant Cascadia Subduction Zone that lie near at the Pacific Ocean coastline that can be capable of producing very large (mega) earthquakes in the range of magnitude 8 to 9, similar to the recent Sumatra earthquake in Indonesia or 1964 Good Friday earthquake in Alaska. The probability of such a large mega earthquake is about once in every 500 years, with the last time in the year 1700 (we know this from Japanese records of tsunamis). This ground motion can reach the project site but is greatly reduced by distance from the source.

I have conducted independent seismic hazard analyses for this site and find that while the statements below may be true they will likely have little actual significance. The ground motion is dependent on whether or not there are deep loess (silt) soil deposits on site over the basalt rock as deep soil will amplify the ground motion. However, the 2006 IBC design that would be based on ASCE 7-05 Section 15 as wind turbines are classified as non-building structures. The IBC design would result in a low seismic design coefficient that may be as low as 0.03 for rock and 0.04 for soil (minimum code value of 0.03 governs in all cases). This compares to a typical base shear coefficient (horizontal/vertical load) for extreme wind loading on 2.5 MW turbines on 80 m towers in the range of about 0.2. Generally, seismic design will only govern requiring strengthened towers for high seismic regions such as at Tehachapi or Palm Springs, California where the design ground motion is 5 to 10 times greater.

So in summary to answer Pat’s final three inquires, the answers I believe are:

1. No, because actual design is based on 2/3 of MCE, but is likely academic in either case.

2. Yes, towers may be seismic strengthened for class IEC-S (S for special environmental conditions) that may approximate IEC-1a class condition in high seismic region, in which this site is not.
3. Evaluate its implication, as I have attempted. If benign, use or ignore it. If adverse, seek clarification.

I hope that this helps.

Sincerely yours,

Shelton L. Stringer, PE, GE, PG, EG
Sr. Vice President / Geotechnical Engineer & Geologist
Earth Systems Southwest
Tel: 760-345-1588

From: Patricia Pilz [mailto:pat@pilzandco.com]
Sent: Thursday, October 04, 2007 11:58 AM
To: Allan Henderson
Cc: Derrel A. Grant
Subject: Shepherds Flat

Maybe you know what this means (it is from the Shepherds Flat Seismic Study):

We understand that the wind turbines structures may have a fundamental period on the order of 3 to 4 seconds. As noted in section 5.3 of this report, the MCE spectrum for the CSZ mega-thrust is significantly greater than the 2006 IBC design spectrum for periods between about 0.5 and 3 seconds. Because the average recurrence interval for earthquakes from this source is about 500 years (the 2006 design spectrum is based on ground motions with a return period of 2,500 years), we recommend that the owner consider modifying the design spectrum by increasing the spectral values for periods between 0.5 and 3 seconds to the CSZ mega-thrust MCE values.

Is this the kind of recommendation we accept? Do they even build towers this way? What do we do when we get a recommendation like this?

Thanks and regards,
Pat

Patricia Pilz
Pilz & Co, LLC
656 San Miguel Way
Sacramento, CA 95819
(T) 916-456-7651
(M) 916-803-0602

I1

Provide a description of measures that will be implemented to avoid or mitigate adverse impacts to soils in the northern project area.

NORTHERN AREA SOILS

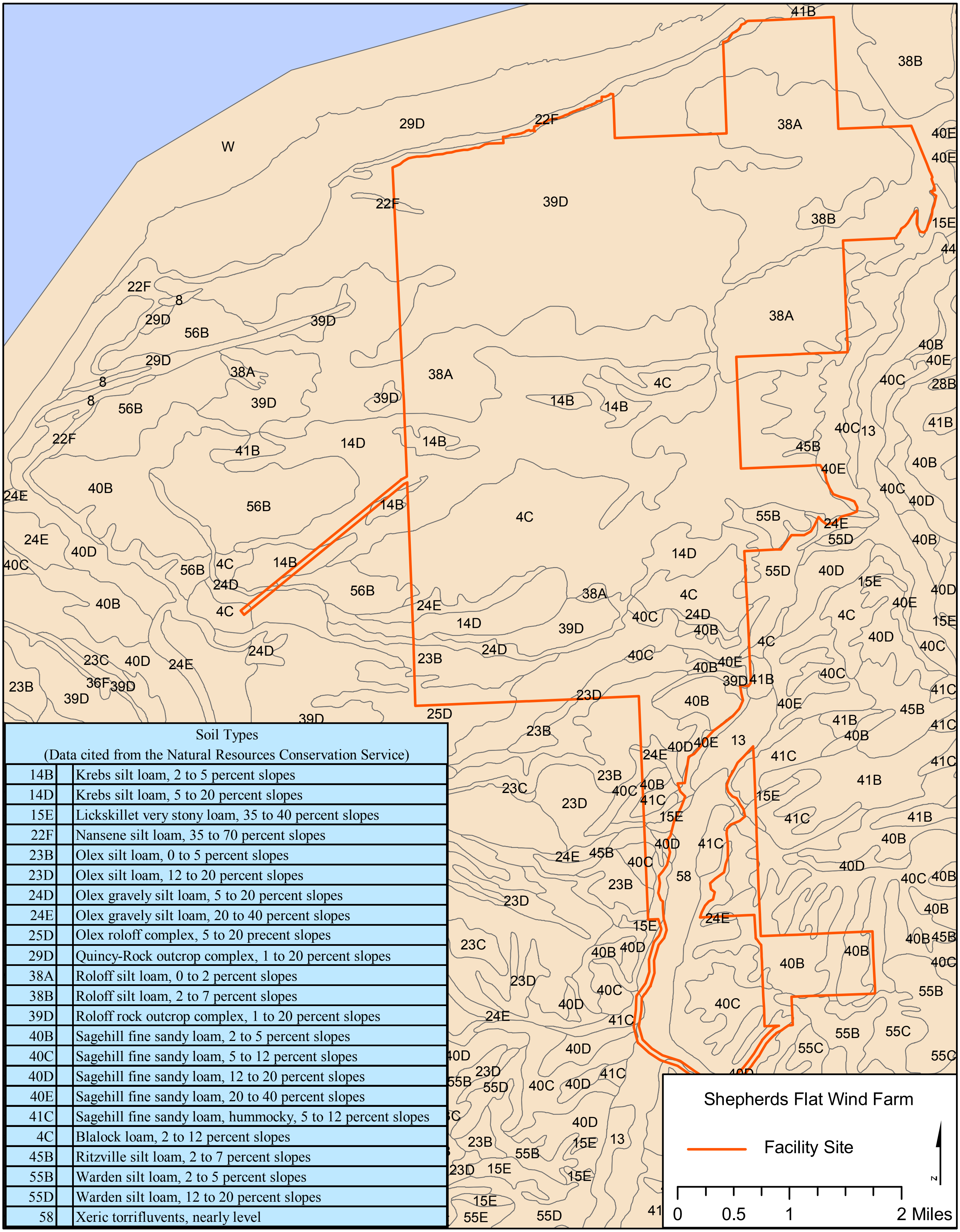
The northern project area is rangeland and the chief soil protection measure implemented to avoid adverse impacts to soils will be to provide maximum protection to the existing plant cover. Areas of temporary disturbance will not be scraped, but, rather, any existing vegetation will be crushed so as to preserve rootstalks. Water applications during construction will also help reduce wind erosion of disturbed soil.

On severely deteriorated range, cheatgrass and other low-value plants are dominant …the status of most portions of the northern project area. In some areas, grazing and sheep tending activities have left areas of the ground bare. However, seedbed preparation and seeding (big bluegrass, crested wheatgrass, and beardless wheatgrass are suitable for dryland seeding) are practical measures which may be taken to improve poor rangeland. Applicant will mitigate for any adverse impact to northern soils through seedbed preparation and seeding in all areas of temporary disturbance, regardless of the original condition of the range. The Applicant will also use crushed rock around the turbine foundations and gravel on finished facility roadways to minimize soil erosion in the permanent footprint.

Applicant will employ two impact avoidance measures to the maximum extent practicable: use of previously disturbed areas (e.g. existing roadways and tracks) and reduction of the area of temporary and permanent disturbance. Central temporary storage and laydown areas will be within the footprint of the permanent field workshops, permanent roadways will be the minimum width consistent with safe use, communication and electrical lines will be buried within the area disturbed by temporary road widening, and turbine foundations will abut roadways as closely as possible.

Please see Figure RAI #2 I-1.

Figure RAI #2 I-1



I2

Provide a description of measures that will be implemented to avoid or mitigate adverse impacts to soils in the southern project area

SOUTHERN AREA SOILS

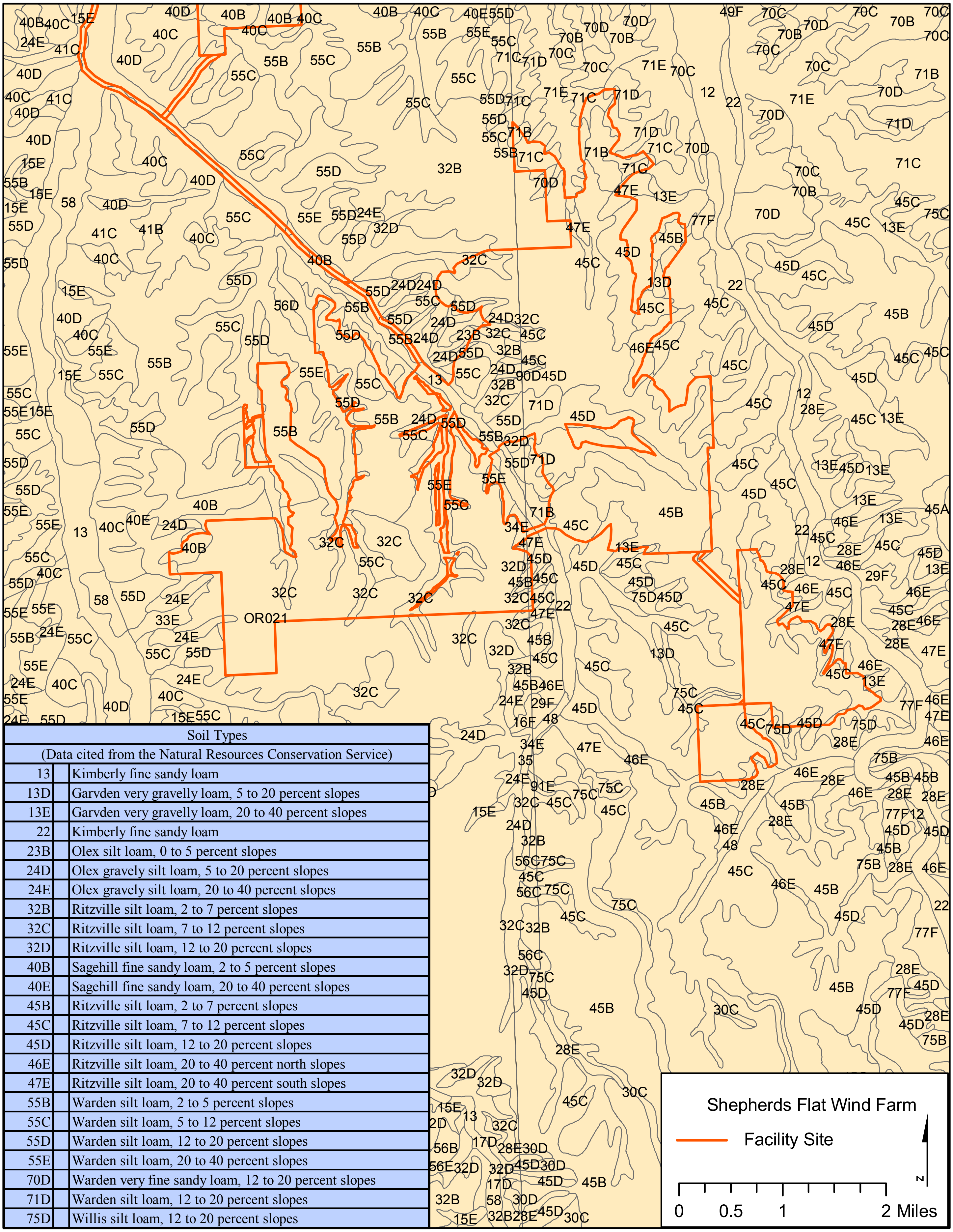
Most facility components and areas of temporary disturbance in the southern project area will occur on soils planted in dryland wheat. Protection of these soils is achieved by grain-fallow cropping, stubble mulch, minimum tillage, contour tillage, and appropriate seedbed preparation and seeding. To avoid adverse impacts to these soils, areas of temporary disturbance will not be scraped, but, rather, wheat or stubble mulch will be crushed in order to provide erosion protection. Landowners will be consulted with respect to existing contour tillage patterns and any diversions will be maintained. Water applications during construction will also help reduce wind erosion of disturbed soil.

Soil compaction can occur when equipment is driven over moist soils, or by an increase in equipment weight. To mitigate for any soil compaction, Applicant's reseeding plan will include soil modification (deep ripping or deep tillage) as requested by the property owners, followed by seeding with the appropriate wheat variety or dryland grass mix. The Applicant will also use crushed rock around the turbine foundations and gravel on finished facility roadways to minimize soil erosion in the permanent footprint.

Applicant will employ two impact avoidance measures to the maximum extent practicable: use of previously disturbed areas (e.g. existing roadways and tracks) and reduction of the area of temporary and permanent disturbance. Central temporary storage and laydown areas will be within the footprint of the permanent field workshops, permanent roadways will be the minimum width consistent with safe use, communication and electrical lines will be buried within the area disturbed by temporary road widening, and turbine foundations will abut roadways as closely as possible.

Please see Figure RAI #2 I-2.

RAI #2 Figure I-2



Soil Types	
(Data cited from the Natural Resources Conservation Service)	
13	Kimberly fine sandy loam
13D	Garvden very gravelly loam, 5 to 20 percent slopes
13E	Garvden very gravelly loam, 20 to 40 percent slopes
22	Kimberly fine sandy loam
23B	Olex silt loam, 0 to 5 percent slopes
24D	Olex gravely silt loam, 5 to 20 percent slopes
24E	Olex gravely silt loam, 20 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
40B	Sagehill fine sandy loam, 2 to 5 percent slopes
40E	Sagehill fine sandy 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
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
70D	Warden very fine sandy loam, 12 to 20 percent slopes
71D	Warden silt loam, 12 to 20 percent slopes
75D	Willis silt loam, 12 to 20 percent slopes

I3

Please explain the statement that the temporary disturbance areas outside the finished width of project access roads (up to 38 feet of temporary disturbance) would be "plowed and planted by the landowner as appropriate" after completion of construction. In general, the certificate holder is responsible for the cost of restoring areas disturbed by construction.

SITE RESTORATION

Applicant will assume the financial responsibility for the cost of restoring areas disturbed by construction.

In cultivated areas, to which Applicant's statement refers, plowing and planting will be appropriate only in the crop season following any construction disturbance (a cover crop is not anticipated as all moisture must be banked for the succeeding wheat crop). Landowners will therefore plow and plant as appropriate.

In areas not presently cultivated, landowners have expressed the desire to: 1) select the appropriate seed mixture; and 2) perform this work themselves. They will be compensated for both time and materials.

I4

Identify which soils in the project area are considered Class II or better by the NRCS. Identify which soils have high wind or water erosion potential.

PROJECT SITE SOILS

Class I and Class II Soils

One potential Class I soil occurs within the project area: Kimberly fine sandy loam. Kimberly fine sandy loam is considered Class I when irrigated. This soil occurs within the site along the bottom of Fourmile Canyon where there is no irrigation.

No Class II soils occur within the project area.

Soils with High Wind Erosion Potential

Soil Type	Wind Erosion Potential
Quincy-Rock outcrop complex, 1 to 20 percent slopes	High
Sagehill fine sandy loam, 12 to 20 percent slopes	High
Sagehill fine sandy loam, 2 to 5 percent slopes	High
Sagehill fine sandy loam, 20 to 40 percent slopes	High
Sagehill fine sandy loam, 5 to 12 percent slopes	High
Sagehill fine sandy loam, hummocky, 2 to 5 percent slopes	High
Sagehill fine sandy loam, hummocky, 5 to 12 percent slopes	High

Soils with High Water Erosion Potential

Soil Type	Water Erosion Potential
Gravden very gravelly loam, 20 to 40 percent slopes	High
Hankins silt loam, 5 to 35 percent south slopes	Moderate to High
Lickskillet very stony loam, 7 to 40 percent slopes	High
Nansene silt loam, 35 to 70 percent slopes	High
Olex gravelly silt loam, 20 to 40 percent slopes	High
Ritzville silt loam, 20 to 40 percent north slopes	High
Ritzville silt loam, 20 to 40 percent south slopes	High
Sagehill fine sandy loam, 20 to 40 percent slopes	High
Warden silt loam, 20 to 40 percent slopes	High

J1

Upon completion of the wetlands and waters survey being conducted in consultation with the Oregon Department of State Lands, please respond to OAR-021-0010(1)(j)(A)-(F). When do you anticipate this survey will be done? Exhibit J should also discuss any potential "waters of the United States" and whether a federal Section 404 permit might be needed.
NOTE: The requirements of Exhibit J (OAR 345-021-0010(1)(j)) are currently under review by the Council. We anticipate that new rules will be in place before the SFWF application is found to be complete. Although the Council has yet to act on any changes to the rule, you should consider, in your response, the Department's proposed revision to the Exhibit J requirements as posted on our website.

WETLANDS AND WATERS

Wetlands/Waters Delineation Report

Attachment J-1 contains Applicant's wetlands and waters survey, including maps and water feature descriptions.

Impact on wetlands, waters of the state, or waters of the United States

Wetlands

The facility site contains no wetlands.

Waters of the State

"Waters of the state of Oregon" means natural waterways including all tidal and nontidal bays, intermittent streams, constantly flowing streams, lakes, wetlands and other bodies of water in the state, navigable and nonnavigable, including that portion of the Pacific Ocean which is in the boundaries of this state (ORS 196.800(14) and 141-085-0010 and 0015).

The facility site contains forty water features, two of which (Eightmile Creek and Fourmile Creek) are named, while 38 may be described as gullies or washes. None are bays, constantly flowing streams, lakes or bodies of water. Fourmile Creek is not an intermittent stream in that it does not flow during a portion of every year of normal precipitation. Nor does it provide spawning, rearing or food-producing areas for food and game fish (ORS 796.800 (8)). The supporting hydrology for each water feature save Eightmile Creek (discussed below) originates from precipitation, and some (but not all) contain flowing water only during, and for a short duration after, precipitation events (OAR 350-081-0020 (58)). They are not, therefore, waters of the State.

Applicant believes that facility construction will have no negative impact on these drainages.

Eightmile Creek, a water of the State, and its associated 10-foot buffer, occupy approximately 1.6 acres of one of the facility's transmission corridors. Applicant proposes to cross Eightmile Creek with overhead transmission lines, but to neither construct new roads nor improve existing roads in that corridor. No power poles will be located within the creek nor its associated buffer, and Applicant believes that facility construction will have no negative impact on Eightmile Creek.

Fourmile Creek (a tributary of Eightmile Creek but not a water of the State) and its associated 7-foot buffer occupy approximately 4.0 acres of one of the facility's overhead transmission line corridors. In addition to this transmission corridor, Fourmile Creek is crossed twice by existing ranch roads that Applicant proposes to improve for site access. There are no culverts at these crossings, and the creek "bed" at the point of crossing is scraped dirt.

Applicant expects that its improvements (particularly gravel) to the ranch roads crossing Fourmile Creek will be beneficial in that they will reduce the runoff of silt into the creek bottom. Applicant will not place power poles within or immediately adjacent to the creek bed.

The remaining drainages (also discussed in Applicant's response to RAI#2 J-2) will be avoided when possible. When crossing a drainage is unavoidable, the drainage will be protected by the addition of crushed rock at the point of crossing.

<u>Waters of the United States</u>

The relevant definition of "waters of the United States" includes:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

    i. Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
    ii. From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
    iii. Which are used or could be used for industrial purpose by industries in interstate commerce;

4. All impoundments of waters otherwise defined as waters of the United States under the definition;

5. Tributaries of waters identified in paragraphs (1)-(4) of this section;

Eightmile Creek is a tributary of Willow Creek which is a tributary of the Columbia which is a water of the United States. While the Army Corps of Engineers has asserted jurisdiction over similar drainages, the U.S. Supreme Court disagrees. In Solid Waste Agency of Northern Cook County v. Army Corps of Engineers (2001) the court ruled that non-navigable, isolated, intrastate waters that do not actually abut on a navigable waterway are not included in waters of the United States. In Rapanos v. United States (2006) the plurality held that the definitional term "water of the United States" can only refer to "relatively permanent, standing or flowing bodies of water," not "occasional," "intermittent," or "ephemeral" flows. None of the site's water features qualify as waters of the United States.

Nevertheless, as discussed above, Applicant believes that improvement and stabilization of existing ranch roads will benefit these drainages.

Removal-fill Permit

A removal-fill permit is required if Applicant proposes to remove or fill 50 cubic yards of material from a water of the State. Even if a water of the State, Applicant proposes to remove no material at any drainage and fewer and 50 cubic yards of gravel would be required at any drainage crossing. No removal-fill permit is required.

Federal Section 404 Permit

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States. The site contains no waters of the United States; no federal Section 404 Permit is required.

Mitigation Measures

Because Applicant will not cause an adverse impact to any wetlands or waters, Applicant proposes neither mitigation nor monitoring.

J2

Are there no drainages within the site boundary that are potentially waters of the State or waters of the United States?

SITE DRAINAGES

The upland portion of the facility site is drained by 38 identified water features (please see Attachment J-1). Applicant has configured its upland site boundaries to avoid these drainages insofar as possible and the extent of their remaining incursion into the site boundary may be seen in Figures 4a and 4b in Attachment J-1.

Each of these water features is ephemeral, in that they contain flowing water only during, and for a short duration after, precipitation events. They are not, therefore, waters of the State. All are non-navigable, isolated, intrastate waters that do not actually abut on a navigable waterway and are not included in waters of the United States. Please see RAI #2 response J1.

ATTACHMENT J1

Attachment J1, *Wetlands/Waters Delineation Report for Shepherds Flat Wind Farm Project, Gilliam and Morrow Counties, Oregon; Mason, Bruce & Girard, Inc., June 08, 2007*, is not included in this copy of Applicant's Supplemental Information but is available upon request.

K1

Please discuss each applicable land use regulation and comprehensive plan criterion (the "applicable substantive criteria") as described in ORS 469.504(1)(b)(A) for both Gilliam County and Morrow County, and explain how the proposed facility would comply with those criteria. OAR 345-021-0010(1)(k)(C)(ii). It is not sufficient to state that the application "includes information assuring compliance." Exhibit K must identify the information and facts about the proposed facility that demonstrate compliance with the land use criteria.

APPLICABLE SUBSTANTIVE CRITERIA

Gilliam County

Zoning Ordinance

The Zoning Ordinance for Gilliam County, Oregon include the following regulations applicable to the proposed SFWF:

Section 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.*

The SFWF will preclude use of more than 20 acres of non-high-value farmland from commercial farm use. Therefore, an exception to Goal 3 is required. Please see Applicant's response to RAI#2 K4.

Section 4.020.H.1: A conditional use "*will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use*" and "w*ill not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.*"

Applicant expects no potential conflicts with accepted farming practices. Development of the northern project area will benefit management of grazing practices in that improved roads will provide improved access for herders and water trucks. In the southern project area, Applicant, in consultation with landowners, will site facility components so as to minimize "plow-arounds." As in the northern project area, improved roads will provide improved access to fields and minimize off-road travel, thereby protecting crops and soils. No operations other than ranching, farming and wind power generation facilities take place on adjacent lands. The construction and operation of the proposed facility will not impact these lands. Applicant expects that the cost of grazing in the northern facility area will be lowered by the construction of improved project roads, and that the cost of farming in the southern facility area will not be affected by the development of the SFWF.

Section 7.020.T Wind Power Generation Facility Siting Requirements 4: *The requirements set out in this section shall apply for the application and review of the siting of a Wind Power Generation Facility and the issuance of a Gilliam County Facility Conditional Use Permit.*

a. The following information shall be provided as part of the application:

(1) A general description of the proposed Wind Power Generation Facility, a tentative construction schedule, the legal description of the property on which the facility will be located, and identification of the general area for all components of the proposed Wind Power Generation Facility, including a map showing the location of components.

Applicant has complied with these regulations. The required information may be found in Exhibit B and Exhibit C of this Application.

(2) Identification of potential conflicts, if any, with: (a) Accepted farming practices as defined in ORS 215.203(2)(c) on adjacent lands devoted to farm uses; (b) Other resource operations and practices on adjacent lands except for wind power generation facilities on such adjacent lands; and (c) The nature and extent of the proposed facility on the cost of accepted farm or forest practices on surrounding EFU land.

Applicant expects no potential conflicts with accepted farming practices. Development of the northern project area will benefit management of grazing practices in that improved roads will provide improved access for herders and water trucks. Grazing can continue on all lands not occupied by permanent above-ground facilities. In the southern project area, Applicant, in consultation with landowners, will site facility components so as to minimize "plow-arounds." As in the northern project area, improved roads will provide improved access to fields and minimize off-road travel, thereby protecting crops and soils. No operations other than ranching, farming and wind power generation facilities take place on adjacent lands. The construction and operation of the proposed facility will not impact these lands. Applicant expects that the cost of grazing in the northern facility area will be lowered by the construction of improved project roads, and that the cost of farming in the southern facility area will not be affected by the development of the SFWF.

(3) A Transportation Plan, with proposed recommendations, if any, reflecting the guidelines provided in the Gilliam County's Transportation System Plan (TSP) and the transportation impacts of the proposed Wind Power Generation Facility upon the local and regional road system during and after construction, after consultation with the Gilliam County Public Works Director. The plan will designate the size, number, location and nature of vehicle access points.

Applicant's road network, including vehicle access points, are described in Exhibit C and mapped on Figure C-2. Expected impacts on traffic safety in the County, and particularly in the City of Arlington, are addressed in Applicant's response to RAI#2 U3.

(4) An avian impact monitoring plan. The avian monitoring plan shall be designed and administered by the applicant's wildlife professionals. For projects being sited by EFSC, compliance with EFSC's avian monitoring requirements will be deemed to meet this requirement. The plan shall include the formation of a technical oversight committee to review the plan, and consist of the following persons: (a) The landowners/farm tenants. (b) Facility

owner/operator representative. (Chair) (c) Oregon Department of Fish and Wildlife representative, if the agency chooses to participate. (d) Two Gilliam County residents with no direct economic interest in the project and recommended by the applicants for appointment by the Gilliam County Board of Commissioners. (e) U.S. Fish and Wildlife representative. if the agency chooses to participate. (f) Gilliam County Planning Commission member. At the request of applicant, this committee requirement may be waived or discontinued by the County.

Because the SFWF is being sited by EFSC, Applicant's wildlife impacts mitigation and monitoring plans will satisfy this regulation.

(5) A Covenant Not to Sue with regard to generally accepted farming practice shall be recorded with the County. Generally accepted farming practices shall be consistent with the definition of Farming Practices under ORS 30.930. The applicant shall covenant not to sue owners, operators, contractors, employees, or invitees of property zoned for farm use for generally accepted farming practices.

Applicant agrees to covenant not to sue for generally accepted farming practices.

(6) A fire prevention and emergency response plan for all phases of the life of the facility. The plan shall address the major concern associated with the terrain, dry conditions, and limited access.

Applicant agrees to the implementation of a fire prevention and emergency response plan.

(7) An erosion control plan, developed in consultation with the Gilliam County Public Works Department. The plan should include the seeding of all road cuts or related bare road areas as a result of all construction, demolition and rehabilitation with an appropriate mix of native vegetation or vegetation suited to the area. This requirement will be satisfied if the applicant has an NPDES (National Pollution Discharge Elimination System) permit.

Applicant has agreed to obtain an NPDES 1200-C permit from the Oregon Department of Environmental Quality and to meet NPDES permit requirements. Please see Applicant's response to RAI#2 V2.

(8) A weed control plan addressing prevention and control of all Gilliam County identified noxious weeds directly resulting from the Wind Power Generation Facility during preparation, construction, operation and demolition/rehabilitation.

Applicant's weed control plan is addressed in Applicant's response to RAI#2 P5.

(9) A socioeconomic impact assessment of the Wind Power Generation Facility, evaluating such factors as, but not limited to, the project's effects upon the social, economic, public service, cultural, visual, and recreational aspects of affected communities. These effects can be viewed as either positive or negative. In order to maximize potential benefits and to mitigate outcomes that are viewed problematic, decision makers need information about the socioeconomic impacts that are likely to occur.

Applicant's assessment of socioeconomic impacts is addressed in Applicant's responses to RAI#2 L1, R2, T2, S1, and U3.

(10) If the Wind Power Generation Facility exceeds 20 acres in size, a Goal 3 exception is required as found in OAR 660-033-0130(22).

The proposed facility exceeds 20 acres of permanent disturbance. Because land use compliance for this application is under EFSC jurisdiction, the applicable standards for an exception to Goal 3 are those set forth in ORS 469.504(2). Please see Applicant's response to RAI#2 K4.

(11) Information pertaining to the impacts of the Wind Power Generation Facility on: (a) Wetlands; (b) Wildlife (all potential species of reasonable concern); (c) Wildlife habitat; (d) Criminal activity (vandalism, theft, trespass, etc.) and proposed actions, if any, to avoid, minimize or mitigate negative impacts.

Applicant has provided this information in Exhibits P, Q, and U and their related RAIs.

(12) A dismantling and decommissioning plan of all components of the Wind Power Generation Facility, as provided in this section.

Applicant has provided this information in Exhibit W and its related RAI.

b. Gilliam County may impose clear and objective conditions in accordance with the County Comprehensive Plan, County Development Code and State law, which Gilliam County considers necessary to protect the best interests of the surrounding area, or Gilliam County as a whole.

Gilliam County has been appointed as a Special Advisory Group to the Siting Council, and can recommend conditions of approval for inclusion in the site certificate for the SFWF. This procedure satisfies the intent of this regulation.

c. Prior to commencement of any construction, all other necessary permits shall be obtained, e.g., Gilliam County Zoning Permit, road access and other permits from the Gilliam County Public Works Department, and from the Oregon Department of Transportation.

This regulation is addressed by Exhibit E and its related RAI.

d. The following requirements and restrictions apply to the siting of a facility:

(1) The Wind Power Generation Facility shall be on property zoned EFU, and no portion of the facility shall be within 3,520 feet of properties zoned residential use or designated on the Comprehensive Plan as residential. (For clarification purposes of this section, EFU Zones are not considered zoned for residential use.)

The portion of the SFWF located within Gilliam County is located entirely on property zoned EFU. No portion of the facility is within 3,520 feet of properties zoned residential use or designated on the Comprehensive Plan as residential.

(2) 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.

All facility towers will be painted white/off white so as to minimize visual impacts.

(3) Reasonable efforts shall be taken to protect and to preserve existing trees, vegetation, water resources, wildlife habitat or other significant natural resources.

Applicant has made reasonable efforts to avoid adverse impacts to all natural resources, and to provide appropriate mitigation for impacts that cannot reasonably be avoided. Please see Exhibit P.

(4) The turbine towers shall be designed and constructed to discourage bird nesting and wildlife attraction.

All turbine towers will tubular in design and construction, with no perching or nesting opportunities.

(5) The turbine towers shall be of a size and design to help reduce noise or other detrimental effects.

All turbines under consideration for the facility meet this regulation. Please see Exhibit X and its related RAI.

(6) Private access roads shall be gated to protect the facility and property owners from illegal or unwarranted trespass, and illegal dumping and hunting.

The facility will be accessed by existing ranch access roads, which are not gated. Although Applicant will be developing new *internal* roads, it will not be constructing new private access points from public roads. Applicant and landowners will assess any need for additional protection throughout the life of the facility.

(7) 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.

Applicant's layout will comply with this regulation. Please see Exhibit C. Minimum ground clearances will not interfere with movement of farm equipment and vehicles.

(8) Required permanent maintenance/operations buildings shall be located off-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.

The north and south field workshops are designed, and will be constructed, to be generally consistent with the character of similar buildings used in the vicinity of the project, and will be removed or converted to farm use upon decommissioning of the facility.

(9) A Wind Power Generation Facility shall comply with the Specific Safety Standards for Wind Facilities delineated in OAR 345-024-0010 (as adopted at time of application).

The facility's site certificate will assure the facility's compliance with this regulation.

(10) To the extent feasible, the County will accept information presented by an application for an EFSC proceeding in the form and on the scheduled required by EFSC.

Gilliam County has been appointed as a Special Advisory Group to the Siting Council, and will receive and comment on the Application for Site Certificate, satisfying this regulation.

Section 7.020.T Wind Power Generation Facility Siting Requirements 5: Decommissioning/ Dismantling Process. *g. For projects sited by EFSC, compliance with EFSC's financial assurance and decommissioning standards shall be deemed to be in compliance with the dismantling and decommissioning requirements of this Section 152.524.*

The EFSC process assures the facility's compliance with this regulation (please see Exhibit W).

Section 7.020.T Wind Power Generation Facility Siting Requirements 6: Wind Power Generation Facility Siting Subsequent Requirements

a. A bond or letter of credit shall be established for the dismantling of uncompleted construction and/or decommissioning of the facility. (See §152.524.) For projects being sited by the State of Oregon's Energy Facility Siting Council (EFSC), the bond or letter of credit required by EFSC will be deemed to meet this requirement.

The facility will be sited by EFSC, meeting this regulation.

b. The actual latitude and longitude location or Stateplane NAD 83(91) coordinates of each turbine tower, connecting lines, and transmission lines shall be provided to Gilliam County once commercial electrical production begins.

As-built documentation will be provided to Gilliam County.

c. A summary of as-built changes in the facility from the original plan, if any, shall be provided by the owner/operator.

As-built documentation will be provided to Gilliam County.

d. An amendment to a Site Certificate issued by EFSC will be governed by the rules for amendments established by EFSC.

Facility changes will be governed by the EFSC process.

e. Within 120 days after the end of each calendar year, the facility owner/operator shall provide Gilliam County an annual report including the following information: (1) Energy production by month and year. (2) Nonproprietary information about wind conditions (e.g., monthly averages, high wind events, bursts). (3) A summary of changes to the facility that do not require facility requirement amendments. (4) A summary of the avian monitoring program – bird injuries, casualties, positive impacts on area wildlife and any recommendations for changes in the monitoring program. (5) Employment impacts to the community and Gilliam County during and after construction. (6) Success or failures of weed control practices. (7) Status of the decommissioning fund. (8) Summary comments – any problems with the projects, any adjustments needed, or any suggestions. The annual report requirement may be discontinued or required at a less frequent schedule by the County. The reporting requirement and/or reporting schedule shall be reviewed, and possibly altered, at the request of the facility owner/operator. (OPTION: For facilities under EFSC jurisdiction and for which an annual report is required, the annual report to EFSC satisfies this requirement.)

Applicant expects that EFSC annual reporting will satisfy this requirement.

Morrow County

Zoning Ordinance

Section 3.010.C and 3.010.D of the Morrow County Zoning Ordinance (MCZO) identify, respectively, the uses permitted outright and the conditional uses permitted in the County's EFU zone.

MCZO 3.010.C.16

MCZO 3.010.C.16 lists "utility and transmission towers not exceeding 200 feet in height." The SFWF will include above-ground collector lnes and transmission lines. These lines will be placed on transmission poles or towers not exceeding 200 feet in height. Therefore, under MCZO 3.010.C.16, these facilities will be outright permitted uses within the Morrow County EFU zone.

MCZO 3.010.D.16

MCZO 3.010.D.16 lists the following "conditional use" within the EFU zone:

> "Commercial utility facilities for the purposes of generating power for public use by sale. 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."

Consistent with the Council's prior decisions (see, e.g., Final Order for Biglow Canyon Wind Farm, June 30, 2006 at pp. 54-55), the wind energy facility, including turbines, power collection system, meteorological towers, control system and maintenance facilities are part of the "principal use" of "commercial utility facilities for the purposes of generating power for public use by sale." Although we analyze the facility's compliance with the applicable Morrow County conditional use standards, the facility will preclude commercial farm use of more than 20 acres of non-high-value farmland. Therefore, an exception to Goal 3 is required. Please see Applicant's response to RAI#2 K4.

Section 3.010(D) LIMITATIONS ON CONDITIONAL USES In addition to the general standards and conditions that may be attached to the approval of a conditional use as provided by Article 6 of this ordinance, the following limitations shall apply to a Conditional Use in the EFU Zone.
1. Will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; and
2. Will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.

Applicant expects no potential conflicts with accepted farming practices. In the southern project area (which includes all of the facility site located in Morrow County), Applicant, in consultation with landowners, will site facility components so as to minimize "plow-arounds." As in the northern project area, improved roads will provide improved access to fields and minimize off-road travel, thereby protecting crops and soils. No operations other than ranching, farming and wind power generation take place on adjacent lands. The construction and operation of the proposed facility will not impact these lands. Applicant expects that the cost of farming in the southern facility area will not be affected by the development of the SFWF.

Section 3.010(D)(16) Commercial utility facilities for the purposes of generating power for public use by sale. 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.

The SFWF will preclude use of more than 20 acres of non-high-value farmland from commercial farm use. Therefore, an exception to Goal 3 is required. Please see Applicant's response to RAI#2 K4.

Section 3.010(I) Transportation Impacts
Traffic Impact Analysis (TIA). In addition to the other standards and conditions set forth in this section, a TIA will be required for all projects generating more than 400 passenger car equivalent trips per day. Heavy vehicles – trucks, recreational vehicles and buses – will be defined as 2.2 passenger car equivalents. A TIA will include: trips generated by the project, trip distribution for the project, identification of intersections for which the projects adds 30 or more peak hour passenger car equivalent trips, and level of service assessment, impacts of the project, and mitigation of the impacts. If the corridor is a State Highway, use ODOT standards.

Applicant does not expect to generate more than 400 passenger car equivalent trips per day, nor 30 or more peak hour passenger car equivalent trips per day at any intersection within Morrow County.

Section 6.020 General Criteria
In judging whether or not a conditional use proposal shall be approved or denied, the Commission shall weigh the proposal's appropriateness and desirability, or the public convenience or necessity to be served against any adverse conditions that would result from authorizing the particular development at the location proposed and, to approve such use, shall find that the development at the location proposed and, to approve such use, shall find that the following criteria are either met or can be met by observance of conditions.
(1) The proposal will be consistent with the Comprehensive Plan and the objectives of the Zoning Ordinance and other applicable policies and regulations of the County.

The Morrow County Comprehensive Plan encourages the development of alternative energy facilities (see above).

Section 6.030 General Conditions In addition to the standards and conditions set forth in a specific zone, this article, and other applicable regulations; in permitting a new conditional use or the alteration of an existing conditional use, the Commission may impose conditions which it finds necessary to avoid a detrimental impact and to otherwise protect the best interests of the surrounding area or the County as a whole.

Morrow County has been appointed as a Special Advisory Group to the Siting Council, satisfying this regulation.

Section 6.040 Permit and Improvements Assurance The commission may require an applicant to furnish the County with a performance bond or such other form of assurance that the Commission deems necessary to guarantee development in accordance with the standards established and the conditions attached in granting a conditional use permit.

This regulation will be satisfied by the Council's findings under OAR 345-021-0010.

Section 6.050(O) Standards Governing Conditional Uses Radio, television tower, utility station or substation:
1. In a residential zone, all equipment storage on the site may be required to be within an enclosed building.
The use may be required to be fenced and provided with landscaping.
The minimum lot size for a public utility facility may be waived on finding that the waiver will not result in noise or other detrimental effects to adjacent property.
Transmission towers, hoses, overhead wires, plumbing stations, and similar gear shall be so located, designed and installed as to minimize their conflict with scenic values.

No facility components will be adjacent to residential zones. All facility components will be designed and installed so as to minimize visual impact.

RAI#3, K1: LAND USE

(Follow-Up)

A. Explain what you mean by "plow-arounds" and how their minimization affects accepted farming practices in the area.

B. [Comment: GCZO 7.020(T)(6) requires gates on "private access roads" to a wind power generating facility. The ordinance does not contain an exception for "internal" roads that do not directly lead from public roads. We have interpreted this ordinance as requiring gates on turbine string access roads.]

C. Both Gilliam and Morrow Counties have an acreage restriction on power generation facilities on EFU land. The ordinances mirror OAR 660-033-0130(22). Please discuss the acreage occupied by the facility components in each county separately. Please provide a table for each county showing the acreages (similar to Table 5 in the Draft Proposed Order for the Leaning Juniper II Wind Power Facility, available on our website).

D. On page 8 of your response, in discussing the Morrow County ordinances, you refer to farming in the northern project area. The parts of the SFWF in Morrow County are in the southern project area. Revise your answer to address the facility components in Morrow County only.

LAND USE

Plow-Arounds

Applicant seeks to minimize obstacles to farming…obstacles in the field which must be plowed (or planted, or harvested) around. Obstacles increase time spent on the tractor for the farmer, and increased turns in the field may lead to an increase in the number of furrows perpendicular to the prevailing wind, a situation which could lead to soil saltation.

Therefore, Applicant's layout will place turbine pads directly on access roads, so far as possible, avoiding road necks and isolated pads which must be plowed around.

Acreage by County

Area occupied by the Shepherds Flat Wind Farm

Structure	**Gilliam County** (acres)	**Morrow County** (acres)	**Total Facility** (acres)
Principal use			
Turbine towers, including pad areas and road turnouts	8.997	2.703	11.700
Meteorological towers	0.0014	0.0007	0.002
Aboveground 34.5-kV collector line	0.120	0.036	0.156
Aboveground 230 kV transmission line	0.180	0.009	0.190
Field workshops	1.607	1.417	3.024
Subtotal	13.201	6.461	19.662
Access roads	115.959	37.035	152.992
Total	**129.159**	**43.496**	**172.656**

In Gilliam County, approximately 129 acres of non-high value farmland will be precluded by the Shepherds Flat Wind Farm. In Morrow County, approximately 44 acres of non-high value farmland will be precluded by the Shepherds Flat Wind Farm.

Amended RAI#2, K1

Please see Applicant's Amendment to RAI#2, K1, resubmitted in its entirety.

K2

Respond to OAR 345-021-0010(1)(k)(C)(iii). Are there any "directly applicable" administrative rules, goals and statutes?

RULES, GOALS AND STATUTES

Because the proposed Shepherds Flat Wind Farm is sited on agricultural land, the use limitations under Goal 3 and its implementing regulations, including OAR 660-033-0120 (Uses Authorized on Agricultural Lands) are directly applicable to the development of the facility. Compliance with Goal 3 standards is addressed in detail in RAI #2, K3 (Compliance with Statewide Planning Goals).

The SFWF will preclude more than 20 acres from use as a commercial agricultural enterprise. Therefore, the Applicant seeks a Goal 3 exception under ORS 469.504(2) (see Applicant's response to RAI #2 K4).

K3

Respond to OAR 345-021-0010(1)(k)(C)(iv).

COMPLIANCE WITH STATEWIDE PLANNING GOALS

The proposed facility does not comply with Section 4.020.D.14 of the Gilliam County Zoning Ordinance, and MCZO 3.010.D.16, because the Shepherds Flat Wind Farm will preclude more than 20 acres of non-high-value farmland from use as a commercial agricultural enterprise.[1] Therefore, the proposed facility does not comply with all of the applicable substantive criteria. Under ORS 469.504(1)(b)(B), the Council must determine whether the proposed facility "otherwise [complies] with the applicable statewide planning goals."

The "applicable statewide planning goal" in this case is Goal 3, the state's Agricultural Lands goal. No other statewide planning goals are applicable. As discussed below, the SFWF complies with Goal 3 with

As expressed in *Oregon's Statewide Planning Goals and Guidelines*, Goal 3 is:

> ***To preserve and maintain agricultural lands.***
> *Agricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700.*

Under Goal 3, non-farm uses are permitted within a farm use zone as provided under ORS 215.283.

To find compliance with ORS 215.283, the Council must determine whether the proposed energy facility and its related or supporting facilities are uses that fit within the scope of the uses permitted in exclusive farm use zones as described in ORS 215.283(1), (2) or (3). The Shepherds Flat Wind Farm would consist of the energy facility (the wind turbine generators and associated step-up transformers) and the following related or supporting facilities: the underground and aboveground power collection lines, 230-kV transmission lines, two substations, two field workshops, six meteorological towers, the control system and access roads.

In the Final Order on Amendment #2 for the Stateline Wind Project, the Council found that a wind energy facility (the "principal use") was a "commercial utility facility for the purpose of generating power for public use by sale" and allowable under ORS 215.283(2)(g). The Council found that the power collector system and meteorological towers were part of the principal use. The Council found that the Stateline substation and the aboveground transmission line connecting the substation with the main power grid were "utility facilities necessary for public service" allowed under ORS 215.283(1)(d). The Council, further, found that the Stateline access

[1] Soils on the SFWF site are identified in Exhibit I. All or nearly all soils do not meet the definition of "high-value farmland," which includes soils designated as prime, unique, Class I and Class II.

roads had “independent utility” and were not part of the principal use. The Council found that the access roads were allowable under ORS 215.283(3).

Under the precedent in the Stateline decision, the wind turbines constitute a “commercial utility facility for the purpose of generating power for public use by sale” and the power collection system and meteorological towers are part of that principal use. In addition, the Shepherds Flat control system and field workshop buildings are part of the principal use.

The proposed substations and transmission lines are “utility facilities necessary for public service” allowed under ORS 215.283(1)(d). The Applicant proposes two new substations: one in the northern project area, and one in the southern project area. The substations would support transformers that will step up the power from 34.5 kV to 230 kV, for purposes of transmission to a point of interconnection with the BPA system. Thus, these substations and transmission lines would be similar in function to the substation and transmission line at Stateline, which was proposed to step up the power for transmission over a 115-kV or 230-kV line that would interconnect the Stateline facility with the regional power grid in Washington. Because the two substations are necessary to make the power from the SFWF available to the public through the BPA system, the “utility facility necessary for public service” provision is applicable.

Finally, consistent with precedent in the Stateline decision, the access roads are allowable under ORS 215.283(3).

Given that each of the facility components falls within the definitions of non-farm uses permitted within a farm use zone as provided under ORS 215.283, we now apply the standards for determining whether each use is allowable in the case of the proposed facility.

The Principal Use and Access Roads

While the principal use and the access roads are allowable subject to two different subsections of ORS 215.283, the substantive standards that both uses must meet for a finding of compliance with Goal 3 are identical; therefore, the following discussion addresses both the principal use and the access roads.

In this case, the principal use is a “commercial utility facility.” ORS 215.283(2)(g) authorizes “commercial utility facilities for the purpose of generating power for public use by sale” on agricultural land, subject to ORS 215.296. OAR Chapter 660, Division 33, contains the Land Conservation and Development Commission (LCDC) administrative rules for implementing the requirements for agricultural land as defined by Goal 3. OAR 660-033-0120 (Table 1) lists the “commercial utility facility” use as a type “R” use (“use may be approved, after required review”) and references the standards found in OAR 660-033-0130(5) and (22) for such a facility if it is proposed to be located on non-high-value farmland, and (5) and (17) if it is proposed to be located on high-value farmland.[2]

[2] OAR 660-033-0020(8) defines “high value farmland.” Non-irrigated farmland is “high value” if the tract is composed predominantly of soils that are classified prime, unique, Class I or II by the NRCS. The soils in the area affected by the principal use are not classified as “prime farmland” by the NRCS, and the soil capability classifications in the area are below Class I and Class II.

The proposed access roads are allowable on EFU land under ORS 215.283(3). ORS 215.283(3) allows "roads, highways and other transportation facilities and improvements" that are not otherwise allowed under paragraphs (1) and (2) of ORS 215.283 to be established in an EFU zone, subject to:

> *(a) Adoption of an exception to the goal related to agricultural lands and to any other applicable goal with which the facility or improvement does not comply; or*
>
> *(b) ORS 215.296 for those uses identified by rule of the Land Conservation and Development Commission as provided in section 3, chapter 529, Oregon Laws 1993.*

The subparagraphs are conjoined by "or" and so either (a) or (b) applies. In this case, subparagraph (b) applies because the facility access roads are a use that has been identified by the LCDC. OAR 660-033-0120 identifies uses authorized on agricultural lands. OAR 660-033-0120 (Table 1) lists "transportation improvements on rural lands allowed by OAR 660-012-0065" as a type "R" use ("use may be approved, after required review"). OAR 660-033-0120 does not make reference to any criteria in OAR 660-033-0130 for this use.

OAR 660-012-0065 applies to transportation improvements on rural lands. The proposed facility access roads fall within the definition of "accessory transportation improvements" in OAR 660-012-0065(2)(d) because they are "transportation improvements that are incidental to a land use to provide safe and efficient access to the use."[3]

Under OAR 660-012-0065(3)(a), "accessory transportation improvements for a use that is allowed or conditionally allowed by ORS…215.283" are consistent with Goal 3, "subject to the requirements of this rule." The proposed access roads are accessory transportation improvements for a "commercial utility facility for the purpose of generating power for public use by sale," which is a use conditionally allowed by ORS 215.283(2)(g). Accordingly, the access roads are consistent with Goal 3, subject to any applicable requirements of OAR 660-012-0065.

The requirements of OAR 660-012-0065(4) are applicable:

> *Accessory transportation improvements required as a condition of development listed in subsection (3)(a) of this rule shall be subject to the same procedures, standards and requirements applicable to the use to which they are accessory.*

The rule language applies specifically to accessory transportation improvements "required as a condition of development." Because the facility access roads are necessary for the operation and maintenance of the wind energy facility, they are a necessary condition of the development of the commercial utility facility. Accordingly, the access roads are subject to the standards and

[3] OAR 660-12-0065(2)(a) defines "access roads" as "low volume public roads that principally provide access to property or as specified in an acknowledged comprehensive plan." The proposed Facility turbine string access roads are not "access roads" under this definition because they are not public roads.

requirements applicable to the principal use. As discussed above, the applicable standards and requirements are contained in OAR 660-033-0130(5) and (22) for non-high-value farmland.

The facility would preclude from agricultural use about 173 acres of non-high-value farmland.

OAR 660-033-0130(5) provides:

> *Approval requires review by the governing body or its designate under ORS 215.296. Uses may be approved only where such uses:*
>
> > *(a) will not force a significant change in accepted farm or forest practices on surrounding lands devoted to farm or forest use; or*
> >
> > *(b) will not significantly increase the cost of accepted farm or forest practices on lands devoted to farm or forest use.*[4]

The principal use and the access roads for the facility would not force a significant change in accepted farm practices on surrounding farm land and would not significantly increase the cost of accepted farm practices. The Applicant's analysis under the parallel local land use standards for Gilliam County and Morrow County is set forth in RAI #2, K1.

On non-high-value farmland, the principal use and access roads are also subject to OAR 660-033-0130(22), which provides:

> *(22) A power generation facility shall not preclude more than 20 acres from use as a commercial agricultural enterprise unless an exception is taken pursuant to ORS 197.732 and OAR chapter 660, division 004.*

In this case, the "power generation facility" consists of the principal use and the turbine string access roads. Based on the permanent facility footprint as described in Exhibit C of the ASC, the area occupied by the power generation facility would be over approximately 165 acres. In total, the facility would occupy about 173 acres, all on non-high-value farmland within the EFU zone., the majority of which is high-value farmland. (Approximately 4.6 acres of that total would be occupied by the substations, which are analyzed for land use purposes in a separate section of this RAI response.) These numbers exceed the allowance of OAR 660-0333-0130(22); therefore, the the principal use and access roads would not comply with OAR 660-033-0130(22) and Goal 3. An exception to Goal 3 is required, and is discussed in RAI #2, K4.

Substations

The proposed substation and aboveground transmission lines would be "utility facilities necessary for public service" allowed on EFU land under ORS 215.283(1)(d), subject to the provisions of ORS 215.275. That conclusion is consistent with the Council's finding that the

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[4] OAR 660-033-0130(5) reiterates the standards set forth in OAR 215.296(1).

Stateline substation and the aboveground transmission line connecting the substation with the main power grid were "utility facilities necessary for public service." Like the substation and transmission line at Stateline, the proposed substations and transmission lines would function to step up the power to accommodate interconnection with the BPA system. Because the proposed substations and transmission line are necessary to make the power from the facility available to the public through the BPA system, a finding that they are "utility facilities necessary for public service" is appropriate.

ORS 215.275 lists factors for deciding whether a utility facility is "necessary for public service." The statute provides:

> *(1) A utility facility established under ORS 215.213 (1)(d) or 215.283 (1)(d) is necessary for public service if the facility must be sited in an exclusive farm use zone in order to provide the service.*
>
> *(2) To demonstrate that a utility facility is necessary, an applicant for approval under ORS 215.213 (1)(d) or 215.283 (1)(d) must show that reasonable alternatives have been considered and that the facility must be sited in an exclusive farm use zone due to one or more of the following factors:*
>
> > *(a) Technical and engineering feasibility;*
> >
> > *(b) The proposed facility is locationally dependent. A utility facility is locationally dependent if it must cross land in one or more areas zoned for exclusive farm use in order to achieve a reasonably direct route or to meet unique geographical needs that cannot be satisfied on other lands;*
> >
> > *(c) Lack of available urban and nonresource lands;*
> >
> > *(d) Availability of existing rights of way;*
> >
> > *(e) Public health and safety; and*
> >
> > *(f) Other requirements of state or federal agencies.*

The proposed substations must be located in an EFU zone because there is no non-EFU land in the vicinity of the facility. There are no reasonable alternatives. At least three of the factors listed in ORS 215.275(2) apply. First, "technical and engineering feasibility" requires that there be a substation to accommodate interconnection with the BPA system. It is not feasible or technically possible to interconnect with the main transmission grid without a substation. Second, the proposed substations are "locationally dependent." They must be located in proximity to the proposed wind turbines in the northern and southern project areas, because that is where the power would be generated. Third, there are no urban or non-resource lands available to locate the substations where they could serve their purpose. For these reasons, location of the substation on EFU land is "necessary for public service" and the substations are allowable under ORS 215.283(1)(d).

ORS 215.275 imposes two requirements on "utility facilities necessary for public service" allowed under ORS 215.283(1)(d). ORS 215.275(4) requires that the owner of the utility facility be responsible for restoring agricultural land and associated improvements to their former condition if they are damaged or disturbed by the siting, maintenance, repair or reconstruction of the facility. The proposed substations would be located on land that would be part of the permanent SFWF "footprint." Construction of the substations would not affect agricultural land or associated improvements outside of that footprint. Nevertheless, the certificate holder would be responsible for restoring all areas temporarily disturbed during construction of the facility upon completion of construction.

ORS 215.275(5) requires the imposition of "clear and objective conditions" on siting a utility facility under 215.283(1)(d) "to mitigate and minimize the impacts of the proposed facility, if any, on surrounding lands devoted to farm use in order to prevent a significant change in accepted farm practices or a significant increase in the cost of farm practices on the surrounding farmlands." Construction of the proposed substations as part of the SFWF would not substantially increase the impacts of the principal use and access roads, which would occupy a much larger area of agricultural land than the substations. For the reasons discussed above, the principal use and access roads would not result in RAI #2, K1, a significant change in accepted farm practices or significantly increase the cost of those practices. The proposed substations and transmission lines similarly would not cause a significant change in accepted farm practices or significantly increase the cost of those practices.

K4

Respond to OAR 345-021-0010(1)(k)(C)(v).

EXCEPTION TO STATEWIDE PLANNING GOALS

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 Shepherds Flat Wind Farm will preclude the use of approximately 173 acres of non-high-value farmland from commercial agricultural purposes, and so an exception is required.

Under ORS 469.504(2), *The council may find goal compliance for a facility that does not otherwise comply with one or more statewide planning goals by taking an exception to the applicable goal. Notwithstanding the requirements of ORS 197.732, the statewide planning goal pertaining to the exception process or any rules of the Land Conservation and Development Commission pertaining to an exception process goal, the council may take an exception to a goal if the council finds:*

(a) The land subject to the exception is physically developed to the extent that the land is no longer available for uses allowed by the applicable goal;

(b) The land subject to the exception is irrevocably committed as described by the rules of the Land Conservation and Development Commission to uses not allowed by the applicable goal because existing adjacent uses and other relevant factors make uses allowed by the applicable goal impracticable; or

(c) The following standards are met:

(A) Reasons justify why the state policy embodied in the applicable goal should not apply;

(B) The significant environmental, economic, social and energy consequences anticipated as a result of the proposed facility have been identified and adverse impacts will be mitigated in accordance with rules of the council applicable to the siting of the proposed facility; and

(C) The proposed facility is compatible with other adjacent uses or will be made compatible through measures designed to reduce adverse impacts.

The proposed Shepherds Flat Wind Farm (SFWF) meets the standards set forth in (c) above:

Reasons Justify Why the State Policy Embodied in the Applicable Goal Should Not Apply

Goal 3 embodies the state policy to preserve and maintain agricultural lands. Applicant believes that facility development will serve to preserve and maintain agricultural lands, that the State policy should apply, but that the 20 acre limit should not.

First, although the facility would occupy more than 20 acres of non-high-value farmland, it would occupy less than one percent of the farmed land adjacent to the facility. The facility site covers 22,390 acres, of which 13,627 (61%) is in this northern project area. Approximately 63% percent of facility components will be sited in the north, and their associated permanent footprint will take up less than one percent of this land.

The southern project area is not irrigated, and so is planted in dryland wheat. Of the 8,763 acres within the southern site boundary, 6,598 are cultivated and the facility's permanent footprint will impact 54 of these acres (less than one percent).

Moreover, most of the permanent facility footprint would consist of new roads or expansions of existing roads (approximately 153 acres). Those roads can also be used for farm purposes. The impact measured in terms of generating capacity per acre of disturbance is also small. Assuming a 2.5MW turbine, the SFWF nameplate capacity will be 757.5 MW, and the permanent facility footprint will be 0.228 acres per MW. Similar, smaller facilities are also subject to the 20 MW limit, and have been sited using 0.240 acres per MW. Applicant believes that its attention to the design of facility components has minimized its facility footprint, and protected Oregon's agricultural heritage.

Second, by increasing the land's economic productivity, the facility will increase the economic feasibility of continued agricultural operations. Property owners will receive payments in exchange for allowing project facilities to be located on their land. That income will support continued agriculture. Due to poor soils and little water, agricultural productivity in the northern project area is marginal. Sheep have been grazed on the land for generations, but for only half of each year—there is not enough rainfall to support feed grasses year-round. The SFWF will increase this land's economic productivity, thereby decreasing pressure to convert it to other, non-ranching uses, and preserve an important way of life. Similarly, the facility will provide additional economic return to the wheat farming on the southern project area, while taking only a very small portion of the area out of agricultural production.

Third, approval of the proposed facility furthers the state policy embodied in Goal 13 (Energy Conservation). The Guidelines for implementing Goal 13 expressly direct land use planning to utilize renewable energy resources, including wind, "whenever possible." State policy supporting development of renewable energy is also found in the State's Renewable Action Plan (ODOE, 2005), which calls for significant, additional development of renewable resources, including wind energy, and in SB 838, the recently enacted "renewable portfolio standard" that requires the state's largest utilities to meet 25 percent of their electric load with new renewable energy sources by 2025.

Fourth, it is not feasible to locate a renewable wind energy facility in Morrow County or Gilliam County without affecting agricultural land because the best wind resources are located on agricultural land. Both counties are predominantly rural, with non-EFU land almost entirely confined to a few "urban" areas.

Significant Environmental, Economic, Social and Energy Impacts

The potential for significant facility impacts have been addressed in Exhibits H, I, J, L, O, P, Q, R, S, T, U, V, X and their associated RAIs. Applicant believes that all significant potential impacts have been identified and that any adverse impacts will be mitigated. The facility is expected to have positive economic and energy impacts.

Compatibility with Other Adjacent Uses

Additional wind facility development is proposed for much of the land immediately adjacent to the facility site, in both the northern and southern project areas.

Areas adjacent to the northern area are used for grazing, a use with which a wind power facility is compatible. Adjacent use in the southern area is farming, and the crop is dryland wheat. The siting of the SFWF will not alter or increase the cost of cultivating and harvesting the wheat crop because the turbines, above and below ground transmission lines, and access roads do not interfere with the use of farm equipment on the facility site, let alone on adjacent property.

RAI#3, K4: LAND USE

(Follow-Up) In discussing the "reasons" exception, please address the areas and percentages for each county separately.

LAND AREA

Goal 3 embodies the state policy to preserve and maintain agricultural lands. Applicant believes that facility development will serve to preserve and maintain agricultural lands, that the State policy should apply, but that the 20 acre limit should not.

Gilliam County

First, although the facility would occupy more than 20 acres of non-high-value farmland, it would occupy less than one percent of the agricultural land within the site boundary. The facility site covers 22,390 acres, of which 18,074 acres (81%) are in Gilliam County. In the typical facility layout, the cultivated land lost to the permanent footprint is approximately 0.9% of that within the site boundary. In Gilliam County, approximately 4,002 acres have been cultivated. Approximately 75% percent of facility components will be sited in the Gilliam County, and their associated permanent footprint will take up less than one percent of this land.

Moreover, most of the permanent facility footprint would consist of new roads or expansions of existing roads (approximately 116 acres). Those roads can also be used for farm purposes. The impact measured in terms of generating capacity per acre of disturbance is also small. Assuming a 2.5 MW turbine, the SFWF nameplate capacity will be 757.5 MW, and the permanent facility footprint will be 0.228 acres per MW overall, and 0.222 acres per MW in Gilliam County. Similar, smaller facilities are also subject to the 20 MW limit, and have been sited using 0.240 acres per MW. Applicant believes that its attention to the design of facility components has minimized its facility footprint, and protected Oregon's agricultural heritage.

Second, by increasing the land's economic productivity, the facility will increase the economic feasibility of continued agricultural operations. Property owners will receive payments in exchange for allowing project facilities to be located on their land. That income will support continued agriculture. Due to poor soils and little water, agricultural productivity in the northern project area of Gilliam County is marginal. Sheep have been grazed on the land for generations, but for only half of each year—there is not enough rainfall to support feed grasses year-round. The SFWF will increase this land's economic productivity, thereby decreasing pressure to convert it to other, non-ranching uses, and preserve an important way of life. Similarly, the facility will provide additional economic return to the wheat farming on the southern project area of Gilliam County, while taking only a very small portion of the area out of agricultural production.

Third, approval of the proposed facility furthers the state policy embodied in Goal 13 (Energy Conservation). The Guidelines for implementing Goal 13 expressly direct land use planning to utilize renewable energy resources, including wind, "whenever possible." State policy supporting development of renewable energy is also found in the State's Renewable Action Plan (ODOE, 2005), which calls for significant, additional development of renewable resources, including wind energy, and in SB 838, the recently enacted "renewable portfolio standard" that requires the state's largest utilities to meet 25 percent of their electric load with new renewable energy sources by 2025.

Fourth, it is not feasible to locate a renewable wind energy facility in Gilliam County without affecting agricultural land because the best wind resources are located on agricultural land. The county is predominantly rural, with non-EFU land almost entirely confined to a few "urban" areas.

Morrow County

First, although the facility would occupy more than 20 acres of non-high-value farmland, it would occupy only one percent of the farmed land within the site boundary. The facility site covers 22,390 acres, of which 4,316 acres (19%) is in Morrow County. Approximately 25% percent of facility components will be sited in Morrow County, and their associated permanent footprint will take up only one percent of this land.

The Morrow County project area is not irrigated, and so most is planted in dryland wheat. Of the 4,316 acres within the site boundary in Morrow County, 3,798 acres have been cultivated and the facility's permanent footprint will impact at most 43 of these acres (approximately one percent).

Moreover, most of the permanent facility footprint would consist of new roads or expansions of existing roads (approximately 37 acres). Those roads can also be used for farm purposes. The impact measured in terms of generating capacity per acre of disturbance is also small. Assuming a 2.5 MW turbine, the SFWF nameplate capacity will be 757.5 MW, and the permanent facility footprint will be 0.228 acres per MW overall, and 0.249 acres per MW in Morrow County. Similar, smaller facilities are also subject to the 20 MW limit, and have been sited using 0.240 acres per MW. Applicant believes that its attention to the design of facility components has minimized its facility footprint, and protected Oregon's agricultural heritage.

Second, by increasing the land's economic productivity, the facility will increase the economic feasibility of continued agricultural operations. Property owners will receive payments in exchange for allowing project facilities to be located on their land. That income will support continued agriculture. The facility will provide additional economic return to the wheat farming in Morrow County, while taking only a very small portion of the area out of agricultural production.

Third, approval of the proposed facility furthers the state policy embodied in Goal 13 (Energy Conservation). The Guidelines for implementing Goal 13 expressly direct land use planning to utilize renewable energy resources, including wind, "whenever possible." State policy supporting development of renewable energy is also found in the State's Renewable Action Plan (ODOE, 2005), which calls for significant, additional development of renewable resources, including wind energy, and in SB 838, the recently enacted "renewable portfolio standard" that requires the state's largest utilities to meet 25 percent of their electric load with new renewable energy sources by 2025.

Fourth, it is not feasible to locate a renewable wind energy facility in Morrow County without affecting agricultural land because the best wind resources are located on agricultural land. The County is predominantly rural, with non-EFU land almost entirely confined to a few "urban" areas.

L1

Explain how you made the determinations reflected in the table on pages 1 and 2 that there was or was not a potential for impact within the protected areas listed. Provide a table listing each protected area in the analysis area, and for each protected area list the basis for protection (based on the list in OAR 345-022-0040), the approximate distance from the nearest point of the protected area to the site boundary and the direction in which the protected area lies from the site (for example, N, NE, E, SE, S etc).

IMPACT ON PROTECTED AREAS

Map Legend	*Protected Area*	*Basis For Protection*	*Distance in Miles from Facility*	*Direction from Facility*
1	John Day River & Wildlife Refuge	National and state wildlife refuge	18.7	W
2	Willow Creek Wildlife Area	National and state wildlife refuge	1.2	NE
3	Umatilla National Wildlife Refuge	National and state wildlife refuge	17.1	NE
4	Horn Butte BLM ACEC	Bureau of Land Management areas of critical environmental concern	0.0	E
5	J.S. Burres State Park	State parks and waysides as listed by the Oregon Department of Parks and Recreation	20.8	SW
6	John Day State Scenic Waterway	Scenic waterways as designated pursuant to ORS 390.826	17.7	W
7	Oregon Trail Interpretive Center	None	2.6	W

Evaluation of Impacts

Applicant evaluated the potential for impacts on the character, public experience and use of protected areas as follows:

<u>Construction and Operating Noise:</u> Construction and operating noise is not expected to be audible more than one mile from the facility. Protected areas more than one mile from the facility were determined to have no potential for noise impact.

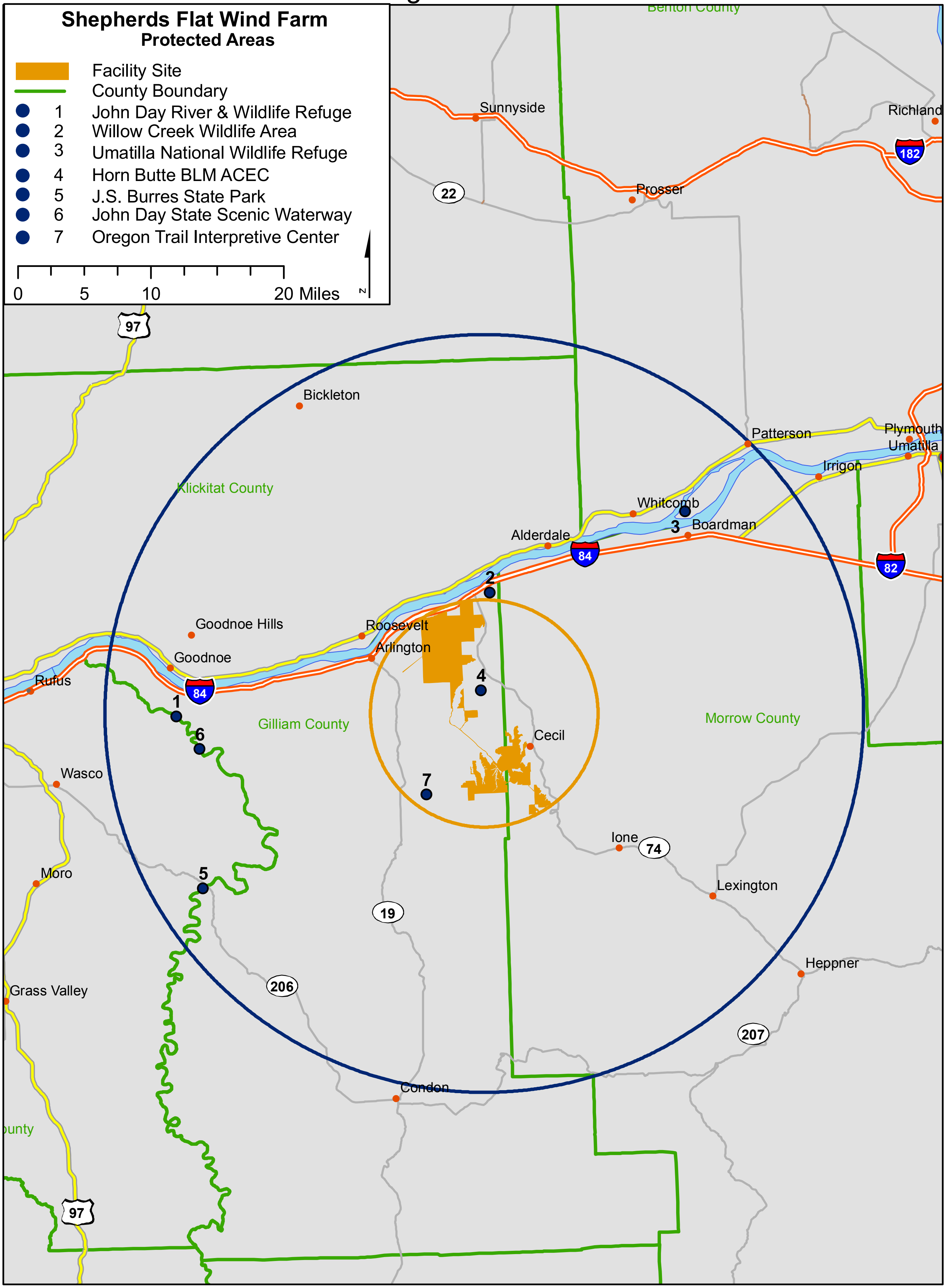
<u>Construction and Operating Traffic:</u> A protected area might be impacted from traffic if located on a major site access road. No protected areas are so located.

<u>Construction and Operating Water and Wastewater:</u> A protected area might be impacted from water usage and wastewater if 1) the area used water, and if so, that water was from the same source as the facility; and 2) facility wastewater were to be discharged so as to affect the protected area. No protected areas rely on water from sources in common with the facility, and no wastewater discharges are anticipated.

Visual Impact: Please see Applicant's response to RAI#2 L2.

Air Emissions: The potential for impacts from air emissions was considered as a function of distance from the facility and sources of emissions. Sources of emissions are predicted to be construction dust and vehicle exhaust during facility construction and operation. Because construction dust will be controlled with applications of water during construction, no impact is anticipated for even those protected areas closest to the facility. Although many vehicles will be present at the site during construction, not all will be in use at the same time, and vehicles will be spread out over a large area. Vehicle exhaust is not expected to drift into even the closest protected area. Vehicle exhaust during facility operation will be inconsequential.

Figure RAI#2 L-1



L2

What analysis did you perform to assess the potential visibility of the SFWS from protected areas?

VISIBILITY FROM PROTECTED AREAS

Applicant commissioned a new "worst-case" visual analysis which is discussed in Applicant's response to RAI#2 R2, and which may be found at RAI#2 Attachment R.

The worst-case analysis shows the following:

Map Legend	*Protected Area*	*Visible?*
1	John Day River & Wildlife Refuge	No
2	Willow Creek Wildlife Area	Yes
3	Umatilla National Wildlife Refuge	Yes
4	Horn Butte BLM ACEC	Yes
5	J.S. Burres State Park	No
6	John Day State Scenic Waterway	No
7	Oregon Trail Interpretive Center	Yes

L3

The ODFW comment letter (see RAC1 below) asks about potential noise impacts on wildlife in the Willow Creek Wildlife Area. Please also discuss the potential for adverse noise impacts on wildlife within the Horn Butte ACEC.

NOISE IMPACTS ON WILDLIFE

Please see Applicant's response to RAC1 for a discussion of the impact of any construction blasting noise on wildlife in the Willow Creek Wildlife Area.

The Horn Butte ACEC is a Bureau of Land Management Area of Critical Environmental Concern designated so for its long-billed curlew nesting habitat. The curlews are present in the Horn Butte ACEC only during nesting season (approximately March 15 to mid-summer each year).

A significant portion of the northern project area of the Shepherds Flat Wind Farm is adjacent to the BLM ACEC and also provides nesting habitat for long-billed curlews. From avian point count data, the project field biologists estimate that curlew nesting density is actually somewhat higher in the upper half of the northern project site than in the BLM ACEC. Applicant has stated that "[c]onstruction activities will not proceed within 0.5 miles of long-billed curlew nesting areas during nesting season…" (please see Exhibit P page 26).

Because no construction activity will take place on BLM land at any time; and no construction activity will take place at the facility site within 0.5 miles of long-billed curlew nesting areas during nesting season; and nesting season is the only time that the long-billed curlew is in residence at the Horn Butte ACEC, Applicant anticipates no potential for adverse noise impacts on the long-billed curlew within the Horn Butte ACEC.

Identical seasonal construction protection has been provided for active raptor nests, wherever located, and permanent construction protection has been provided for the Washington ground squirrel. Most of the avian and mammalian wildlife species that may occur within the BLM ACEC breed in the spring and early summer when curlew and raptor nesting occurs. Disturbance protection for nesting curlews and raptors will also prevent disturbance and displacement of other wildlife species during breeding. For these reasons, and because the site boundary does not abut the Horn Butte ACEC in areas where large numbers of turbines can be placed, aside from temporary displacement along the boundary Applicant anticipates no potential for adverse noise impacts on other wildlife species within the Horn Butte ACEC.

RAI#3, L3: PROTECTED AREAS

(Follow-Up)

A. Please address how noise generated during operation of the proposed facility may affect protected areas, including impacts on the long-billed curlew during the nesting season.

B. What source can you provide to back up your statement that the Horn Butte ACEC is designated "for its long-billed curlew nesting habitat"?

C. Can you specify a minimum distance (buffer) between the Horn Butte ACEC and the nearest turbine (as a condition of the site certificate)?

PROTECTED AREAS

A: Noise and Disturbance of Protected Areas

Of the protected areas listed in Exhibit L, only the Willow Creek Wildlife Area, Horn Butte BLM ACEC, and Oregon Trail Interpretative Center are within the 35 dB noise contour.

The 35 dB contour may extend a short distance into the closest boundary of the Willow Creek Wildlife Area, but the vast majority of the area is predicted to experience less than 35 dB. The noise from the SFWF facility is expected to rarely be audible above the traffic noise from Interstate 84. Wildlife species using the area would be inured to the variable noise levels presented by vehicles and by trains passing on the tracks adjacent to the interstate. Intermittent loud noises, such as from passing trucks and trains and the discharge of guns during hunting within the wildlife area, are likely to be more disturbing to wildlife than the relatively constant low-level background noise generated by the SFWF.

The Horn Butte ACEC is within the 50 dB contour close to the boundary between the ACEC and the SFWF site, and the ACEC is generally between the 50 and 40 dB contours. The SFWF will be audible within the majority of the ACEC. Some recreational users may find the noise disturbs their contemplation of the ACEC, while others may not find it intrusive. The ACEC is leased for sheep grazing, and recreational users may find this intrusive as well. The BLM has instituted a wind energy policy for public lands, and prepared both a Programmatic Environmental Statement and a Programmatic Biological Assessment to evaluate development impacts on wildlife and public use of BLM lands. Development of the SFWF would have less impact to wildlife and recreational use of the ACEC than development of a facility within the ACEC itself. Although the BLM has excluded some Oregon ACECs from consideration for wind development, the Horn Butte ACEC is not among them.[1] The BLM recommends turbine siting avoid important sage grouse habitats, but does not recommend siting consideration or mitigation related to turbine noise and its impacts. Vehicles are considered to be the major source of facility

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[1] http://www.blm.gov/nhp/efoia/wo/fy06/im2006-216attach1.pdf

noise-related wildlife disruption, with these considered to be temporary in duration.[2] The BLM does not consider wind development incompatible with recreational use of public land.

The Oregon Trail Interpretive Center lies between the 40 and 35 dB noise contours. This level of noise should be less disturbing to visitor enjoyment than traffic on the adjacent county road.

Operational noise generated by the SFWF turbines is not expected to be a significant source of disturbance to nesting long-billed curlews or to other nesting avian species. The peregrine falcon is the most notorious of avian species found nesting in surprisingly noisy locations. The falcon was federally listed as endangered in 1970 and was delisted in 1999. Peregrine falcon nesting locations in New York City include building ledges above Manhattan streets, bridges filled with commuter traffic, and a church bell tower.[3,4] Peregrine falcons are also found nesting in the Chicago city center.[5] Although Portland is less intensively developed than Manhattan and Chicago, it too has its share of peregrine falcons nesting in unlikely locations.[6] Other, less cosmopolitan avian species also nest in locations that would be surprising if they were considered to be particularly sensitive to noise disturbance. At older facilities, Applicant has observed several species, including raptors, nesting on platforms adjacent to the nacelles of operating wind turbines. Sheep, sheepherders and sheepdogs are present on the SFWF site during the curlew nesting season with no apparent impact. Wildlife biologists have found raptor nests on the bluff faces directly above noisy Interstate 84 and the adjacent railway. They have also noted raptors and other species nesting on operating water-pumping windmills, large numbers of pigeon and owl nests in barns regularly accessed by trucks and farm equipment, and nests, including those of raptors, in transmission towers that produce noise audible at ground level.

The restriction on construction near raptor nests and the 3 CUR habitat is related in part to the intermittent nature and relatively high level of noise produced during construction. For the curlew, the cryptic coloration of the eggs and difficulty discerning nest sites could result in an unacceptable level of nest loss during construction. Curlew do not nest on roadways, and facility operation does not present the same level of risk. The construction limitations to protect nesting long-billed curlew in the 3 CUR habitat on the SFWF site will serve to prevent construction disturbance of curlew present in the portion of the ACEC above the Columbia River (section 4 in Figure C-2). This portion of the ACEC contains curlew nesting at the high density found in the SFWF 3 CUR habitat. The remainder of the ACEC does not host exceptional levels of long-billed curlew. Since no facility construction activities will take place within any portion of the ACEC, no impacts to curlew nesting within the ACEC are expected to occur.

B: Designation of the ACEC

In a discussion of the John Day Basin planning area, the BLM states "The Horn Butte Curlew ACEC is approximately 6,000 acres and is located five miles east of Arlington, in the extreme

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[2] http://www.windeis.anl.gov/documents/fpeis/maintext/Vol1/Vol1Ch5.pdf
[3] http://query.nytimes.com/gst/fullpage.html?sec=health&res=9C0CE5DC1E3BF937A15755C0A966958260
[4] http://www.55water.com/falcons/
[5] http://www.uptownchicagocommission.org/peregrine.htm
[6] http://www.audubonportland.org/livingwithwildlife/peregrines/pdxperegrines

northeast corner of the planning area. Designated for its long billed curlew nesting habitat, a management plan was prepared in 1989 . . ." [7]

C: Horne Butte Conditional Buffer

For the reasons described, above, Applicant does not consider that restrictions on turbine siting within a specified distance from the ACEC would provide protection to nesting long-billed curlew not already afforded by the limitation of construction during nesting season in the 3 CUR area and by the proposed setback from the SFWF facility boundary. Applicant does not see the need for imposition of an additional buffer.

[7] http://www.blm.gov/or/districts/prineville/plans/files/JDB/AMS/CH3-SpecialManDes.pdf

M1

Please respond to OAR 345-021-0010(1)(m)(B) and (C).

LETTER OF CREDIT

Applicant will submit, before each phase of facility construction begins, a letter of credit (or similar instrument acceptable to the Council) in the amount calculated to cover facility retirement and site restoration for that phase as shown in Exhibit W and its associated RAIs.

Applicant's positive credit outlook, and therefore its associated ability to secure said letter of credit, is presented in Exhibit M.

RAI#3, M1: FINANCIAL ASSURANCE

(Follow-Up) Provide evidence that CSF has a reasonable likelihood of obtaining a bond or letter of credit in an amount of up to $20,000,000 to cover the estimated cost of facility retirement and site restoration. Such evidence may take the form of a letter of commitment from an acceptable financial institution.

LETTER OF COMMITMENT

Please see Figure RAI#3 M1.

CHASE

Wendy Weinsier Segal
Vice President
Corporate Banking

September 17, 2007

Patrick O'Shaughnessy
Caithness Energy
555 5th Avenue, 29th Floor
New York, New York 10017

Re: Letter of Credit Proposal by application of Caithness Sherpherds Flat

Dear Mr. O'Shaughnessy:

This is to indicate, as you have requested, that JPMorgan Chase Bank, N.A. ("Chase") would be interested in issuing a letter of credit in the stated amount of up to $20,000,000 for the benefit of The Oregon Department of Energy by application of Caithness Sherpherds Flat ("LC"). We would expect that the reimbursement obligations under the LC would be collateralized and documented in the same manner that Chase has previously issued letters of credit on behalf of other subsidiaries of Caithness Energy and, *provided that is the case*, there is a reasonable likelihood that Chase would be inclined to issue the LC.

As we have neither completed our due diligence nor obtained credit approval for the LC, the foregoing expression of interest is, of course, not a commitment to issue the LC. This letter of interest is for your information and use only and is not to be shown to or relied upon by third parties.

Very truly yours,
JPMorgan Chase Bank, N.A.

By: Wendy Segal
VICE PRESIDENT

J.P. Morgan Securities Inc. • 277 Park Avenue, Floor 22, New York, NY 10172

Telephone: 212 622 3542 • Facsimile: 646 534 0691
wendy.weinsler@jpmorgan.com

M2

The embedded letter from your legal counsel states that CSF has "legal authority to construct and operate the up to 750 megawatt" Shepherds Flat Wind Farm. Assuming that you are able to support a finding by the Council that 909 MW of transmission access is available and you choose to go forward with an application for a site certificate to approve 909 MW of peak generation, please provide an appropriate letter from legal counsel responding to OAR 345-021-0010(1)(m)(A). Although your counsel's qualifications to practice in New York and New Jersey is acceptable with regard to an opinion about the documents listed in the second paragraph of his letter, we would like to have an opinion from a qualified member of the Oregon State Bar regarding whether CSF is legally qualified to do business in Oregon (specifically construction and operation of a wind energy facility).

COUNSEL'S LETTER

Applicant's counsel's letter may be found at Figure RAI#2 M2a.

OPINION LETTER

Applicant's opinion letter may be found at Figure RAI#2 M2b.

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

June 15, 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 909 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

Michael Kowal
Legal Counsel

BALL JANIK LLP

ATTORNEYS

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

www.balljanik.com

RICHARD H. ALLAN

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

rallan@bjllp.com

June 28, 2007

By Electronic Transmission

Oregon Energy Facility Siting Council
625 Marion Street NE
Salem, OR 97310

Re: Application for Site Certificate for Shepherds Flat Wind Farm

Dear Ladies and Gentlemen:

I am a partner with Ball Janik LLP and a member of the Oregon Bar. I have acted as Oregon counsel for Caithness Shepherds Flat, LLC, a Delaware limited liability company (the "Applicant"), with respect to the application for site certificate for the Shepherds Flat Wind Farm.

In that connection, I have examined: (i) the Limited Liability Company Agreement of Applicant; (ii) the Delaware Certificate of Formation of Applicant; and (iii) the Oregon Certificate of Registration of Applicant as a Foreign Limited Liability Company (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 managers 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 meeting all applicable federal, state and local laws (including all rules and regulations promulgated thereunder), the Applicant is legally qualified to do business in Oregon to construct and operate the up to 750 Megawatt (MW) name-plate capacity wind-powered electric generating project known as the Shepherds Wind Farm located in Gilliam and Morrow Counties, Oregon (the "Project") that the Applicant proposes in its Application for Site Certificate 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 States of Oregon and Washington and do not hold myself out as an expert in, and do not express any opinion in this matter with respect to the law of any jurisdiction other than Oregon. This opinion is provided to the Oregon Energy Facility Siting Council and the Oregon Department of Energy solely for use in their evaluation of the Application for Site Certificate for the Project. This opinion does not supersede or replace the opinion letter of January 29, 2007 from Michael Kowal, in-house legal counsel for Caithness Shepherds Flat, LLC.

Very truly yours,

Richard H. Allan

Richard H. Allan

RHA:crs

O1

Address the amount of water that would be required for sanitary facilities or other incidental uses at the field workshops. Explain the source of this water and whether a water right is needed. OAR 345-021-0010(1)(o). ORS 537.545(1)(f) provides that a new water right is not required for industrial and commercial uses of up to 5,000 gallons per day. Discuss the need for a water right or confirm that water use would not exceed 5,000 gallons per day during facility operation.

FIELD WORKSHOP WATER REQUIREMENTS

Applicant proposes establishing two new wells, one each at the northern and southern field workshop sites, to provide water for sanitary facilities and other incidental uses. Applicant's experience at similar facilities shows that 20 gallons per day per employee will be required, an amount equaling 500 gallons per day at the northern field workshop, and 140 gallons per day at the southern field workshop.

Applicant also proposes a 20,000 gallon water tank for each field workshop, to be used for fire fighting and as a backup for the wells. These tanks can be filled without exceeding water usage of 5,000 gallons per day.

Applicant confirms that water use will not exceed 5,000 gallons per day during facility operation and that no water right is needed.

O2

Describe the commercial sources from which water would be purchased during construction of the proposed facility. Describe the total amount of water that would be needed for construction of the facility. Provide verification that sufficient water is available from a "commercial source" that has an appropriate water right for this proposed use.

WATER REQUIREMENTS DURING CONSTRUCTION

Applicant expects to use an average of 100,000 gallons of water per day for dust suppression and road compaction during construction. This worst-case estimate is based on uniformly hot, dry and dusty conditions: however applicant believes that actual water usage will average less than this in the north project area where soils are rocky and shallow and where two thirds of facility components are likely to be placed.

Applicant estimates that in the worst-case, 200 watering days will be required each year over the 3.5 year construction period, for a total construction water requirement of 70 million gallons.

The City of Arlington is able to supply water in sufficient quantity for facility construction. The City's verification may be found at Attachment O1.

RAI#3, O2: WATER REQUIREMENTS

(Follow-Up) Please provide a letter verifying that the City of Arlington would be able to supply water in sufficient quantity for facility construction (described as Attachment O1 in your response).

CITY OF ARLINGTON

Please find letter attached as Figure RAI#3, O2.

ANNALA, CAREY, BAKER, THOMPSON & VANKOTEN, P.C.

Wayne C. Annala
Wilford K. Carey
Jeffrey J. Baker*
Michael J. Thompson*
Victor W. VanKoten

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305 Cascade Street
P.O. Box 325
Hood River, Oregon 97031

Telephone 541-386-1811
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*Also Admitted to
Practice in Washington

August 9, 2007

Caithness Shepherd's Flats, LLC
656 San Miguel Way
Sacramento, California 95819

Re: City of Arlington, Oregon

Gentlemen:

We are the attorneys for the City of Arlington, Oregon. The content of this letter arose out of the City Council Meeting which occurred on the evening of August 8, 2007. It is understanding of the Council that you have requested a preliminary commitment letter of assurance that the City is willing and able to provide you with approximately 70 million gallons of water for your use in your project referred to as "Shepherd Flats Wind Project" to be located near the town of Arlington, Oregon. It is our understanding that your need for water is for dust suppression and road compaction over a period of approximately 3 ½ years. You have further indicated that your expectation is to need an average of 100,000 gallons per work day and that you are requesting this letter which can be used by your project manager in making application for permits or possibly financing, although we are uncertain as to your reasons for requesting this letter.

It was the unanimous view of the City Council that the City would be willing to supply your water needs, but only upon the condition that all of your water requirements for the above project would be obtained from the City of Arlington. There are several other projects on various drawing boards and the supply of water is limited, therefore, an open-end commitment to cover your needs without any commitment from you in return, can only work a severe economic hardship on the City.

After you have considered the City's required precondition, the City stands ready to negotiate your cost of water to be obtained from the City's source.

Sincerely,

WAYNE C. ANNALA

WGA:sls

cc: City of Arlington
P.O. Box 68
Arlington, Oregon 97812

O3

Do you anticipate the need for blade-washing at any time during operation of the facility? If so, describe the amount of water needed for this purpose and the source of this water.

BLADE WASHING

Applicant does not anticipate the need for blade washing at any time during operation of the facility.

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
- that 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 Shepherds Flat Wind Farm (SFWF) 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 adjacent to the site boundary contain portions of the bluffs along the river. The upland area is characterized by shallow soils, and is 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. The alien species cheatgrass (*bromus tectorum*) and spring-whitlow grass (*Draba verna*) are found throughout the area and are 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 intermittent stream, is cultivated in some areas, and in others contains a diverse blend of native dryland plant species as well as the ubiquitous cheatgrass and other alien species. 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 and Eightmile Canyon lie to the east and west, respectively. Fourmile Canyon (an offshoot of Eightmile Canyon) has an ephemeral stream and a diversity of plant species. Residences, shops and farm equipment storage areas are present within the site boundary in the south area.

Habitat Categories

Habitat Category 1: 1.6 acres

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. Habitat within the site boundary Applicant considers Category 1 includes: natural or artificial structures with active or inactive raptor nests; and the area surrounding an identified Washington ground squirrel burrow complex.

Habitat Category 2: 107 acres

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 includes: natural features that have the potential to be useful for raptor nesting; a buffer area around the identified Washington ground squirrel burrow complex; and sage steppe habitat in good condition.

Habitat Category 3: 7568 acres

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 includes: areas with high long-billed curlew nesting activity; grasslands with a relatively high proportion of native species; and shrub steppe habitat in reasonably good condition, but with shrubs widely scattered or present only in small patches.

Habitat Category 4: 6816 acres

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 includes: grasslands with high alien species presence; previously cultivated areas seeded to bunchgrass; areas of exposed rock, sand or soil; and sage steppe with sparse sage in poor condition.

Habitat Category 5: 7445 acres

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 includes: dryland wheat fields; and previously cultivated areas containing a mixture of alien and native grasses and weeds.

Habitat Category 6: 452 acres

According to OAR 635-415-0025, this habitat has a low potential to become essential or important habitat for fish and wildlife. Habitat within the site boundary Applicant considers to be Category 6 includes: areas used for feeding, confining or transporting livestock; weedy previously cultivated fields; roads and parking areas; and ranch and farm buildings and yards.

Habitat Subtypes

Raptor nesting structures: 1.5 acres

The RN habitat subtype includes natural and man-made features containing active raptor nests, including basalt walls, trees, burrowing owl burrows and raptor nests on the ground, in barns, on power poles and on derelict water windmills. The subtype also includes natural or artificial features with an inactive raptor nest or natural features with a reasonable potential to be used for raptor nesting.

In addition to raptor nesting and perching, these features can be used for perching, nesting and over-wintering by non-raptors, and for shade and storm protection by mammals including porcupine and deer. Trees are not present in any area on the site at a density that would qualify as woodlands. Individual trees were mapped wherever they were detected. Juniper trees (*Juniperus occidentalis*) are also used by loggerhead shrike, and basalt ledges and the bare ground beneath trees may be used by reptiles. Evidence of the scarcity of appropriate natural nesting structures available for raptor use within and near the site boundary includes a Swainson's hawk found nesting on the ground and raptor nests in junipers at less than 6 feet above the ground. Structures suitable for use for raptor nesting are both essential and limited in the ecoregion and on the site.

1 RN: 0.57 acres
These contain active or inactive raptor nests, and successful replacement is uncertain.

2 RN: 0.92 acres
These do not contain raptor nests and may not currently be suitable for raptor nesting. Replacement habitat may prove to be more suitable.

Washington ground squirrel: 23 acres

The WGS subtype includes habitat immediately surrounding an identified colony, as well as adjacent soils and habitat appropriate for Washington ground squirrel use. The WGS subtype is both essential and limited within the ecoregion and on the site.

1 WGS: 1.1 acres
This category includes the area around the identified burrow entrances and all shrub steppe habitat surrounding the entrances. The shrub steppe vegetation has the same characteristics as category 2 sage shrub steppe. Occupied burrows and the adjacent habitat are not replaceable.

2 WGS: 22 acres
This category consists of grassland with a few scattered big sage (*Artemisia tridentata*) or rabbitbrush (predominantly *Ericameria nauseosa* but occasionally *Chrysothamnus viscidiflorus*),

and is bounded by the 1 WGS habitat, a road, a cultivated wheat field, an area of soil unsuited for use by Washington ground squirrels, and the site boundary. The grassland vegetation has the same characteristics as category 4 grassland. This subtype is not currently used by the identified colony, and the habitat is distinctly different in characteristics from the subtype the colony occupies. This category provides a buffer between the colony and surrounding lower value habitats. The habitat could be replaced by another area also not in use by Washington ground squirrels, or by an alternate buffering method.

<u>Curlew: 6444 acres</u>

Like the RN and WGS subtypes, the CUR habitat has been named for a wildlife species. In some years, the density of long-billed curlew nesting in this habitat is probably at the maximum that food resources will support. This habitat is essential for long-billed curlew, but it is not limited on the site or in the ecoregion.

3-CUR: 6444 acres

This habitat is found in Hurlburt Flats (Figure P-1) and has extensive areas of basalt at or just above the soil surface among larger basalt outcrops. The south boundary of this habitat generally follows changes in soil type from rock outcrop complexes to other soils. The vegetative characteristics of this subtype range from category 3 to category 4 grassland, with no apparent discrimination in curlew nesting density between categories.

Vegetation of this habitat was quantitatively assessed at 17 sites. Total plant cover ranges from 50 to 100%. On average, native vegetation provides just over half the plant cover. Sandberg's bluegrass (*Poa secunda*) is found at 71% of the sites and provides as much as 35% of the cover. Bluebunch wheatgrass (*Pseudoroegneria spicata*) was found at 59% of the sites providing up to 30% of the cover. Six-weeks fescue (*Vulpia octoflora*), slender phlox (*Microsteris gracilis*), broom snakeweed (matchbrush, *Guteirrezia sarothrae*), tall willowherb (*Epilobium paniculatum*) bottlebrush squirreltail (*Elymus elymoides*), needle-and-thread grass (*Hesperostipa comata*) and Canby's biscuitroot (*Lomatium canbyi*) were identified at 10 to 30% of the sites, with cover generally less than 25% and as low as 1%. Thick-spike wheatgrass (*Agropyron dasytachyum*), tarweed fiddleneck (*Amsinckia lycopsoides*), wavy-leaved thistle (*Cirsium undulatum*), buckwheat (*Eriogonum strictum*) and foxtail barley (*Hordeum jubatum*) were found at only one site each, with all but foxtail barley (present at 20% cover) providing less than 10% of the cover.

Of alien species, spring-whitlow grass (*Draba verna*) was found at 71% of the sites and provided up to 50% of the cover; cheatgrass (*Bromus tectorum*) was found at 65% of the sites providing up to 27% cover; redstem storksbill (*Erodium cicutarium*) was found at just over half the sites and provided up to 20% of the cover; and jagged chickweed (*Holosteum umbellatum*) was found at just under 50% of the sites providing as much as 40% of the cover. Hairy catsear (*Hypochaeris radicata*), tumble-mustard (*Sisymbrium altissimum*) and medusa head (*Taeniatherum caput-medusae*) were found at between 12 and 18% of the sites providing 1 to 10% of the cover. Traces of diffuse knapweed (*Centaurea diffusa*) were found at 1 site and tumbleweed (Russian thistle, *Salsola kali*) at 3 sites.

Wetlands – dry wash: 6.3 acres

The WL-W subtype applies to the dry washes in canyon floors. Although this habitat meets none of the requirements for designation as wetland habitat, the subtype name was assigned and the habitat mapped before wetland surveys were complete (Attachment J-1). Although it is inaccurate, the original subtype name has been retained. Basalt makes up portions of the wash walls, and the vegetation in the wash and immediately adjacent to it often includes big sage, native bunchgrasses and annual weeds. The washes contain water only during brief periods following heavy thunderstorms. This habitat is relatively undisturbed in relation to surrounding areas that are cultivated or grazed. The washes can provide sheltering and resting for reptiles and mammals, and may be used as linkages between larger native habitats by reptiles and small mammals. If the wash provides habitat linkage, it is both essential and limited within the site.

2 WL-W: 6.3 acres
All of this subtype is assessed as category 2 habitat. This habitat could be replaced by off-site areas providing linkage between habitats.

Sage shrub steppe: 369 acres

The SS-S subtype contains sage steppe with big sage as the predominant shrub, and with shrubs as the predominant vegetation.

2 SS-S: 78 acres
This category contains sage both in good condition and in extensive stands. Rabbitbrush and purshia (bitterbrush, *Purshia tridentata*) are present in some stands. The understory typically consists of patches of bare ground, native bunchgrass (predominantly Sandberg's bluegrass) and some cheatgrass and redstem storksbill. Although acreage within the site boundary is low, these stands are all connected to sage stands off-site, primarily to the east of the north project area and in canyons adjacent to the south project area site boundary. Loggerhead shrike, sage sparrow, sagebrush lizard and white-tailed jackrabbit can all use this habitat. Other shrub-nesting avian species, other small mammals, and reptiles including the Western rattlesnake may also use this habitat. This habitat is essential for wildlife foraging, nesting and cover and is limited within the ecoregion and on the site; it can be replaced.

3 SS-S: 261 acres
In this category, shrub stands are small or shrubs sparse and widely scattered. Understory species are similar to those in category 2 SS-S, but cover provided by bare ground is generally lower and cover by alien species higher. This category was sampled at only one location. The shrub coverage of a larger area assessed sage as providing 30% of the cover with no other shrub species identified. In a smaller portion evaluated for herbaceous cover, no bare soil was present. Broom snakeweed provided 20% and Sandberg's bluegrass 30% of the cover, and were the only native species identified. Spring-whitlow grass (30% cover), cheatgrass and redstem storksbill (each providing 10% cover) were the other species present.

This habitat is less appropriate for sage or shrub-obligate species than category 2 sage stands. The habitat is suitable for use by white-tailed jackrabbit and other mammals, shrub or ground-nesting avian species, and reptiles including the Western rattlesnake. This habitat is not essential, but it is important and limited on the site and within the ecoregion.

4 SS-S: 29 acres
There are few shrubs aside from sage in this category, and the sage is widely scattered or in very poor condition due to fire, herbicide overspray or disease. Some bare soil is present but nearly all cover is provided by cheatgrass, redstem storksbill and other alien species. This habitat provides few attractions for shrub nesting or sage-obligate species, but may be used by grassland birds, small mammals, and by raptors as a source of prey species. This habitat is not essential, but it is important. Sage steppe habitat in poor condition, although represented by a small number of acres within the site, is not limited in the immediate vicinity of the site or in the ecoregion.

<u>Purshia shrub steppe: 4.3 acres</u>

In the SS-P subtype, purshia is the predominant shrub. There is only one identified area of SS-P. Purshia within the site boundary is usually found as a less prominent shrub within the sage shrub steppe subtype.

3 SS-P: 4.3 acres
In this small patch, nearly all shrubs are moderate to large purshia. Bare ground, Sandberg's bluegrass, foxtail barley and cheatgrass constitute the remainder of the cover. This habitat can be used by white-tailed jackrabbits and other small mammals, larger mammals including deer, and shrub-nesting birds. This habitat is not essential but it is important, and it is limited on the site and in its vicinity.

<u>Rabbitbrush shrub steppe: 122 acres</u>

In the SS-R subtype, gray rabbitbrush is the predominant shrub. Sage is present in some locations.

3 SS-R: 122 acres
In this category, shrub cover tends to be higher and cover by grass or bare ground lower than seen in SS-S. The native grass is usually Sandberg's bluegrass along with bluebunch wheatgrass. Cheatgrass, redstem storksbill and spring-whitlow grass are present, but rarely provide higher cover than native species. White-tailed jackrabbits, other mammals and many common bird species use this habitat. This habitat is not essential but it is important, and it is somewhat limited on the site and in its vicinity.

<u>Broom snakeweed shrub steppe: 263 acres</u>

In the SS-B subtype, broom snakeweed is the predominant, and nearly the only, shrub present.

5 SS-B: 263 acres
This habitat is marginal for use by wildlife; the shrubs are too small for species preferring shrub habitats, and are too densely packed for use by grassland avian species. The vegetation height provides poor daytime cover for white-tailed jackrabbits. Bare soil, Sandberg's bluegrass, bluebunch wheatgrass, and cheatgrass generally occupy the small spaces between shrubs. Broom snakeweed is a poor forage plant but may provide food for seed-eating species, is used by butterflies and bees, and provides cover for burrowing small mammals. Broom snakeweed is a native shrub that is a part of normal plant succession in the return to sage steppe following fire.

This habitat is not essential or important, but there is high potential for eventual restoration to sage steppe.

Grassland: 6851 acres

The GL habitat has not been divided into subtypes except for cultivated areas. Native and alien grasses constitute the predominant vegetation of GL habitats, with some shrubs too scattered or in clumps too small to map separately. Individual junipers in grasslands were mapped as RN habitat.

3 GL: 736 acres

This habitat has healthy grass stands and few areas of disturbed soil. Native species presence is significant. Six vegetation sample sites occurred in 3 GL habitat. One of these sites consisted entirely bare soil, with bare soil in the other sites providing less than 10% of the cover. In the remaining five sites, bare soil ranged from 0 to 15% of the cover and averaged 6% cover. Native species provided 18 to 75% of the plant cover and averaged 58% cover. Sandberg's bluegrass was found at all sites other than that with bare soil, providing 15 to 40% of the cover. Slender phlox was found at 4 sites, with 10 to 20% cover. Bluebunch wheatgrass (2 sites and 5 to 30% cover), tall willowherb (3 sites with a trace to 5% cover), longleaf phlox (*Phlox longifolia*, a trace at one site) broom snakeweed (1 site, 15% cover) and inland saltgrass (*Distichlis spicata* var. *stricta*, 1 site, 5% cover) were the other native species identified.

The most prevalent alien species were cheatgrass and spring-whitlow grass, both found at 4 sites providing up to 25% of the cover. Except at one site, the significant presence of one of the species was accompanied with no measurable cover from the other. Clasping pepperweed (*Lepidium perfoliatum*) was found at 4 locations, with 70% cover at one location, 10% at another, and traces at the two remaining locations. Redstem storksbill was found at 2 sites, with cover at one 15% and a trace at the other. Traces of jagged chickweed and prickly lettuce (*Lactuca serriola*) were found at two sites each.

Common ground-nesting grassland avian species are widespread in this habitat, and several grasshopper sparrows were found. Long-billed curlews use the habitat, but in much lower numbers than are found in the CUR subtype. Badgers and other burrowing mammals and foraging deer are found. This habitat is essential to grassland species, but is not limited on the site or within the ecoregion.

4 GL: 6116 acres

The grass stands in this habitat are generally in poorer condition than those found in 3 GL habitats, and native species provide lower cover. Impacts from poor or shallow soil, heavy grazing, fire, soil disturbance by livestock or vehicles, and herbicide overspray are evident. Alien species provide 40 to 90% of the plant cover, and areas of bare soil less than 30% of the cover. Eight sites had no measurable areas of bare soil.

Vegetation was sampled at 14 locations, and cheatgrass was found in 12. Cheatgrass cover ranged from 20 to 70%. Redstem storksbill was found at 7 sites providing 1 to 35% cover. Spring-whitlow grass, tumbleweed and tumble-mustard were found at 4 sites each, with cover up to 25, 30 and 50%, respectively. Three sites contained medusa head providing 4 to 5% of the cover. Species present at one site each were yellow starthistle (*Centaurea solstitialis*, 25% cover), jagged chickweed (25% cover), hairy catsear (5% cover), and dryland wheat (*triticum* sp., 30% cover).

Of the native species, Sandberg's bluegrass was found at half of the sites, providing 3 to 25% of the cover. Slender phlox was found at 5 sites, providing 5 to 20% of the cover. Cover provided by broom snakeweed, also found at 5 sites, was 1 to 5%. Six-weeks fescue was found at 4 sites, and provides cover of 1 to 10%. Tarweed fiddleneck and bluebunch wheatgrass were found at 3 sites each at a maximum cover of 10 and 8%, respectively. Bottlebrush squirreltail (1% cover) and gray rabbitbrush (1 – 2% cover) were found at 2 sites each. Green rabbitbrush (10% cover), winged cryptantha (*Cryptantha pterocarya*, 1% cover), Idaho fescue (*Festuca idahoensis*, 20% cover) and needle-and-thread grass (2% cover) were found at 1 location each.

Common ground-nesting grassland avian species are present, and a few grasshopper sparrows were located. Long-billed curlews use the habitat, but in much lower numbers than are found in the CUR subtype. Badgers and other burrowing mammals are present, and foraging deer. This habitat provides prey species for raptors, and the vegetation height may make prey more visible. This habitat is not essential, but it is important to grassland species. It is not limited on the site or within the ecoregion.

<u>Rock, soil and sand: 149 acres</u>

Exposed basalt, bare sand or soil are contained in the RS subtype. Bare ground is usually found in road cuts or hillsides, and it is often capped by basalt. The sand includes some small dune areas. Vegetation is very sparse to absent.

4-RS: 149 acres
This subtype has no distinguishing vegetative characteristics other than absence. Some areas may be appropriate for bank swallows and burrowing owls. Many areas contain small mammal burrows, in sizes that could accommodate mice, marmots, rabbits, gophers and badgers. Some reptile species may also use this habitat for basking and shelter. This habitat is not essential, but is important. It is not limited on the site or within the ecoregion.

<u>Previously cultivated: 1202 acres</u>

The PC habitats fit into the general grassland type but were cultivated at some point. Some of this land is in the Conservation Reserve Program, and some is at field edges but not currently cultivated.

4 PC: 522 acres
This subtype has generally been seeded with bunchgrass species, or has been out of cultivation long enough to contain fewer weeds. This habitat is used by common avian grassland species. It may be used by white-tailed jackrabbits and burrowing owls, although mammal burrows were rarely observed. The habitat may at some point be useful for grasshopper sparrows, but none has yet been seen. This habitat is not essential, but it is important. It is not limited on the site or within the ecoregion.

5 PC: 585 acres
This habitat shows no evidence of seeding, and contains a mixture of cheatgrass, tumbleweed and tumble-mustard. In the one site surveyed, these three alien species provided nearly equal coverage of the assessed area. Burrowing owls, white-tailed jackrabbits and small mammals may use the habitat. It is not particularly attractive for common avian grassland species, but some are present. This habitat is not essential or important. However, there is a high potential for eventual restoration.

6 PC: 95 acres
This habitat has not been seeded, and is dominated by tumble-mustard and tumbleweed. The habitat has little value to any wildlife species. The habitat is not essential, is not important, and has little potential for restoration without significant effort.

<u>Dryland wheat: 6598 acres</u>

Dryland wheat fields, either planted to wheat or fallow, are included in the DW subtype.

5 DW: 6598 acres
This habitat is a rich source of raptor prey in the fall as fields are cultivated, when it is particularly attractive to Swainson's hawks. One site was sampled, and 80% of the cover was provided by bare ground. The remainder was evenly divided between tumbleweed and tumble-mustard. This habitat is not essential, important or limited, and it is replaceable. There is not a high potential for restoration. This habitat provides value to wildlife, but is not generally "*recognized as a contributor to sustaining fish and wildlife populations on a physiographic province basis over time.*" OAR 635-415-0005 (11).

<u>Animal facilities: 74 acres</u>

The AF subtype includes disturbed areas used for housing, transporting, feeding or watering livestock.

6 AF: 74 acres
Vegetation in this category is short-cropped or absent. These habitats are often associated with depressions, where animal traffic and disturbance has caused soil loss. One site within this habitat was assessed, and cover consisted of 60% foxtail barley and 40% bare ground. Other than the water that may be provided in these locations, the habitat has limited value to any wildlife species. This habitat is not essential or important, and it does not have high restoration potential.

<u>Structures: 39 acres</u>

The ST subtype contains houses, barns, silos, shops, equipment storage areas, junk piles and farmyards.

6 ST: 39 acres
This habitat has limited value to any wildlife species. Any trees or structures present in this habitat that contain active or inactive raptor nests have been separately categorized as 1 RN. This habitat is not essential or important, and it does not have high restoration potential.

Roads and Parking: 244 acres

The RP subtype contains paved, graveled and unimproved roads and trails, as well as paved or graveled road verges and pullout areas.

6 RP: 244 acres
Use of this habitat is essentially limited to scavengers, usually ravens and magpies, feeding on roadkill. This habitat is not essential or important, and it does not have high restoration potential.

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 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.

Rare Plant Species

Along with the listed plant species and those identified as species of concern, all plants ranked by the Oregon Natural Heritage Program that currently or historically occur in Morrow or Gilliam County within the Columbia Basin ecoregion were reviewed.

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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

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.

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

[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.

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 through P-3).

The Willow Creek plot (adjacent to highway 74 east of the south project area) 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. Leased land east of the Willow Creek Valley was within the site boundary as proposed in the SFWF Notice of Intent. Avian species within the Valley were thus potentially at risk from traffic during facility construction or operation. With the removal of the land east of the Valley from within the site boundary, the sampling plot is no longer relevant to avian use of the site. Many of the species sighted from the Willow Creek plot were never seen in the upland areas within the site boundary. Birds remaining within the valley are unlikely to be at risk from facility activities. Upland point count sites were capable of detecting any bird species that reside in the Willow Creek Valley and use 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 in the north project area 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).

During surveys for the Wetlands/Waters Delineation Report (Attachment J-1), vegetation cover was measured at 37 representative sample plots distributed throughout the project area during March and April 2007. Two measurements of plant cover at each sample plot were collected: assessment of herbs, sapling and shrub cover within a 5-foot radius; and assessment of a 30-foot radius for tree and woody vine cover.

Special Status Species Surveys

Separate studies for the Washington ground squirrels and burrowing owl, loggerhead shrike and sage sparrow, and the grasshopper sparrow were performed in spring of 2007 (Attachment P-5). Surveys for the Washington ground squirrel, burrowing owl, loggerhead shrike and sage sparrow were performed using transects approximately 200 feet apart in all areas of habitat suitable for use by the subject species. The Washington ground squirrel and burrowing owl survey also included a 100-foot search buffer adjacent to the project site boundary. Surveys for the grasshopper sparrow included a mixture of transects and sample plots distributed throughout suitable habitats within the site boundary. Incidental observations of white-tailed jackrabbits and active raptor nests were also recorded and mapped.

Although the long-billed curlew nests in large numbers on the Hurlburt Flats portion of the north project site, no searches for curlew nests were performed. The unfortunate consequence of such searches all too often is discovery of nests because the searcher has stepped upon one.

Determination of Habitat Categories

Habitat categories within the site boundary were assessed by reviewing the results of the vegetative characteristics study, the wetlands/waters delineation 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.

Quantitative assessment of vegetation cover and identification of plant species took place at 46 locations within or near the site boundary. Nine sites were assessed in 2002 (Attachment P-4) and 37 sites were assessed in 2007 (Attachment J-1). The location and frequency of observation of sensitive and listed species during the general wildlife surveys and the special status species surveys 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. All habitats within the Shepherds Flat Wind Farm site boundary were qualitatively assessed for general vegetative characteristics during mid-March through May of 2007. These quantitative and qualitative assessments are the basis for habitat assignment to types and subtypes. Assignment of habitats to categories was based on wildlife observations, habitat subtypes and OAR 635-514-0000. 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.

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[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.

RESULTS OF SURVEYS

Special Status Species Review

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 avian surveys of the area, only the bald eagle was observed, and only one individual. One active Washington ground squirrel was observed within the site boundary and the adjacent 1000-foot buffer.

The nearest known occurrences of sessile mousetail are 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. These species are addressed individually in Exhibit Q.

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

Scientific Name	Common Name	Federal Status[1]	State Status[2]
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
2. **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.

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

Neither invertebrate species of concern is expected to be present within site boundary, as they require aquatic resources not present. 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.

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]

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 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 Canyon.

[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.

Reptiles

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.

Birds[13]

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.
Grasshopper sparrow	Nine observed or heard during 2007 surveys of the site for the species. As many as 150 individual birds may occur within the site boundary. Uses grasslands, hayfields and prairies.
Golden eagle	Observed on and near the site during all portions of the wildlife study. Two active golden eagle nests found outside

[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.

	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. Eight individuals were observed during species-specific surveys. 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. The species is assumed to nest in the habitat designated as 3-CUR at the maximum density the habitat can support. 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; none observed during species-specific surveys. Uses arid brush, sage or chaparral areas.
Swainson's hawk	Observed on and near the facility site during all portions of the wildlife survey. One active nest found on the site. Uses open juniper woodlands, sagebrush flats or grasslands.
Western burrowing owl	One observed within the site boundary in the north area during avian point count surveys; two additional observations during other wildlife study activities. Four active nest burrows were found during the species-specific survey. 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.

<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	Eight observation within and outside of the site boundary during wildlife studies. 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]

Listed Plant Species, Plant Species of Concern, and Rare Plant Species

Two surveys of the Shepherds Flat Wind Farm (SFWF) site include botanical information: Vegetative Characteristics of the Shepherds Flat Wind Farm (Attachment P-4) and Wetlands/Waters Delineation Report for Shepherds Flat Wind Farm Project (Attachment J-1). Through identification of plant species and associations at surveyed locations, habitat categories

[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.

and subtypes were identified. Neither survey was intended as a comprehensive search for a particular species, nor to provide an inventory of all plant species within the site boundary. Surveys in search of specific listed or rare plant species within all suitable habitats would not add information useful in vegetation subtype determinations, nor would they provide assistance in determining habitat categories as these are based on known or potential use of the habitat by wildlife species.

Listed plant species and species of concern

Federal or state listed plant species are administratively protected in Oregon. Federal or state candidate species or species of concern have the potential to be listed prior to completion of SFWF construction. A search for these species would be justified if they might appear within the site boundaries, not for reasons pertaining to fish and wildlife habitats and species but to avoid take of protected plants. No habitat used by these species exists within the SFWF site boundary in the elevation ranges used by them. The following special status plant species are included in Tables P-1 and P-2, which also encompass plant species discussed in Exhibit Q.

Hepatic monkeyflower (*Mimulus jungermannioides*)
The habitat required by this species is wet seep areas in steep basalt canyon walls. According to the wetlands survey (Attachment J-1), no wet seep areas are within the current project boundary. The basalt walls of Fourmile and Eightmile Canyons, the basalt bluffs above the Columbia River, and the basalt walls above Willow Creek Valley are also not within the current site boundary. Applicant has not identified any habitat suitable for hepatic monkeyflower within the site boundary.

Disappearing monkeyflower (*Mimulus evanescens*)
This species requires seeps, seasonally moist areas or riparian habitat. No habitat with these characteristics was found within the site boundary during surveys for wetland areas on or near the site. Applicant has not identified any habitat suitable for disappearing monkeyflower within the site boundary.

Robinson's onion (*Allium robinsonii*)
Habitat for Robinson's onion is limited to sand and gravel deposits along the Columbia River. The closest habitat of this type is to the north of the site and on the other side of the Interstate. This habitat does not exist within the site boundary.

Little mousetail (*Myosurus minimus apus*) and sessile mousetail (*Myosurus sessillis*)
The habitat required for both species is alkaline vernal pools. No similar habitat was located within the site boundary during surveys for wetland features. Applicant has not identified any habitat suitable for either mousetail species within the site boundary.

Dwarf evening primrose (*Camissonia pygmaea*)
The habitat associated with this species is sagebrush uplands, typically in open areas of loose, rubble substrate. The species occurs on unstable soil or gravel in steep talus, dry washes, banks

and roadcuts. The elevation range of the species is currently 1800 to 2000 ft.[18] The few soils within the project boundary that may be somewhat suitable for use by this species are all below 1000 feet in elevation. Applicant has not identified any suitable habitat within the elevation range used by the dwarf evening primrose within the site boundary.

Laurence's milk-vetch (*Astragalus collinus* var. *laurentii*)
Habitats used by this species include basaltic grassland, sagebrush desert and dry slopes. In Oregon, the species is found on fractured basaltic outcroppings above 1970 feet.[1] Basaltic grasslands, sagebrush desert and dry slopes, and thus habitats suitable for use by Laurence's milk-vetch, are fairly abundant within the site boundary in the north project area. These habitats are all below 1050 feet in elevation. Applicant has not identified any suitable habitat within the elevation range used by Laurence's milk-vetch within the site boundary.

Plants ranked by the Oregon Natural Heritage Program

The ranked plant species that currently or historically occur in Morrow or Gilliam County within the Columbia Basin ecoregion are listed below. Vegetation surveys to date have included identification of plant species in 46 plots within the SFWF site boundaries and in nearby areas, which provides a reasonable sampling of the site for plant species that may occur. None of the ranked species were detected in these surveys. If any of these species are present, they are not abundant or widely distributed within the site boundary. No surveys for these species in all habitats that might be appropriate for their use were conducted.

List 2 – threatened with extirpation or presumed to be extirpated from the state

Salt heliotrope (*Heliotropium curassavicum*)
This species is found in alkali wetlands, on beaches and marsh margins. Applicant has not identified any habitat suitable for use by salt heliotrope within the site boundary.

Porcupine sedge (*Carex hystericina*)
This species occurs in wet depressions, drainages and seeps. Applicant has not identified any habitat suitable for use by porcupine sedge within the site boundary.

Watson's desert-parsley (Lomatium watsonii)
This species occurs in dry, open hillsides, and is associated with sage. Habitat for this species occurs in many areas within the site boundary.

Gray cryptantha (Cryptantha leucophaea)
This species occurs on unstable sand dunes along the Columbia River and tributaries. The Oregon Natural Heritage Program indicates this species is extirpated from Oregon. The sand dunes along the river or its tributaries are not within the site boundary. Applicant has not identified any habitat suitable for use by gray cryptantha within the site boundary.

[18] Croft, L.K., W.R. Owen and J.S. Shelly (1977). Interior Columbia Basin Ecosystem Management Project Analysis of Vascular Plants. Interior Columbia Basin Ecosystem Management Project, U.S. Forest Service.

List 3 – species for which more information is needed before status can be determined

Columbia bladderpod (*Lesquerella douglasii*)
This species occurs on sandy and gravel bar soils, either near the Columbia River or in sagebrush desert in the vicinity of the river. Small patches of this habitat occur within the site boundary.

Dotted smartweed (*Polygonum punctatum*)
This is a wetland plant. Applicant has not identified any habitat suitable for use by dotted smartweed within the site boundary.

List 4 – species of conservation concern but not currently threatened or endangered

Hedgehog cactus (*Pediocactus simpsonii* var. *robustior*)
This species occurs on thin, rocky soil at elevations above 1000 feet. Some habitat suitable for hedgehog cactus within the elevation range occupied by the species occurs within the site boundary.

Columbia mild-vetch (*Astragalus succumbens*)
This species uses sagebrush desert and sandy barrens. Several areas of habitat suitable for the Columbia milk-vetch occur with the site boundary.

Stalked-pod milk-vetch (*Astragalus sclerocarpus*)
This species uses dunes and sandy barrens in steppe vegetation. Some habitat suitable for use by stalked-pod milk-vetch occurs within the site boundary.

Creamy stickseed (*Hackelia diffusa* var. *cottonii*)
This species occupies cliffs, talus and wooded slopes, and occurs in the Columbia River Gorge or other river canyons. Applicant is not aware of any habitat suitable for use by creamy stickseed within the site boundary.

Results of General 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

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
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		
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

Common Name	Scientific Name	NP[1]	SP	P5	BB	Other
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
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			Winter			Spring			Summer		
	# 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

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 During Avian Surveys

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 the black-tailed jackrabbit, porcupine, 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 9 sample points in 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 these survey of vegetative characteristics of the north area of the site took place in 2002, vegetation in the vicinity of these sites was quantitatively and qualitatively assessed in spring 2007. No significant difference in general characteristics of the vegetation was observed.

During the Wetlands/Waters Delineation in spring 2007, 37 plots were assessed distributed throughout the facility area (Attachment J-1). In the south project area, the alien species cheatgrass, Russian thistle (*Salsola kali*) and tumble-mustard (*Sisymbrium altissimum*) provided the majority of plant cover. In the south project area, the only native species found was Idaho fescue, located in one plot. In the north project area, the alien species spring-whitlow grass (*Draba verna*), redstem storksbill (*Erodium cicutarium*), jagged chickweed (*Holosteum umbellatum*) provided substantial cover at some plots, along with cheatgrass, Russian thistle and tumble-mustard. The native species Sandberg's bluegrass, needle and thread grass, bluebunch wheatgrass and six-weeks fescue were found to provide coverage similar to that seen in the 2002 study. Slender phlox (*Microsteris gracilis*) provided up to 30% cover in some plots, with Canby's biscuitroot (*Lomatium canbyi*) and foxtail barley (*Horateum jubatum*) providing substantial cover in a few plots. Plant coverage by native species exceeded the coverage by alien species at 40% of the plots. Overall, native species coverage in the north project area averaged 40% and coverage by alien species averaged 46%.

Special Status Species Surveys

One small Washington ground squirrel burrow complex was located within the site boundary, and five larger complexes were found outside of the site boundary and beyond the search buffer. No burrows were found on or near the north project area. Four burrowing owl burrows were located, three within the site boundary and one within the search buffer. Nine individual loggerhead shrike were observed, and no sage sparrows were found during searches of sage steppe or juniper stands larger than 35 acres within the site boundary. All of the loggerhead shrike sightings were within the transmission corridor in Eightmile and Fourmile Canyons linking the north and south project area (Attachment P-5).

No grasshopper sparrows were located in the south project area. On Hurlburt Flats, designated as 3 CUR in the north project area, the habitat is unsuitable for use by the grasshopper sparrow. Approximately 6% of the remaining habitat within the north project area was searched for grasshopper sparrows, and nine were either visually or audibly located within or near the project site. This rate of species locations suggests as many as 150 individual grasshopper sparrows may occupy the site (Attachment P-5). Incidental to these surveys, four new raptor nests were located: two red-tailed hawks, one golden eagle and one Swainson's hawk.

Cumulative Impact Analysis

The impact to habitat and wildlife species that could potentially be caused by facilities projected to be constructed within approximately 100 kilometers of the SFWF was determined (Attachment P-6). Twenty wind power projects are planned or under construction within this area, with a nameplate generating capacity of 4060 MW of electricity. At a capacity factor of 31%, typical of the wind regime in the general area, actual power output from these 20 facilities would be approximately 1260 MW. Potential cumulative habitat and wildlife impact from these facilities should be compared to that from facilities with equivalent generating capabilities in the same region. The Boardman Coal Plant generates 550 MW of power; the combined output from the two Coyote Springs natural gas combined cycle combustion turbines is 503 MW; the John Day and McNary Dams generate 2160 and 980 MW, respectively; and the Columbia Generating Station nuclear power plant generates 1157 MW.

At the rate at which dead birds have been found at existing wind facilities in the region, construction of all 20 proposed facilities could result in an average of 7,715 dead birds found per year for all 20 facilities combined. This demonstrates the efficacy of current siting practices and component design. The Altamont Pass Wind Resource Area, with a large number of old and small turbines, is reported to result in 10926 avian fatalities/year.[19] The Altamont turbines have a total nameplate capacity of 580 MW, equating to 180 MW of electrical output at a 31% capacity factor. The Altamont, with only 14% of the power output of 20 modern facilities, substantially exceeds the avian fatality rate projected in the cumulative impact assessment.

POTENTIAL IMPACTS TO IDENTIFIED HABITATS

Temporary and Permanent Habitat Loss

Habit loss includes destruction of plants, displacement of mobile wildlife, and death 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.

Habitats identified within the SFWF site boundaries were mapped into ArcMap™ 9.2. A worst-case layout was developed excluding habitats Applicant proposed to avoid, placing the maximum number of components within the remaining highest category habitat. Turbine string spacing and the distance between in-string turbines were based on the shortest distances between strings and turbines in the typical layout. The worst-case layout was developed without regard to wind direction, turbine elevation or similar energy-productivity criteria. No existing roads were used in the worst-case layout. Overhead lines have both permanent and temporary impacts. While underground runs have no permanent impacts, the area of temporary impact for off-road trenching is higher than for overhead lines. There is no clear distinction between these for use in the worst-case layout. In choosing between overhead and underground installation of conductors between strings and substations for the worst-case layout, common sense was used and longer conductor runs were overhead. Alternative conductor paths that were somewhat plausible were compared, and both underground and overhead conductors were placed within the path that resulted in impact to the highest category habitats.

The typical layout (Figures P-6a and b) and the worst-case layout (Figures P-7a and b) were used to determine the acreage of temporary and permanent disturbance from each. Habitat impacts were produced within ArcMap by removing the habitat occupied by facility components, and by calculating the permanent and temporary project footprints (Tables P-6a through c) using component disturbance areas shown in Exhibit C. Permanent impact acreage from both layouts are the same, and temporary impact acreage from the worst-case layout was smaller due to the concentration of components within fewer areas (Table P-7).

[19] Smallwood K.S. and C.G. Thelander, 'Developing Methods to Reduce Bird Mortality in the Altamont Pass Wind Resource Area', PIER Final Project Report 500-04-052, August 2004.

Table P-6a: Disturbance impacts for individual habitat categories and subtypes

Category and subtype	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
1 Raptor nest	0.57	0	0	0	0
1 Washington ground squirrel	1.1	0	0	0	0
2 Raptor nest	0.92	0	0	0	0
2 Shrub steppe – sage	78	0	0	0	0
2 Washington ground squirrel	22	0	0	0	0
2 Wetland-wash	6.3	0	0	0	0
3 Curlew	6444	37	43	92	88
3 Grassland	736	5.3	5.1	22	16
3 Shrub steppe – purshia	4.3	0	0	0	0
3 Shrub steppe – rabbitbrush	122	1.5	1.5	4.1	3.6
3 Shrub steppe – sage	261	4.1	4.4	7.2	8.6
4 Grassland	6116	54	56	23	19
4 Previously cultivated	522	3.1	2.5	2.9	1.7
4 Rock and soil	149	0.33	0.53	0.29	0.16
4 Shrub steppe – sage	29	0.010	0.29	0.013	0.36
5 Dryland wheat	6598	54	50	18	11
5 Previously cultivated	585	9.5	7.5	1.4	1.0
5 Shrub steppe – broom snakeweed	263	2.5	3.1	0	0
6 Animal facility	74	0.24	0.35	0	0
6 Previously cultivated	95	0.23	0.34	0.56	0.33
6 Road and parking	244	0.61	0.70	1.4	0.98
6 Structures	39	0.23	0.18	0.26	0.16
Total	**22390**	**173**	**176**	**173**	**151**

Table P6-b: Disturbance impacts for individual habitat categories

Category	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
1	1.6	0	0	0	0
2	107	0	0	0	0
3	7568	48	54	125	116
4	6816	57	60	26	21
5	7445	66	61	20	13
6	452	1.3	1.6	2.3	1.5
Total	**22390**	**173**	**176**	**173**	**151**

Table P-6c: Disturbance impacts for individual habitat subtypes

Subtype [1]	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
Raptor nest	1.48	0	0	0	0
Washington ground squirrel	22.6	0	0	0	0
Wetland-wash	6.3	0	0	0	0
Grassland	13818	100	107	136	124
Shrub steppe – purshia	4.3	0	0	0	0
Shrub steppe – sage	369	4.1	4.7	7.2	9.0
Shrub steppe – rabbitbrush	122	1.5	1.5	4.1	3.6
Shrub steppe – broom snakeweed	263	2.5	3.1	0	0
Rock and soil	149	0.33	0.53	0.29	0.16
Agricultural	7182	63	58	20	13
Disturbed	452	1.3	1.6	2.3	1.5
Total	**22390**	**173**	**176**	**173**	**151**

1. Category 4 PC and 3 CUR were added to the grassland subtype, and category 6 PC and 6 AF added to disturbed. Agricultural includes 5 DW and 5 PC.

Table P-7. Permanent and temporary disturbance caused by components

Permanent Impacts

Component	Per unit		Number of units *Typical*	**Worst**		Acreage Typical	Worst
Turbine pads	1187	sq ft	303	303	WTGs	8.26	8.26
Turbine turnouts	495	sq ft	303	303	WTGs	3.44	3.44
Substations	2.3	acre	2	2	each	4.60	4.60
Medium-voltage power poles	7	sq ft	971	746	poles	0.16	0.12
High-voltage power poles	14	sq ft	586	670	poles	0.19	0.22
Field workshop north	70000	sq ft	1	1	each	1.61	1.61
Field workshop south	61720	sq ft	1	1	each	1.42	1.42
Meteorological towers	15	sq ft	6	6	each	0.00	0.00
Expansion of existing roads	42240	sq ft/mi	30.2	0	miles	29.28	0.00
New roads	95040	sq ft/mi	56.7	70.2	miles	123.71	153.16
Total						**172.66**	**172.82**

Temporary impacts

Component	Per unit		Number of units Typical	Worst		Acreage Typical	Worst
Turbine pads	7650	sq ft	303	303	WTGs	53.21	53.21
Turbine turnouts	0	sq ft	303	303	WTGs	0.00	0.00
Substations	0.5	acre	2	2	each	1.00	1.00
Medium-voltage power poles	200	sq ft	971	746	poles	4.46	3.43
High-voltage power poles	400	sq ft	586	670	poles	5.38	6.15
Off-road trenching	15840	sq ft/mi	17	5	miles	6.18	1.82
Meteorological towers	1585	sq ft	6	6	each	0.22	0.22
Staging and storing north	0	sq ft	1	1	each	0.00	0.00
Staging and storing south	0	sq ft	1	1	each	0.00	0.00
Expansion of existing roads	52800	sq ft/mi	30.2	0	miles	36.61	0.00
New roads	52800	sq ft/mi	56.7	70.2	miles	68.73	85.09
Total						**175.79**	**150.92**

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, and for the Washington ground squirrel, below. 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 for 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. Although the area in which the proposed facility is located historically contained substantial stands of big sagebrush over much of the site,[20] 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.

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.

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

Temporary Impacts from Facility Construction

Impact to habitat has both a wildlife and vegetation component. Three habitat types – raptor nesting structures, Washington ground squirrel burrows, and long-billed curlew nesting areas – have been designated due to the species that occupy them. Specific avoidance of temporary disturbance to these species is discussed in the habitat categories named for their presence. Other habitat categories have been designated according to their vegetative characteristics and for their potential use by special status species. The habitats are used by many non-special status species as well, and general construction-related impacts to wildlife are separately discussed. Other than habitat categories specifically assigned due to raptor, long-billed curlew and Washington ground squirrel use, individual wildlife species have not engendered habitat categories. Net loss, net benefit and time-to-restore discussions address vegetation and its ability to support pre-disturbance levels of wildlife use.

It should be noted that agricultural activity and the long history of sheep grazing on the site has resulted in many disturbed areas with same nature as those that would be caused by facility construction (disturbed soil, compacted earth, noxious weeds and an increase in alien plant species cover). These areas are scattered throughout all habitat types and categories, and were not separately mapped or categorized. Trees supporting active raptor nests, suitable trees without active nests whenever they were found, and Washington ground squirrel category 1 habitat were the smallest areas mapped. Other than those, the smallest habitats are a few 0.25-acre areas that contained small clumps of sage or bare rock and soil. The ground temporarily disturbed by construction of a single turbine is approximately 0.18 acres. An equivalent area of disturbed soil or other microhabitat was not mapped for currently existing conditions.

<u>Temporary impacts to wildlife from construction</u>

Temporary disturbance to wildlife in all habitat categories can cause the same impacts, although there is the potential for more individuals to be affected by disturbance of habitats with higher levels of use. Temporary disturbance to wildlife separate from that caused by temporary disturbance to the vegetation they use includes displacement and loss of individuals.

Construction activity is expected to temporarily displace wildlife from the immediate area of construction. Applicant proposes to disturb no category 1 or 2 habitats, which are rare in the area. Category 3 – 6 habitats are not scarce within the site boundaries and in its vicinity, with sufficient nearby habitat available for wildlife dispersal away from areas of construction. When construction in an area is completed, wildlife is expected to resume use of the habitat within two months.

The death of individual animals caused during construction of the facility is also considered a temporary impact to the species. Most wildlife species using the site have significantly reduced habitat currently available compared to their historic ranges. The alteration of vegetation due to agriculture and grazing limits regional population size for many species.[21] Loss of individuals caused by facility construction or operation is expected to be much lower than background

[21] 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.

mortality,[22] and to have an insignificant impact on the local population. Of more importance is the loss of the vegetation communities they require. Impacts to vegetation from temporary disturbance are discussed under the specific habitats, below.

<u>Temporary impacts to vegetation from construction</u>

Applicant proposes (below) to avoid any disturbance of several habitat categories and types (Figures P-8a and b). Applicant does not consider this mitigation, and can remove these habitats from within the site boundary for clarification if necessary. Applicant also proposes to limit construction activities within several corridors (Figures P-9a and b).

<u>Category 1 raptor nesting:</u> Applicant proposes to cause no temporary or permanent disturbance to any raptor nesting structures containing occupied nests. Applicant proposes to avoid construction within 0.5 miles of occupied nests during raptor nesting season. Applicant also proposes spring surveys during the period raptor nests are being constructed (approximately mid-March through early April) in all areas within 0.5 miles of construction scheduled to take place during nesting season (approximately early April through June). There is no time-to-restore, and no net loss of habitat quantity or quality, as no temporary or permanent disturbance of raptor species or nest trees or structures is proposed.

<u>Category 1 Washington ground squirrel:</u> Applicant proposes to cause no temporary or permanent disturbance to category 1 Washington ground squirrel habitat. Applicant proposes to avoid construction within 1,300 to 1,700 feet from identified burrows during the period in which Washington ground squirrels are active (approximately mid-March through May). There is no time-to-restore, and no net loss of habitat quantity or quality, as no temporary or permanent disturbance of Washington ground squirrels or surrounding vegetation is proposed.

<u>Category 2 raptor nesting:</u> Applicant proposes to avoid removal of any trees greater than 3 feet in height that may be suitable to use for raptor nest construction. There is no time-to-restore, and no net loss of habitat quantity or quality, as no temporary or permanent disturbance of trees with the potential for use in nesting is proposed. There is no need to achieve net benefit for temporarily disturbed category 2 raptor nesting habitat, as there will be no temporary or permanent disturbance.

<u>Category 2 sage shrub steppe:</u> Applicant proposes to avoid construction or disturbance of all areas of category 2 sage shrub steppe. There is no time-to-restore, and no net loss of habitat quantity or quality, as no temporary or permanent disturbance of category 2 sage shrub steppe vegetation is proposed. There is no need to achieve net benefit for temporarily disturbed category 2 sage shrub steppe habitat, as there will be no temporary or permanent disturbance.

<u>Category 2 Washington ground squirrel:</u> Applicant proposes to avoid construction or disturbance of all areas of category 2 Washington ground squirrel habitat. Applicant proposes to avoid construction within 1,000 feet of category 2 Washington ground squirrel habitat during the period in which the squirrels are active. There is no time-to-restore, and no net loss of habitat

[22] Young, D.P. Jr. and V.K. Poulton (March 2007) Avian and Bat Cumulative Impacts Analysis Shepherds Flat Wind Project Gilliam and Morrow Counties, Oregon. Western EcoSystems Technology, Inc., Cheyenne WY.

quantity or quality, as no temporary or permanent disturbance of Washington ground squirrels or surrounding vegetation is proposed. There is no need to achieve net benefit for temporarily disturbed category 2 Washington ground squirrel habitat, as there will be no temporary or permanent disturbance.

Category 2 wetlands-dry wash: Applicant proposes to avoid construction or disturbance of all category 2 wetlands dry wash. All areas at which washes will be crossed by vehicles during facility construction and operation are crossed by existing roads. Additional crossing of washes is limited to use by overhead transmission lines. Applicant proposes to avoid placement of any transmission line supports within the washes. There is no time-to-restore, and no net loss of habitat quantity or quality, as no temporary or permanent disturbance of category 2 wetlands-dry wash vegetation or channels is proposed. There is no need to achieve net benefit for temporarily disturbed category 2 wetlands-dry wash habitat as there will be no temporary or permanent disturbance.

Category 3 long-billed curlew: Applicant proposes to prevent disturbance to nesting curlew by avoiding construction activity within 0.5 miles of identified curlew nesting habitat during nesting season, approximately March 8 through mid-June. Please see discussion of category 3 and 4 grasslands, below, for impacts to the vegetation in this habitat.

Category 3 grassland: This grassland is expected to experience three types of temporary impacts – vegetation crushing, vegetation loss when soil is disturbed, and soil compaction. Crushing of plants, without significant damage to the roots, can be caused by vehicle tracks, the footprint of hay bales upon which facility components (such as blades) are supported above ground, and the footprint of components placed directly upon the ground. Crushing of annual or perennial grasses while they are dormant is expected to cause little impact other than laying them down, and the wind on the site often causes this naturally. Crushing while grasses are actively growing is expected to cause stunting but not death. With just-in-time deliveries, no hay bales or components will be on the ground except for the far ends of the rotor blades. Should delivery schedules be disrupted, components will not be on the ground long enough to cause death of the plants. Crushed dormant plants are expected to return to pre-impact condition in the next growing season (within 8 months), and crushed growing plants after a few months.

Without intervention, when plants are lost from trenching and other ground-disturbing activities that impact the plant root zone, restoration of grass cover and species mix to category 3 conditions is expected to take more than 10 years. Most of the annual grass species in this habitat are aliens, and these would be the most prevalent species following disturbance. With intervention, restoration to category 3 condition in disturbed patches should take approximately 3 – 5 years.

Without intervention, soil compaction is expected to result in the loss of some plants and the stunting of those remaining, a condition expected to persist indefinitely. With intervention, time-to-restore for compacted areas would be the same as that for areas of ground disturbance with intervention, approximately 3 – 5 years.

In a worst-case analysis, the maximum number of turbines that can be sited per acre of habitat is estimated at 0.036. The temporary disturbance associated with this density of turbines, new roads to service them, and associated met towers and substations, is 1.4% of the habitat. Temporary disturbance for the submitted typical layout of the SFWF is 0.8% of the total area.

In 6 samples of vegetation in category 3 grassland, plant cover was 100% at two sites, 90% at two others, 85% at one site and 0% at the remaining site. Alien species were found to provide 35 to 70% of vegetation coverage. A 1.4% increase in bare ground and/or alien plant species is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance.

The overall quality of this habitat would be slightly diminished by temporary disturbance. Applicant proposes to offset this by improvement of habitat quality within the habitat mitigation area (described, below).

Category 3 sage or purshia (bitterbrush) shrub steppe: Shrubs in this category are either scattered or present in small patches. When shrubs cannot be avoided, Applicant proposes to prune rather than break interfering limbs, and to shorten rather than remove plants. Purshia is able to produce shoots from below-ground buds, making even severe pruning a good alternative to plant removal.

Impacts to the herbaceous component of these categories are the same as that for grasslands. Time-to-restore for the herbaceous component is expected to be the same as the category 3 or 4 grassland most similar to the shrub understory. For the shrub component without any intervention, return of pruned shrubs to previous biomass may take 3 to 5 years depending on the severity of the pruning and the original size of the shrub. In areas of disturbed ground, lost large, healthy shrubs (4 or more feet tall) could take 20 years to grow to that height from seed, and they may not return in the foreseeable future. With intervention, replacement of small sage could take 10 years and large sage 20 years even from transplants, with somewhat less time required for purshia.

There is one small (less than 5-acre) mapped category 3 purshia sage steppe habitat. Applicant proposes to avoid any disturbance of this habitat. Of the 21 mapped category 3 sage shrub steppe habitat areas, 12 are smaller than 5 acres. Applicant proposes to avoid category 3 sage shrub steppe mapped at 5 acres or smaller. Of the remaining 9 larger areas, significant damage to or loss of shrubs can be kept well below 2% of those present, which is not sufficient to change the categorization of this habitat. No loss of category quantity is expected from temporary disturbance.

The overall quality of this habitat would be slightly diminished by temporary disturbance. Applicant proposes to offset this by improvement of habitat quality within the habitat mitigation area.

Category 3 rabbitbrush shrub steppe: Impact to and time-to-restore for the herbaceous component of this habitat is expected to be the same as the category 3 or 4 grassland most similar to the shrub understory. Applicant proposes to crush rather than remove shrubs when possible to minimize shrub loss. Rabbitbrush is a copious seed producer and a rapid grower. For the shrub component without any intervention, damaged shrubs are expected to return to pre-impact condition within 2 or 3 years. For areas of disturbed ground, sizeable replacement shrubs for those lost should be present within 3 years and reach pre-disturbance condition within 5 years. Without correction of compacted soil, stunting and plant loss is expected to persist. Intervention for the shrub component is limited to correction of soil compaction, and return to pre-disturbance conditions the same as for shrubs in areas of disturbed soil.

The smallest mapped area of category 3 rabbitbrush shrub steppe is less than 3 acres, and Applicant proposes to avoid it. The next smallest is 11 acres. Damage to or loss of 1.4% of the rabbitbrush or understory is not sufficient to change categorization of this habitat, and no loss of category quantity is expected from temporary disturbance.

The overall quality of this habitat would be slightly diminished by temporary disturbance. Applicant proposes to offset this by improvement of habitat quality within the habitat mitigation area.

Category 4 grassland: This grassland is expected to experience three types of impacts – vegetation crushing, vegetation loss caused by soil disturbance, and soil compaction. The maximum measured ground cover provided by native species in this habitat is 35%, with the balance covered by alien species and bare soil. Cheatgrass is the alien species most frequently present, and generally has a higher coverage rate than other alien or native plants. Cheatgrass is an annual, a rapid grower, and prolifically reseeds. Crushed vegetation is expected to return to previous condition within 8 months. Without intervention, vegetation lost to ground disturbance is expected to be replaced within a year by the annual alien species in the vicinity, typically cheatgrass, redstem storksbill, tumble-mustard and tumbleweed. Return to pre-disturbance species variety and composition is expected to take 3 to 4 years. Without intervention, soil compaction is expected to cause persistent stunting and plant loss. With intervention, restoration to pre-disturbance habitat quality is expected to take 1 to 2 years.

In 14 samples of vegetation in category 4 grassland, plant cover was 100% at 8 sites, with two sites at 70%, and one site each at 59, 78, 80 and 85%. Alien species were found to provide 42 to 90% of vegetation coverage. A 1.4% increase in bare ground and/or alien plant species is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance.

The overall quality of this habitat would be slightly diminished by temporary disturbance. Applicant proposes to offset this by improvement of habitat quality within the habitat mitigation area.

Category 4 previously cultivated: Characteristics of vegetation in this habitat are nearly identical to that of category 4 grassland. The primary distinction between these habitats is that in previously cultivated fields, soil disturbance makes the habitat less useful to burrowing mammals, the variety of plant species is lower, and native species less frequent. Time-to-restore under different conditions is anticipated to be the same as that for category 4 grassland, with no change in habit categorization caused by disturbance to 1.4% of the area.

The overall quality of this habitat would be slightly diminished by temporary disturbance. Applicant proposes to offset this by improvement of habitat quality within the habitat mitigation area.

Category 4 rock and soil: This category consists of bare soil on steep banks, exposed rock, and sand dunes. Little to no vegetation is present. Temporary disturbance is expected to last only as long as materials and equipment are present. This habitat will return to pre-disturbance condition as soon as equipment is removed. No change to habitat categorization will be caused by temporary disturbance, and no loss of either habitat quality or quantity from temporary disturbance is anticipated.

Category 4 sage shrub steppe: This category contains sage that is sparse and damaged by disease, herbicide drift or fire. The characteristics of the understory are those of category 4 grassland. Time to restore the shrub understory to pre-disturbance condition is the same as for category 4 grassland. Existing damaged sage plants will be avoided when practical, and every effort made to avoid healthy plants. The sage is sufficiently sparse to allow avoidance of nearly all plants. When sage cannot be avoided, Applicant proposes to prune rather than break interfering limbs, and to shorten rather remove plants.

For the shrub component without any intervention, damaged shrubs in reasonable condition should return to previous biomass within 3 – 5 years, and lost shrubs are not expected to return in the foreseeable future. With intervention, sage in poor condition that are lost to ground disturbance and replaced by small, healthy shrubs could have equivalent live coverage within 3 to 5 years. Lost large, healthy shrubs (4 or more feet tall) could take 20 years to grow to that height.

All habitat mapped as category 4 sage shrub steppe is along the transmission corridor between the south and north project areas. The proportion of disturbed area within this corridor will be very small, and cause no change to categorization of this habitat. No loss of category quantity is expected from temporary disturbance.

The overall quality of this habitat would be slightly diminished by temporary disturbance. Applicant proposes to offset this by improvement of habitat quality within the habitat mitigation area.

Category 5 dryland wheat: Both planted and fallow wheat fields have been designated as category 5. Damage to growing wheat or wheat stubble would not change the habitat quality. Intervention is needed to protect against soil wind or water erosion. For disturbed soil without intervention, normal landowner farming activities would result in planting or plowing within 8 months. With intervention, plowing would be accomplished within an estimated 3 months, with the same estimate for planting in season. With no intervention, the number of small mammal burrows in compacted soil would be reduced, an effect that would persist indefinitely. Restoration would be complete as soon as correction of the compaction occurred.

These habitats cover the majority of the south project area. Disturbance to 1.4% of the area is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance.

Applicant proposes to provide net benefit to category 5 habitat temporarily disturbed by improvement of habitat quality within the habitat mitigation area.

Category 5 previously cultivated: Vegetation cover in this category is typically provided by bare ground, wheat, alien grass species, tumble-mustard and tumbleweed. Damaged vegetation is expected to return to pre-disturbance condition within 8 months. For vegetation lost from soil disturbance, reseeding by tumble-mustard and tumbleweed is the likely result without intervention. In that event, return to the mix of species found in category 5 habitat would take at least 5 years. With intervention, time-to-restore is expected to be approximately 1 – 2 years. Disturbance to 1.4% of the area is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance.

Applicant proposes to provide net benefit to category 5 habitat temporarily disturbed by improvement of habitat quality within the habitat mitigation area.

Category 5 broom snakeweed shrub steppe: This habitat contains closely-spaced broom snakeweed with alien and native grass species in between. Vegetation crushing is expected to have little affect on the habitat, with restoration to pre-impact conditions within 8 months. Without intervention, soil compaction is expected to cause persistent stunting and plant loss. For loss of vegetation from soil disturbance, without intervention restoration to habitat with category 5-quality (species variety and ground coverage) would take 3 to 4 years. With intervention, restoration to pre-disturbance habitat quality is expected to take 1 to 2 years.

There is one mapped category 5 broom snakeweed shrub steppe area, located in the north and approximately 260 acres. Disturbance to 1.4% of the area is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance.

Applicant proposes to provide net benefit to category 5 habitat temporarily disturbed by improvement of habitat quality within the habitat mitigation area.

Revegetation of Disturbed Areas

Correction for compaction

In the north project area, soils are generally too shallow to experience compaction. Soils in the south are susceptible, and some areas may become compacted by construction activity. In areas identified as having compacted soil, the condition will be corrected by deep tillage or ripping using the method preferred by the landowner. Awareness of compaction may be delayed until vegetation indicates the condition through poor seed sprouting, stunting or plant death. Following correction of compaction, the area will be revegetated.

Revegetation of dryland wheat

Ground disturbance is largely limited to off-road trenching, leveling of portions of the crane pads, and the off-road crane tread path within which the transmission and communication lines will be buried. The areas disturbed by off-road trenching and the off-road crane path are narrow enough (3 – 10 feet) to present a low risk for wind or water erosion of soils. The temporarily disturbed ground around power poles, meteorological towers, substations and workshops are also limited in area or width. Where larger areas have been disturbed, as for leveling of crane pads where necessary, the area will be cultivated as soon as possible. If it is the proper season for wheat planting, and the disturbed area is within a field that is not intended to remain fallow, the area will be planted with a wheat variety selected by the landowner. Otherwise, cultivation and planting will occur on the same schedule as in surrounding fields. The landowners who grow wheat prefer to perform the plowing and planting themselves, and they will be reimbursed for these activities.

Revegetation of other habitats

The predominant habitat subtype that will be disturbed by facility construction is grassland. The seed used for revegetation in non-wheat habitat will contain a mixture of species anticipated to perform well in the soils of the north where most of the grassland habitat occurs. The seed mixture will be determined through consultation with Oregon State University Cooperative Extension specialists, the Siting Council, the Oregon Department of Fish and Wildlife and the landowners, with landowners given the opportunity to approve or reject species. The native grass species most prevalent in the north project area and on rocky slopes in the south is Sandberg's bluegrass followed by bluebunch wheatgrass. In the deeper soils of the south project area, Idaho fescue and bluebunch wheatgrass are expected do well. Big bluegrass and beardless wheatgrass are native species that have been successfully used for revegetation or pasture improvement in arid areas, and big bluegrass can successfully compete with alien grass species including cheatgrass. The seed mixture selected for revegetation of grasslands will also be used for revegetation of disturbed shrub steppe, previously cultivated and animal facility subtypes. The subtype classified as exposed rock, bare soil or sand will not be vegetated.

Disturbed areas will be evaluated for the need to be seeded. The practice of crushing rather than removing vegetation, and minimization of site clearing and leveling (please see RAI#2 C2) will result in loss of few perennial plants in areas designated as disturbed. These areas are likely to recover more quickly without intervention.

The areas of actual soil disturbance by off-road trenching and the off-road crane path are narrow enough (3 – 10 feet) to be seeded and left without mulch. Hand seeding, rather than mechanical seeding, will be used in small areas where planting equipment is liable to cause more disturbance than it corrects. The temporarily disturbed ground around power poles, meteorological towers, substations and workshops are also limited in area or width and will be seeded without mulching. Where larger areas of ground have been disturbed, as for leveling portions of crane pads, the area will be seeded and weed-free straw or other mulch applied to protect against erosion and preserve moisture. No-till methods, such as drilling or broadcast seeding, will be employed.

In the arid climate of the site, successful seeding is limited to mid-fall through very early spring. In mid-fall, all disturbed soil in areas where construction is complete will be seeded. In early spring, soil subsequently disturbed will be seeded. Larger areas of disturbed soil that will not be seeded within 2 months will be mulched in the meantime to minimize erosion.

Weed control

In the spring and early summer (approximately April through June), weeds commonly found on the site can be identified before they seed. In habitat subtypes other than exposed rock, bare soil and sand, all disturbed soil in areas in which construction is complete will be evaluated in the spring for the presence of noxious and nuisance weed species. Any discovered will be managed as suggested by the Gilliam and Morrow County Weed Control Programs. After a disturbed area has been deemed successfully revegetated, evaluations specifically for noxious weed species will be suspended. During vegetation surveys and facility operation activities, noxious or nuisance weeds found in previously disturbed areas will be managed appropriately.

Monitoring of revegetation success

In dryland wheat, Applicant will rely on the landowners' judgment and reporting as to soil compaction, construction-related erosion or poor crop growth in disturbed areas, and correct any problems found.

In other habitats, revegetation progress will be measured by comparison of vegetation coverage and species mix in temporarily disturbed areas to that in reference areas. At least 20% of the disturbed area will be reviewed, distributed among all habitat subtypes disturbed. Survey sites will also be proportionally distributed between areas of disturbed soil and areas of crushed vegetation. Reference sites will be selected from nearby undisturbed areas within the same habitat subtype and category. Reference sites should have similar slopes, soil depth and prevalence of rock outcrops as the sites to which they will be compared.

At each site, a qualified independent investigator knowledgeable in identification of inland native and alien plant species and survey techniques will assess the percent coverage provided by bare soil, native vegetation and alien species. The investigator will also qualitatively assess the degree of erosion at each site. Disturbed areas will be surveyed beginning a year after seeding. Surveys will continue each year until there is sufficient evidence of progress to indicate additional revegetation efforts in the area are not necessary. Subsequent surveys will take place every five years for the life of the project. Unless the investigator deems a reference or disturbed site inappropriate, the same reference and disturbed sites will be used for every survey.

Criteria for evaluation of revegetation success

Revegetation will be considered successful when 1) vegetation cover of native species at disturbed sites is greater than or equal to that at reference sites, and 2) bare soil in disturbed sites does not exceed the sum of reference site bare soil plus three times the percentage that native species cover on disturbed sites exceeds native species cover on reference sites.

Mitigation for revegetation success shortfalls

Indications that progress towards successful revegetation is too slow include emergence of comparatively few plants one year after disturbance, and vegetation cover in the second monitoring year significantly lower than that on reference sites with little progress between the first and second monitoring year. If soil compaction is suspected of causing poor seed emergence or failure to thrive, the condition will be alleviated and the area reseeded. Other growth failures may be due to soil that is unsuitable for the seeded species, low precipitation, fire, alien species competition or other site-specific conditions that reduce the success of native vegetation establishment. A review of native and alien vegetation that has appeared in the disturbed area will be used to determine specific remediation procedures, and the Oregon State Cooperative Extension Service consulted if revegetation efforts continue to be unproductive.

Progress may be improved by reseeding with the same seed mix, seeding with different native species, or by using a mix that also contains alien rangeland species. In some areas, supplemental irrigation may be necessary until plants are established. Seed selection will follow the procedures used to determine the original mix. Reseeding when monitoring reveals unsatisfactory progress will occur as soon as seasonally appropriate.

Permanent Impacts to Habitat from Facility Construction

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 (Photographs P-1 trough P-3) . 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 believes that 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 lease of a parcel of land that is predominantly Category 4 and 6 habitat, and which is equal in area to that permanently lost from development of the facility as well as mitigation for temporary habitat losses. A replacement parcel of approximately 205 acres is estimated to be adequate for mitigation of permanent and temporary impacts to habitat. This property would be maintained, monitored and protected for the lifetime of the facility (Attachment P-7). The Applicant proposes to complete parcel acquisition and begin a habitat conversion program upon issuance of the SFWF Site Certificate.

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 during the period in which the squirrels are active (Figures P-10a and b). These distances from identified resources will be seasonally flagged, and 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 Eightmile Canyon, 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 and one golden eagle nest 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 approximately 0.5 miles. Additional adjustments to the site boundary resulted 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,[23] 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.[24] 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 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 that 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.

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[23] 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.

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

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 exterior 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 number of scientific studies are currently examining wildlife impacts caused by wind energy facilities, and new research is reported frequently. The National Wind Coordinating Collaborative has been producing research summaries at intervals of two to three years. Their most recent document, the 'NWCC Mitigation Toolbox', was released in May 2007. It summarizes existing policy and guideline recommendations for siting, and whether or not any studies have been conducted that support each recommendation. Several industry best practices are designed to minimize the project footprint; these are incorporated into the facility footprint in Exhibit C. Siting practices to minimize disturbance of important habitat include reduced footprints and habitat avoidance. There are also general siting practices to reduce impacts to bats and avian species, and some quite specific recommendations for raptors.

Avian and bat siting recommendations commonly include avoidance of facility components sited in areas of high avian or bat use. For bats, the only specific turbine siting recommendation is to avoid forest openings or edges, and it is not applicable to the SFWF site. One recommendation for wildlife in general is avoidance of riparian or wetland areas, and there are none within the SFWF site boundary.

Avian mortality is thought to increase when turbines, strings or facilities are sited between forage areas and high-density nesting or migratory bird rest areas. The SFWF does not intervene between any identified high-density nesting or migratory bird resting areas and their foraging areas. Although nesting density of the long-billed curlew is high on the site, the birds forage in locations in the vicinity of their nests and no specific siting recommendations apply.

One recommendation, to avoid siting on steep slopes, is due to an assumed increase in mortality of red-tailed hawks under those circumstances. Red-tail hawks may prefer to soar on steep slopes. Applicant proposes to avoid siting of turbines on slopes greater than 20%. For raptors in general, siting of turbines on ridge edges, and siting on the windward side of slopes are thought to increase mortality. Raptors soaring along bluffs concentrate in a fairly narrow band along the edge. On the SFWF site, the bluffs along the Columbia River are to the north of the site, Willow Creek Valley is to the east, and Eightmile and Fourmile Canyons pass through portions of the site. These are all features most likely to concentrate raptor soaring in updrafts above bluffs and slopes.

The direction of prevailing winds result in generally north-south runs for turbine strings near the bluffs, and thus fewer turbines near the bluff than if the strings had an east-west orientation. Applicant proposes to avoid siting a turbine string along the north site boundary, and to avoid siting turbines within 250 feet of the bluff edge. This setback is adequate to protect raptors soaring along the rim. Some slopes along Willow Creek Valley are quite steep and all are suitable for raptor soaring. Due to the direction of the prevailing wind, most soaring occurs above slopes on the east side of the Valley. The slopes on either side of the Valley are not within the facility boundary, and Applicant proposes the same 250-foot turbine setback from the east site boundary above the Willow Creek Valley.

Where Eightmile Canyon runs through the north area, short (approximately 20 – 50 feet) basalt bluffs are at the base of some slopes leading up to the site, and the slopes above the bluffs are not particularly steep. The bluffs and part of the slope above them are not within the site, and no setback is proposed. There are no bluffs along Fourmile Canyon, most of the slopes above it are not within the site, and Applicant proposes no setbacks. Eightmile Canyon passes considerably to the west of the site boundary in the south portion of the project, and it will not affect turbine siting.

The recommendation against siting in narrow corridors opening up into valleys is due to an assumed increase in golden eagle mortality under those circumstances. Golden eagles apparently prefer to travel between lowland areas using ravines, canyons or ridge saddles rather than by flying above intervening high ground. Although no published data indicate a significant increase in mortality for other species, avian observations indicate this flight behavior is not limited to the golden eagle. Most ravines and canyons have been removed from the site, and those remaining are at elevations lower than those at which turbines will be sited. Applicant has proposed corridors in which turbine siting in ravines and canyons is avoided (Figures P-9a and b).

There are some locations, predominantly in the north project area, where lower elevation passes or saddles between hilltops could be preferred by avian species for travel between areas. While performing avian point counts and incidental avian sightings, the wildlife biologists surveying the site identified one corridor in the south project area that might be used by raptors to access Schoolhouse Canyon. Applicant was notified, and additional raptor observations were performed at that location (Attachment P-2). The identified area is no longer within the site boundary, and no high-use corridors within the boundary were identified. Although not identified as high-use corridors, ridge saddles and gaps between hilltops could have some preferential use by avian species. During final turbine siting, these areas will be reviewed by the project's wildlife biologists, and turbine locations adjusted accordingly.

Although no turbines will be placed in canyons or narrow ravines, in these features, as well as in saddles and gaps between hilltops, overhead transmission lines are of concern. Overhead lines crossing narrow saddles, ravines or gaps can present a higher risk for avian wire-strike mortality than transmission lines located in other terrains. Broad canyons and valleys do not seem to present as high a risk, perhaps because the lines are further away when they come into view. Most overhead lines shown in Applicant's typical layout run parallel to ravines and canyons rather than crossing them. Overhead transmission crossing narrow saddles, ravines and gaps will be avoided where possible. There are cases where overhead line crossings may be preferred over underground lines to minimize habitat impacts. Where crossings cannot be avoided, avian line markers such as PVC spirals will be installed. These line markers significantly reduce avian mortality from wire strikes.

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). 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 (Attachment P-8). The plan for monitoring the success of habitat conversion on the habitat replacement parcel is included in Attachment P-7, and monitoring the success of revegetation in temporarily disturbed areas is described, above.

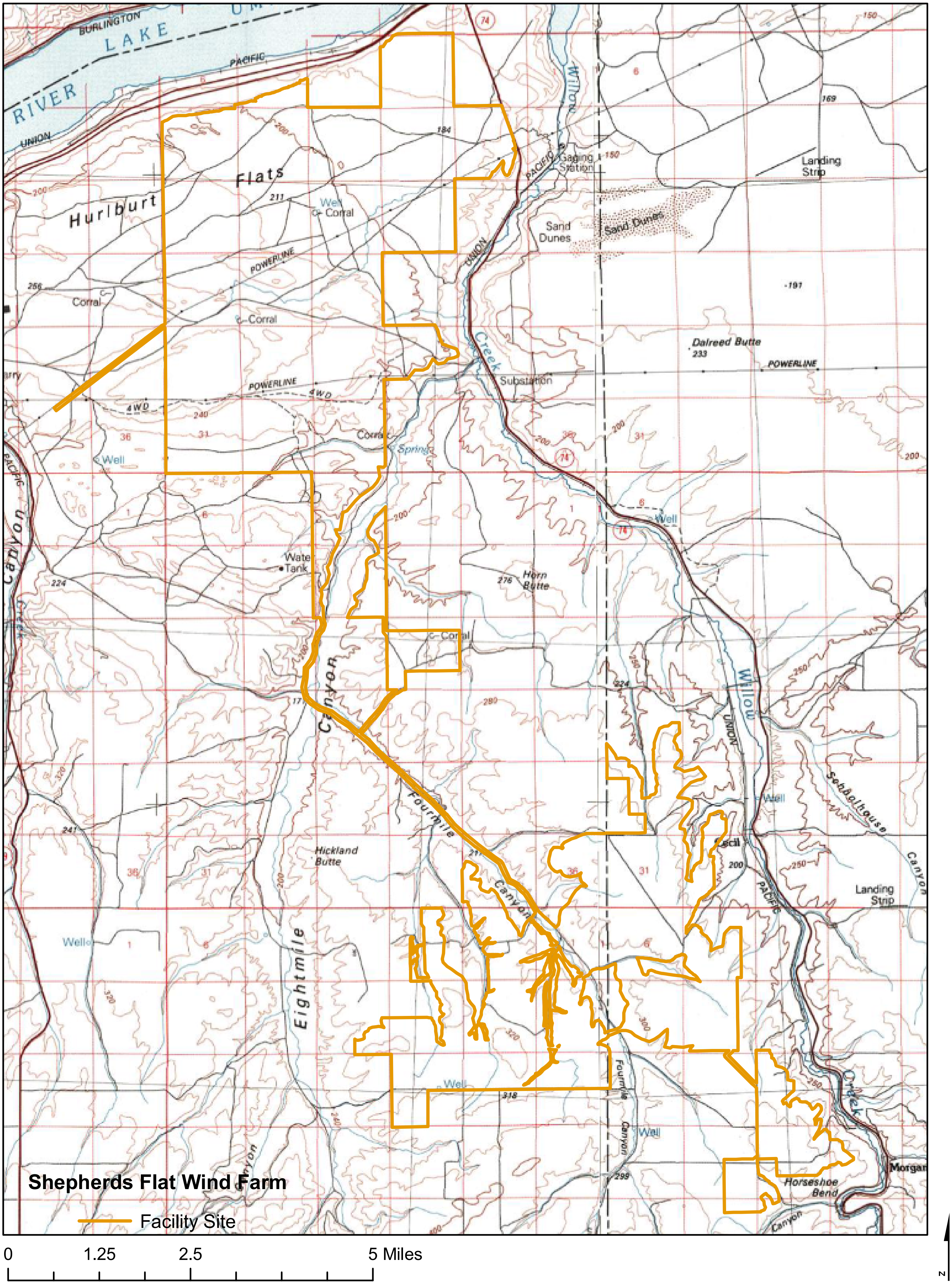
Monitoring of Avian Species Fatalities

This plan (Attachment P-7) 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. The study is proposed to last for a period of two years.

RESPONSE TO AGENCY COMMENTS NOT ADDRESSED IN THE EXHIBIT

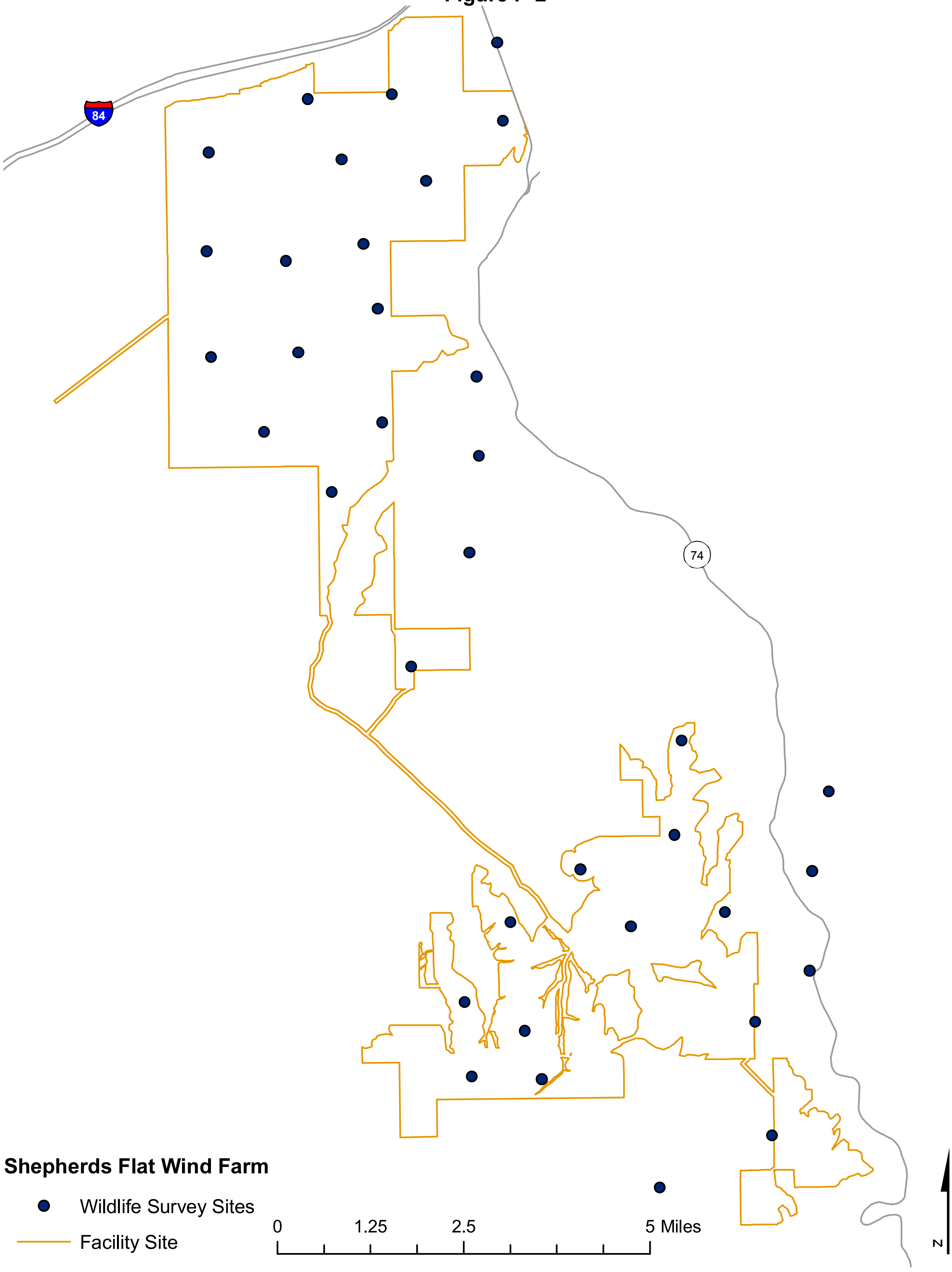
Although the Oregon Department of Fish and Wildlife has expressed an interest in obtaining permission to conduct wildlife surveys in the project area, the Applicant's wind project ground leases do not allow the Applicant authority to grant third party access to private lands.

Figure P-1



Shepherds Flat Wind Farm
Facility Site
0
1.25
2.5
5 Miles
N
Hurlburt Flats
Sand Dunes
Landing Strip
Gaging Station
Dalreed Butte
POWERLINE
Substation
Willow Creek
Horn Butte
Hickland Butte
Fourmile Canyon
Eightmile Canyon
Schoolhouse Canyon
Cecil
Horseshoe Bend
Morgan
Well
Corral
Water Tank
Spring
4WD
UNION PACIFIC
BURLINGTON
RIVER
LAKE

Figure P-2



84
74
Shepherds Flat Wind Farm
Wildlife Survey Sites
Facility Site
0
1.25
2.5
5 Miles
N

Figure P-3

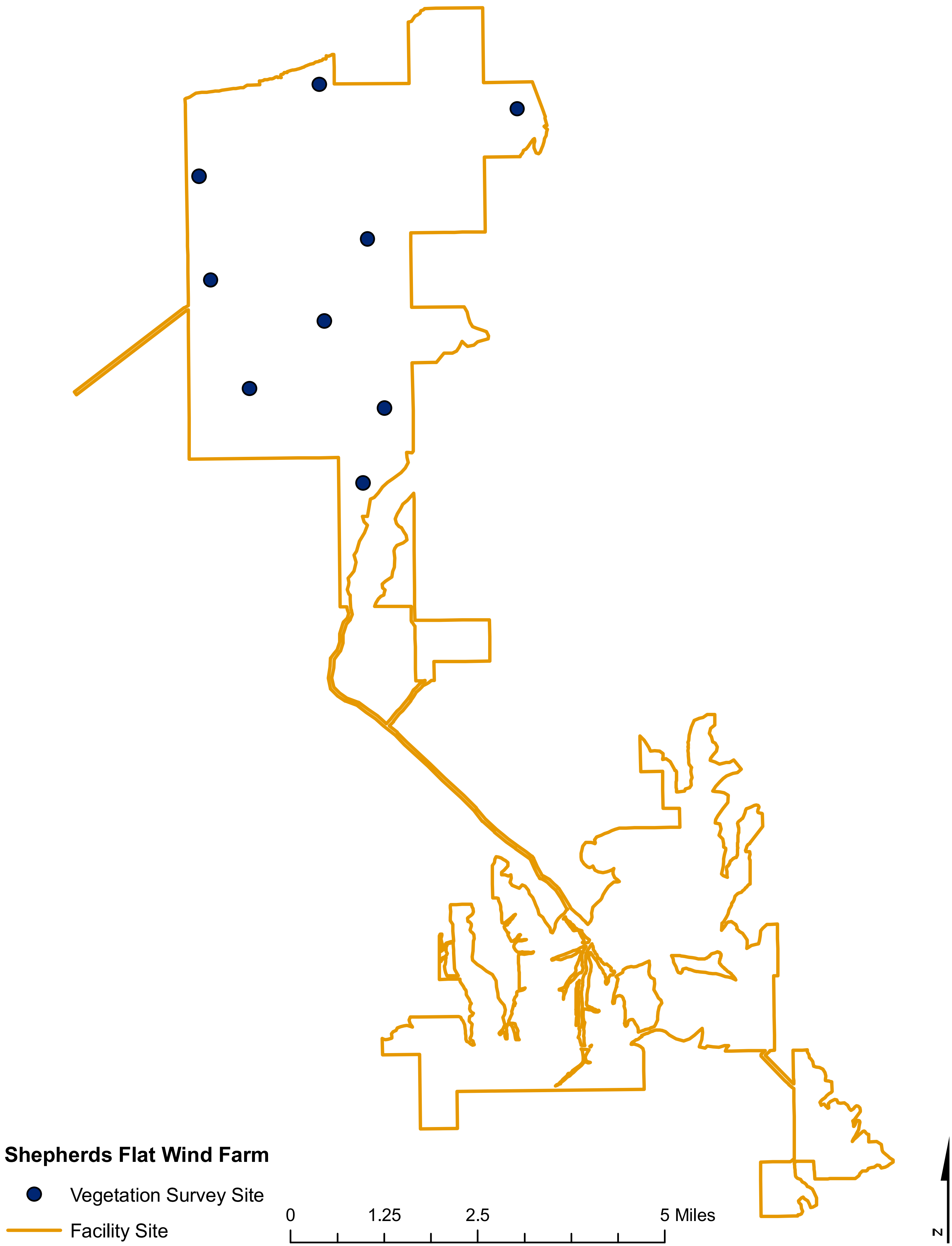

Shepherds Flat Wind Farm
Vegetation Survey Site
Facility Site
0
1.25
2.5
5 Miles
N

Figure P-4

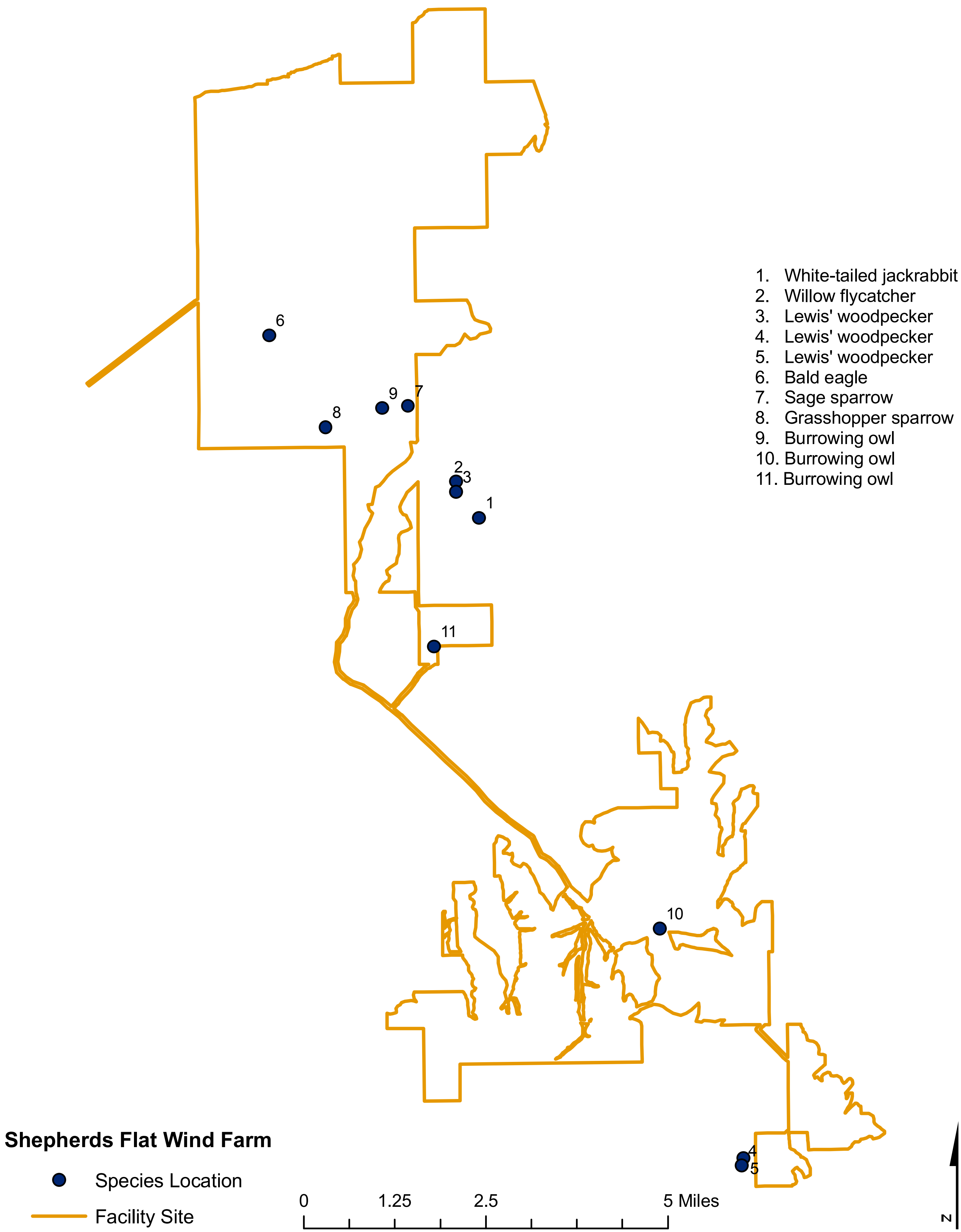
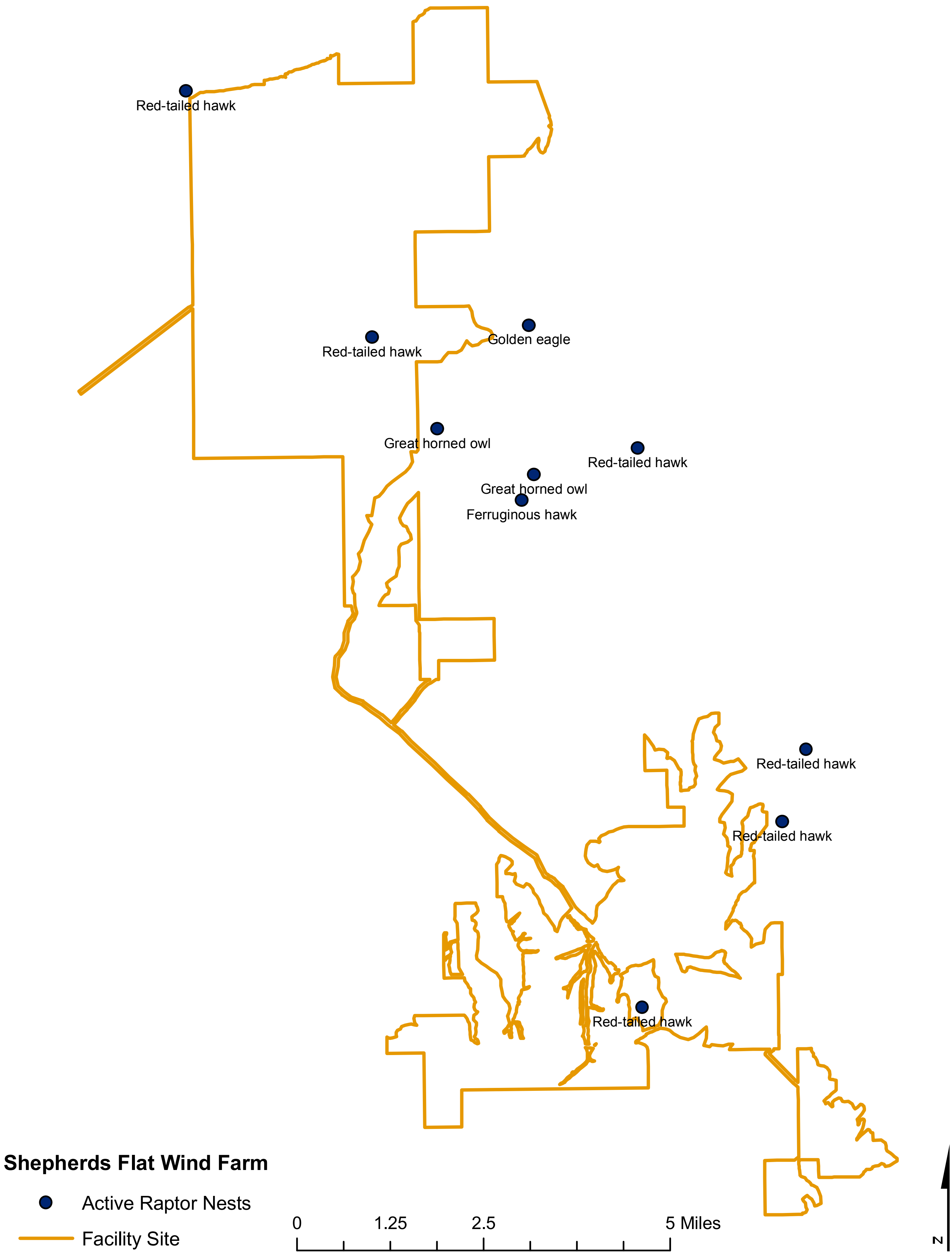

1. White-tailed jackrabbit
2. Willow flycatcher
3. Lewis' woodpecker
4. Lewis' woodpecker
5. Lewis' woodpecker
6. Bald eagle
7. Sage sparrow
8. Grasshopper sparrow
9. Burrowing owl
10. Burrowing owl
11. Burrowing owl
Shepherds Flat Wind Farm
Species Location
Facility Site
0
1.25
2.5
5 Miles
N

Figure P-5



Red-tailed hawk
Red-tailed hawk
Golden eagle
Great horned owl
Red-tailed hawk
Great horned owl
Ferruginous hawk
Red-tailed hawk
Red-tailed hawk
Red-tailed hawk
Shepherds Flat Wind Farm
Active Raptor Nests
Facility Site
0
1.25
2.5
5 Miles
N

Figure P-6a: Typical north layout

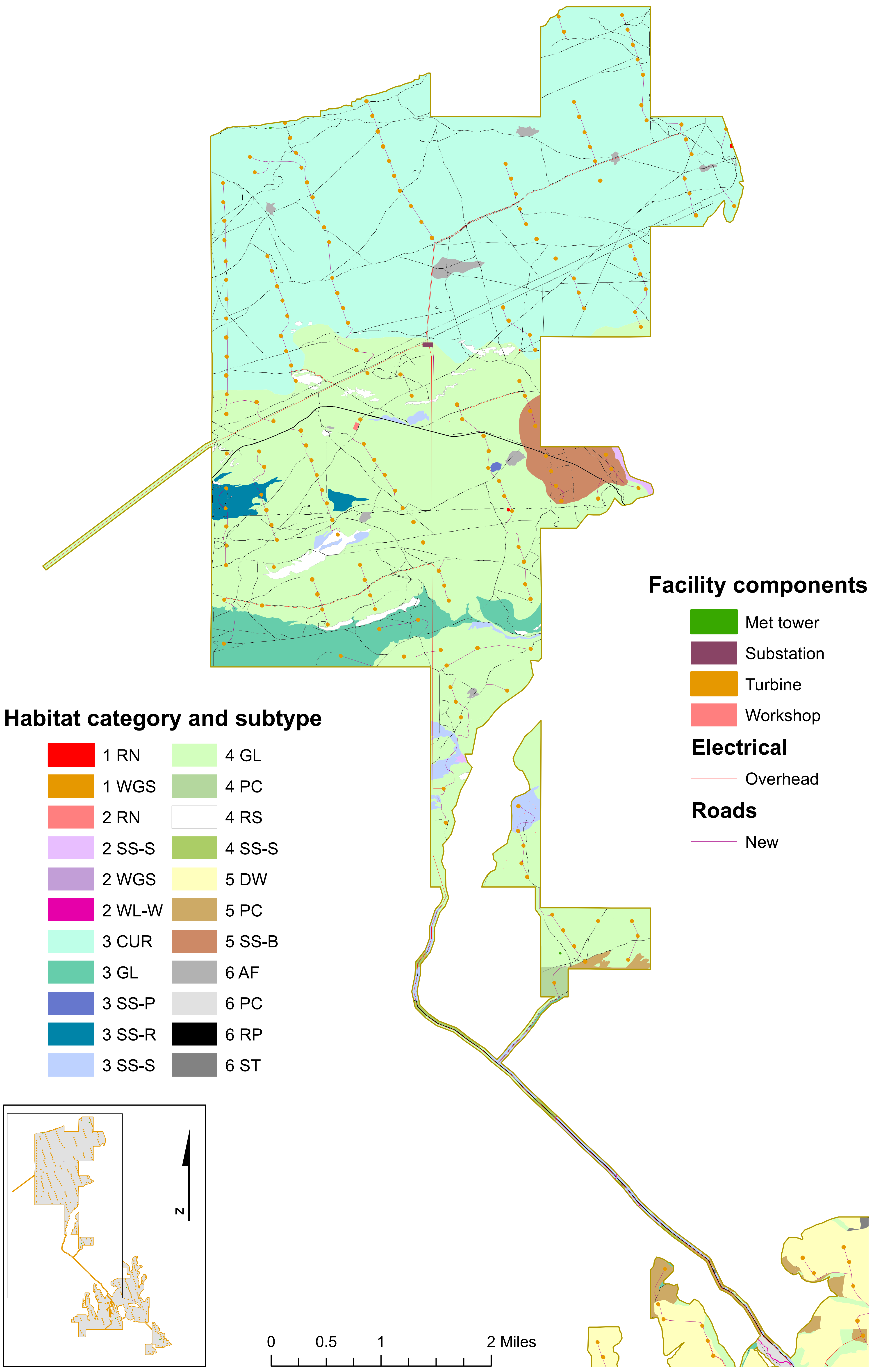


Figure P-6b: Typical south layout

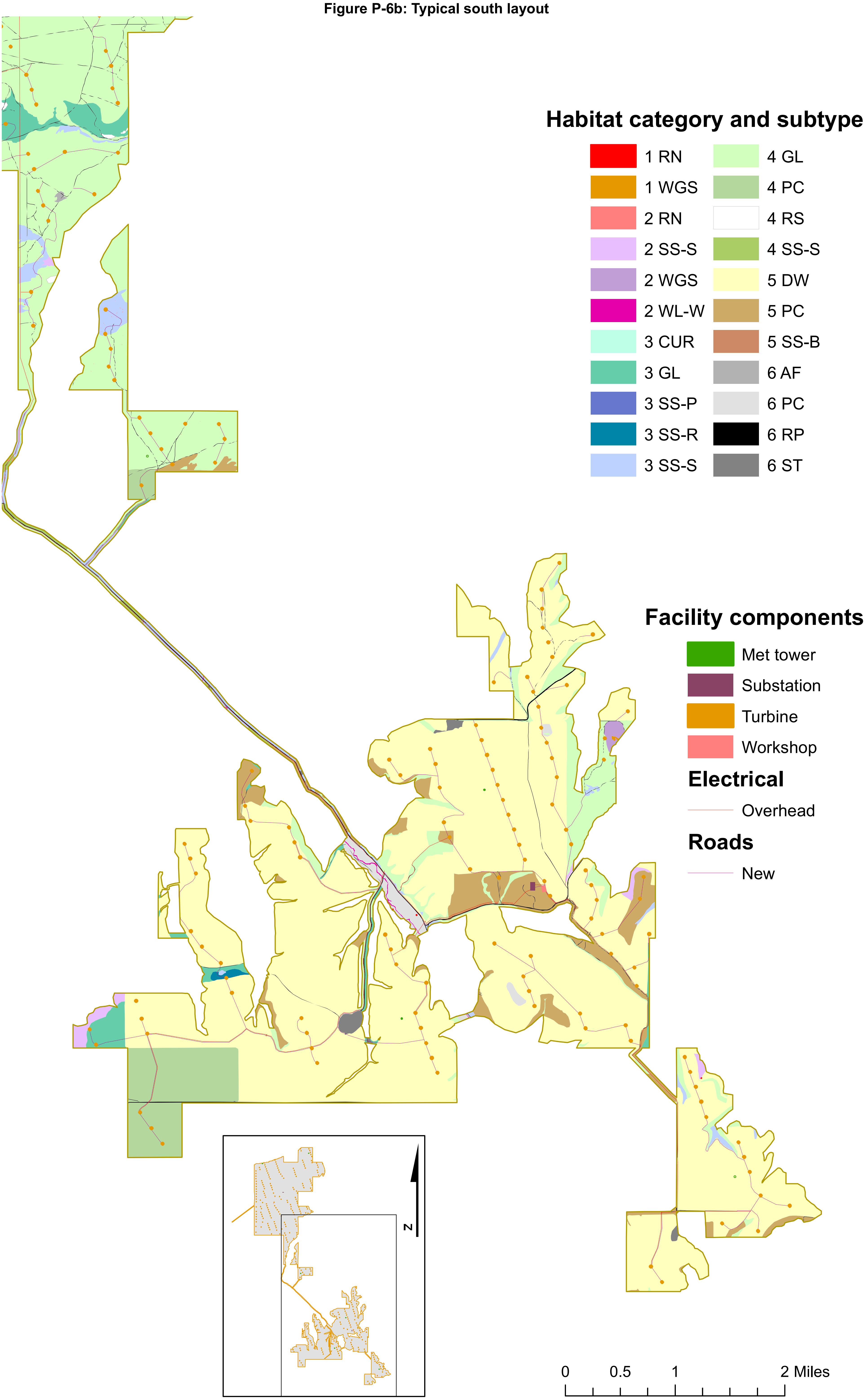


Figure P-7a: Worst-case north layout

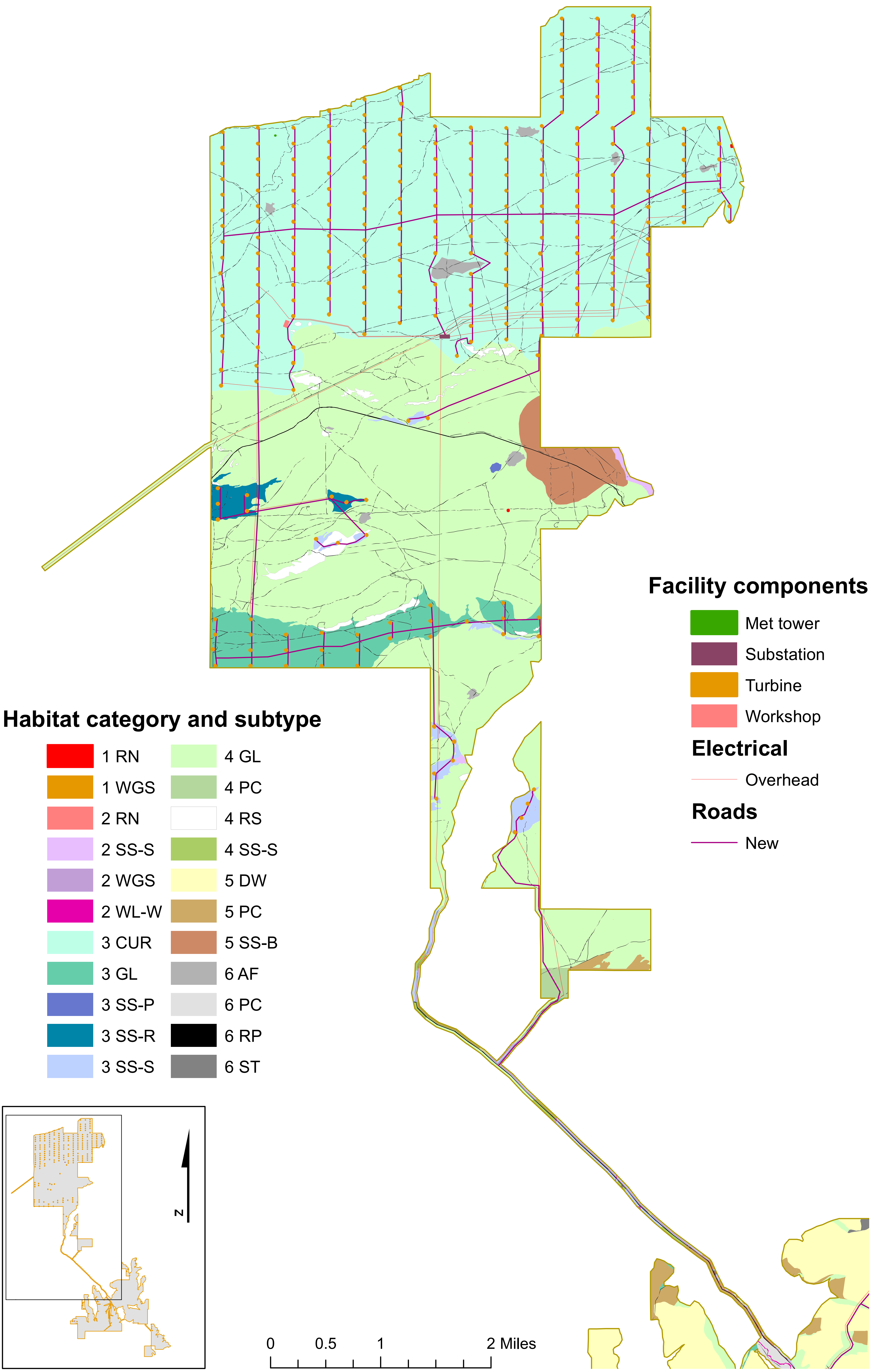


Figure P-7b: Worst-case south layout

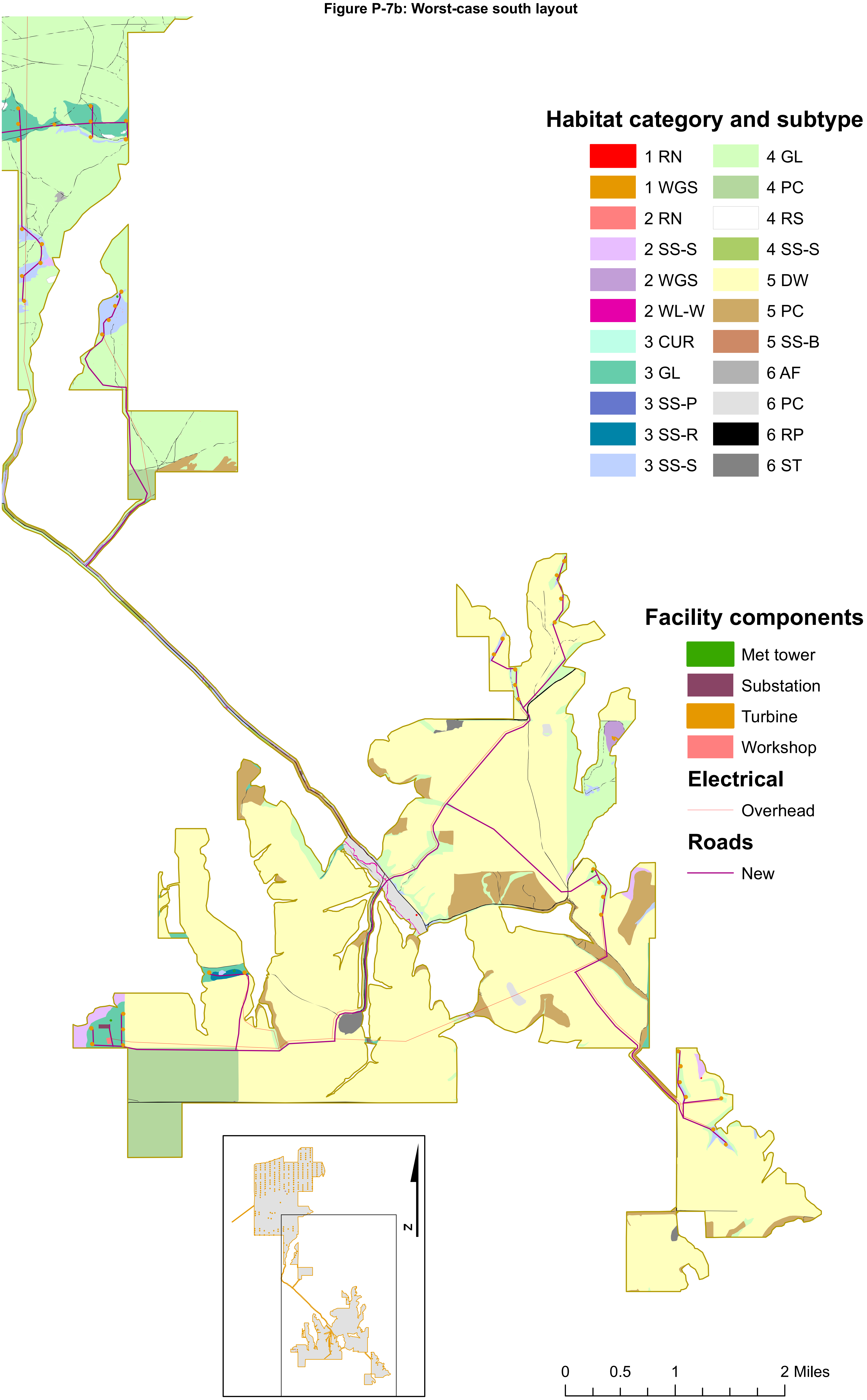


Figure P-8a: North construction exclusions

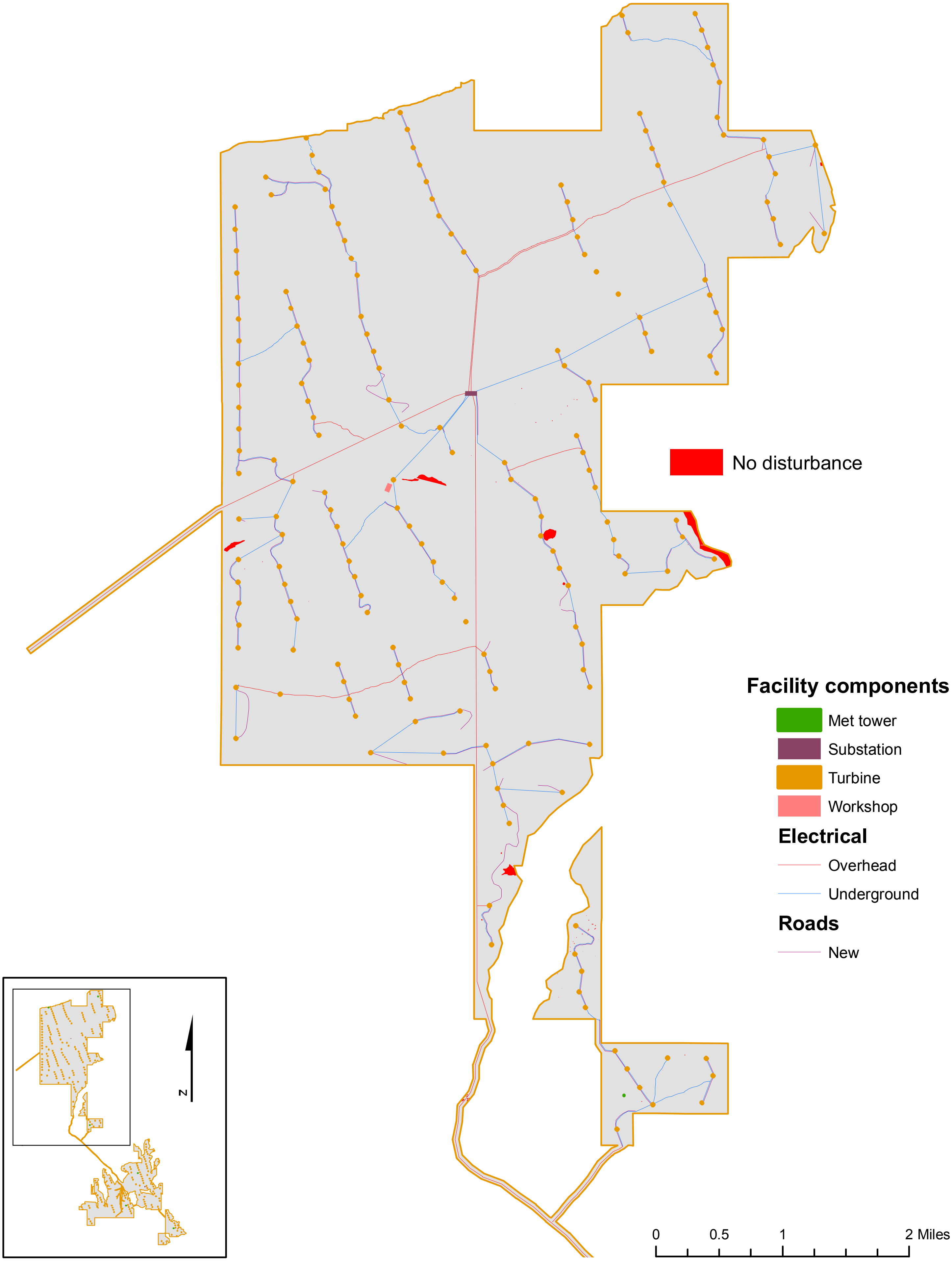


Figure P-8b: South construction exclusions

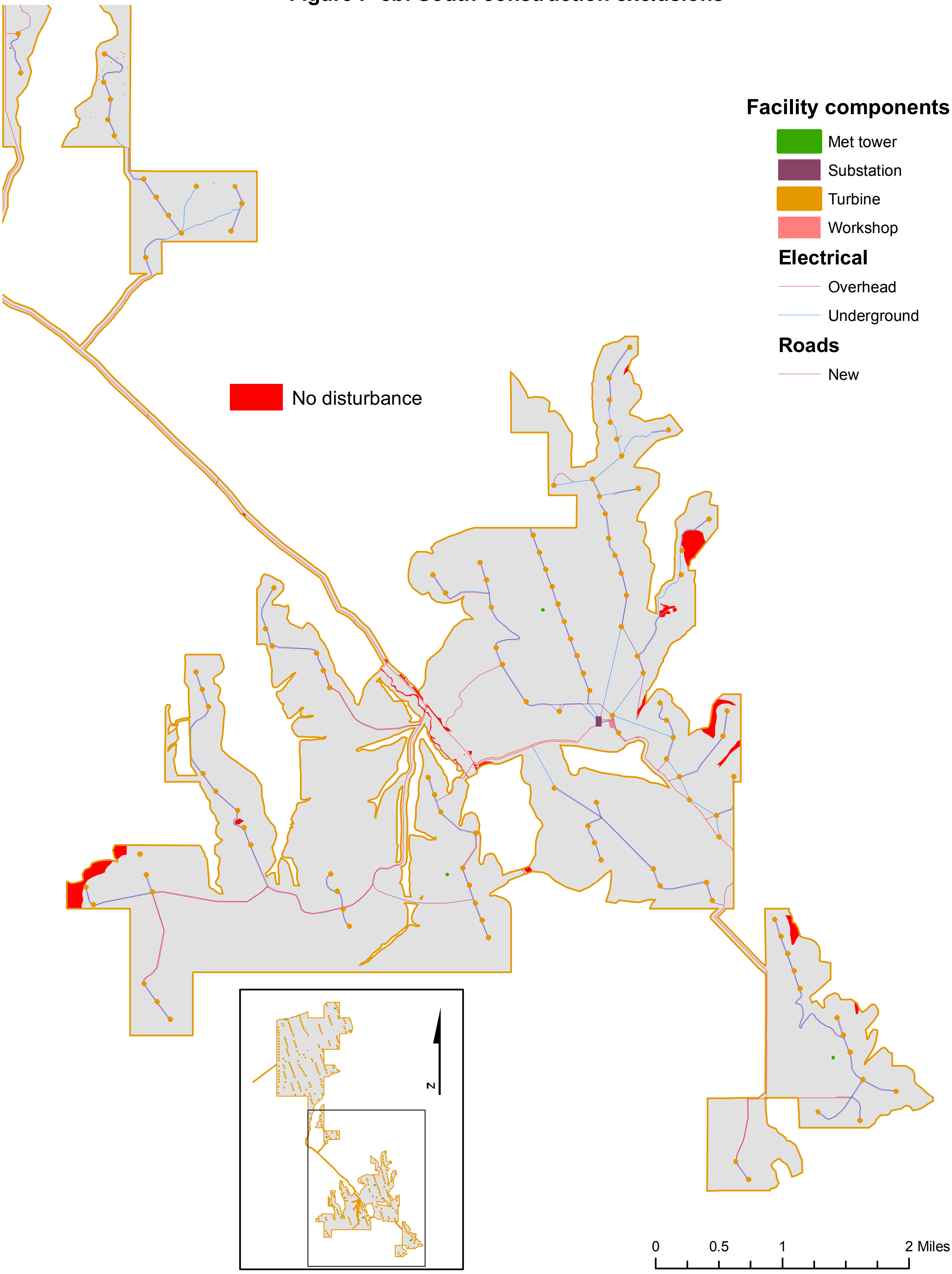


Figure P-9a: North construction corridors

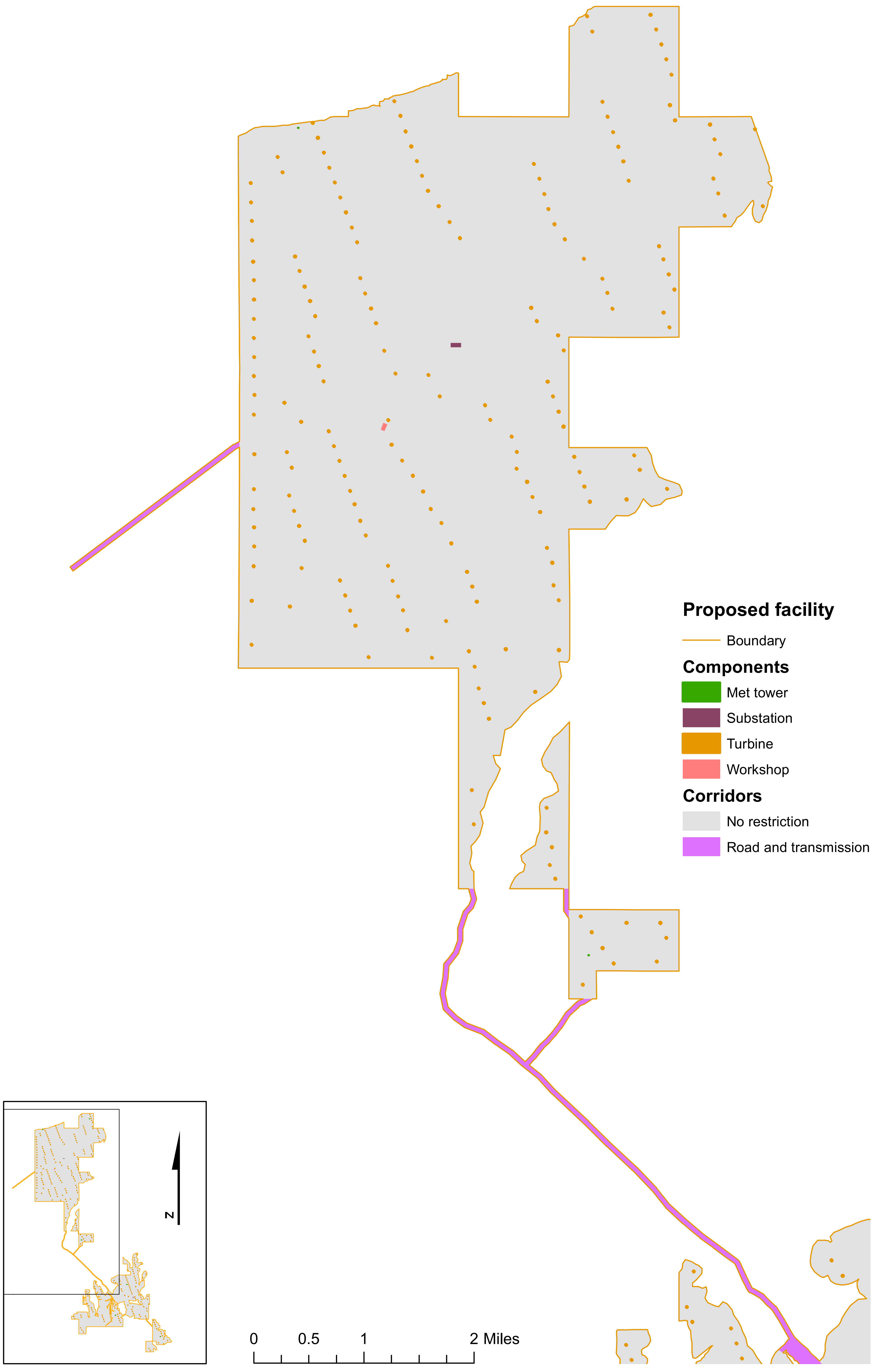


Figure P-9b: South construction corridors

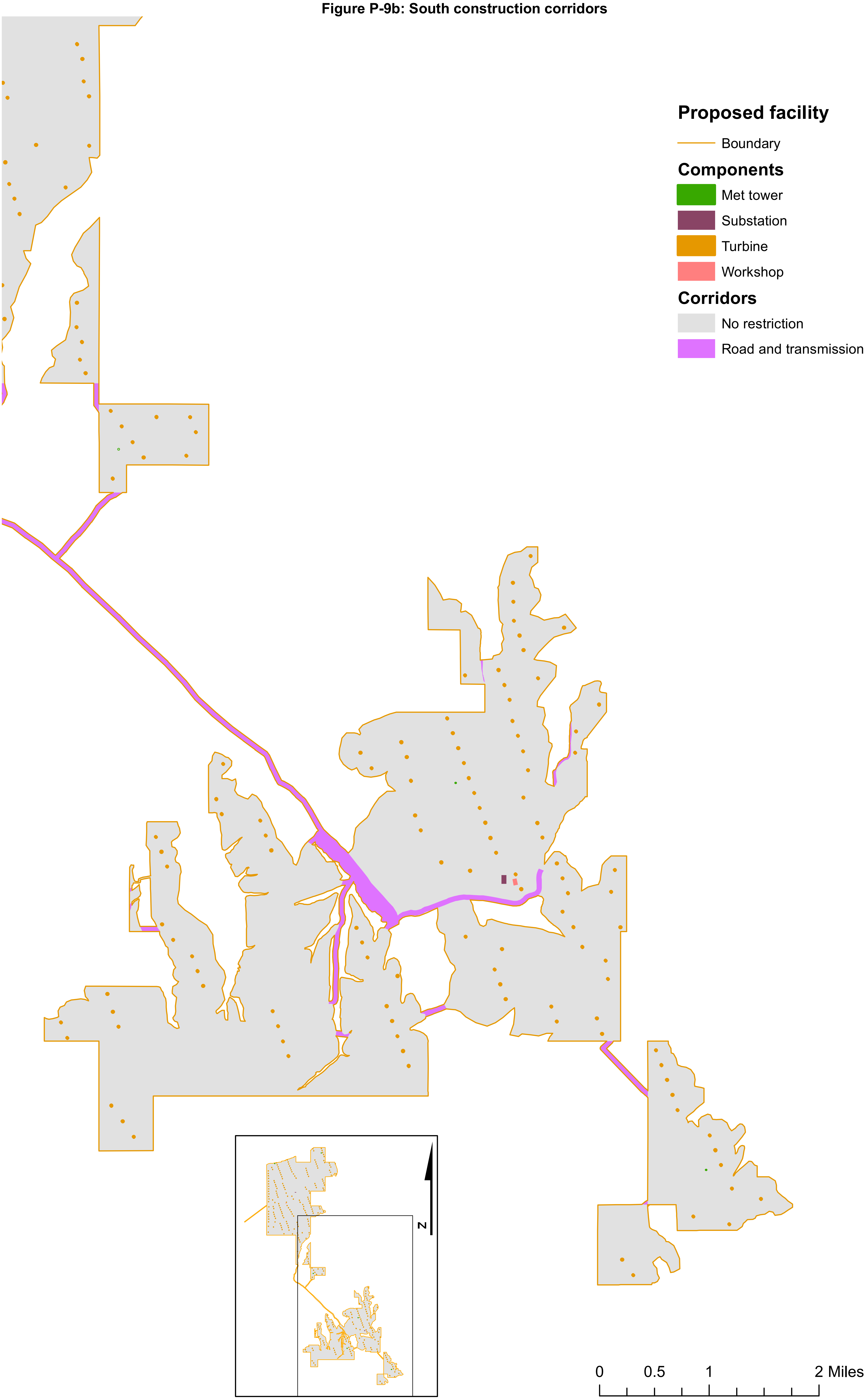


Figure P-10a: North rapter nests and curlew habitat

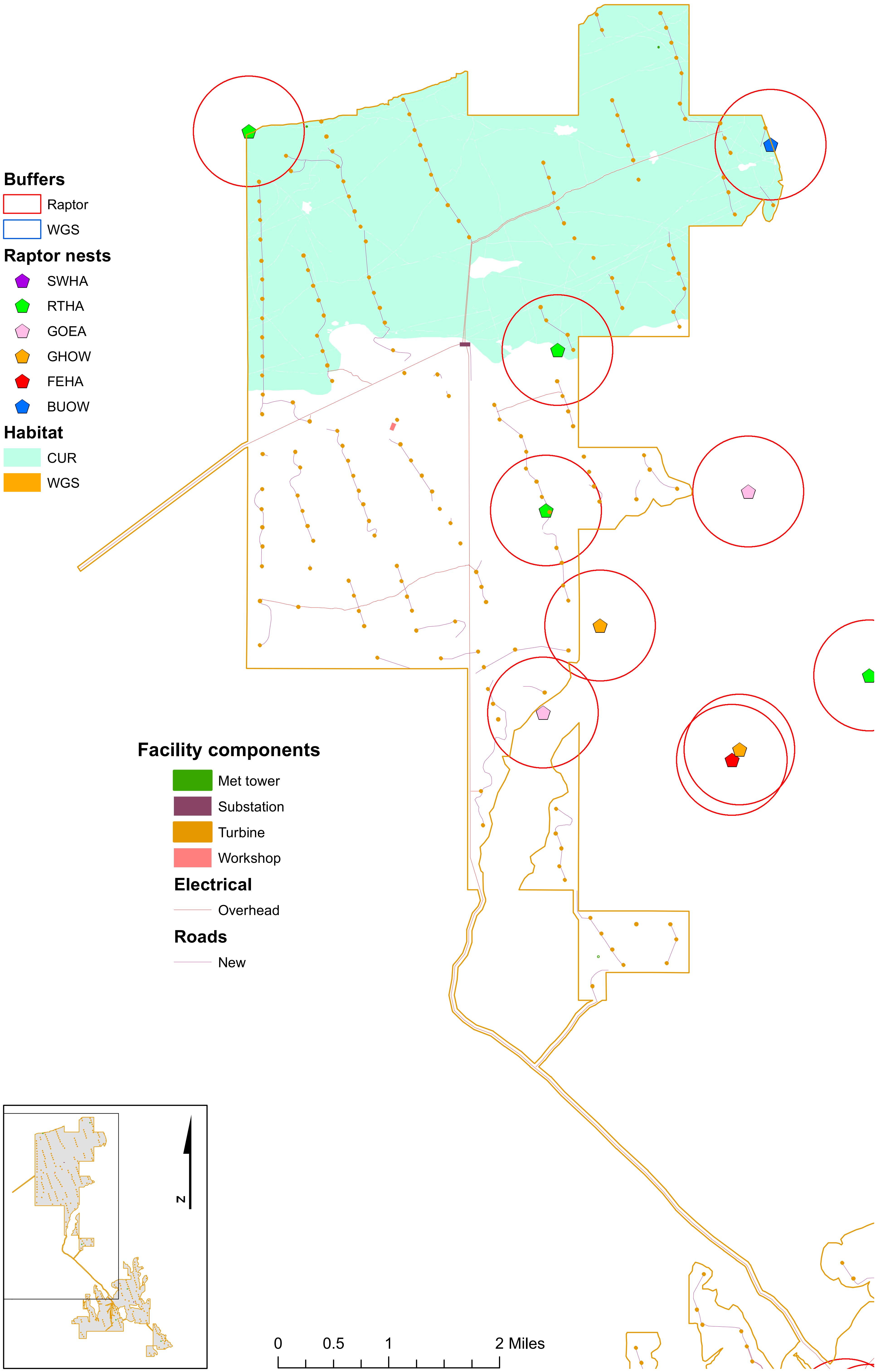
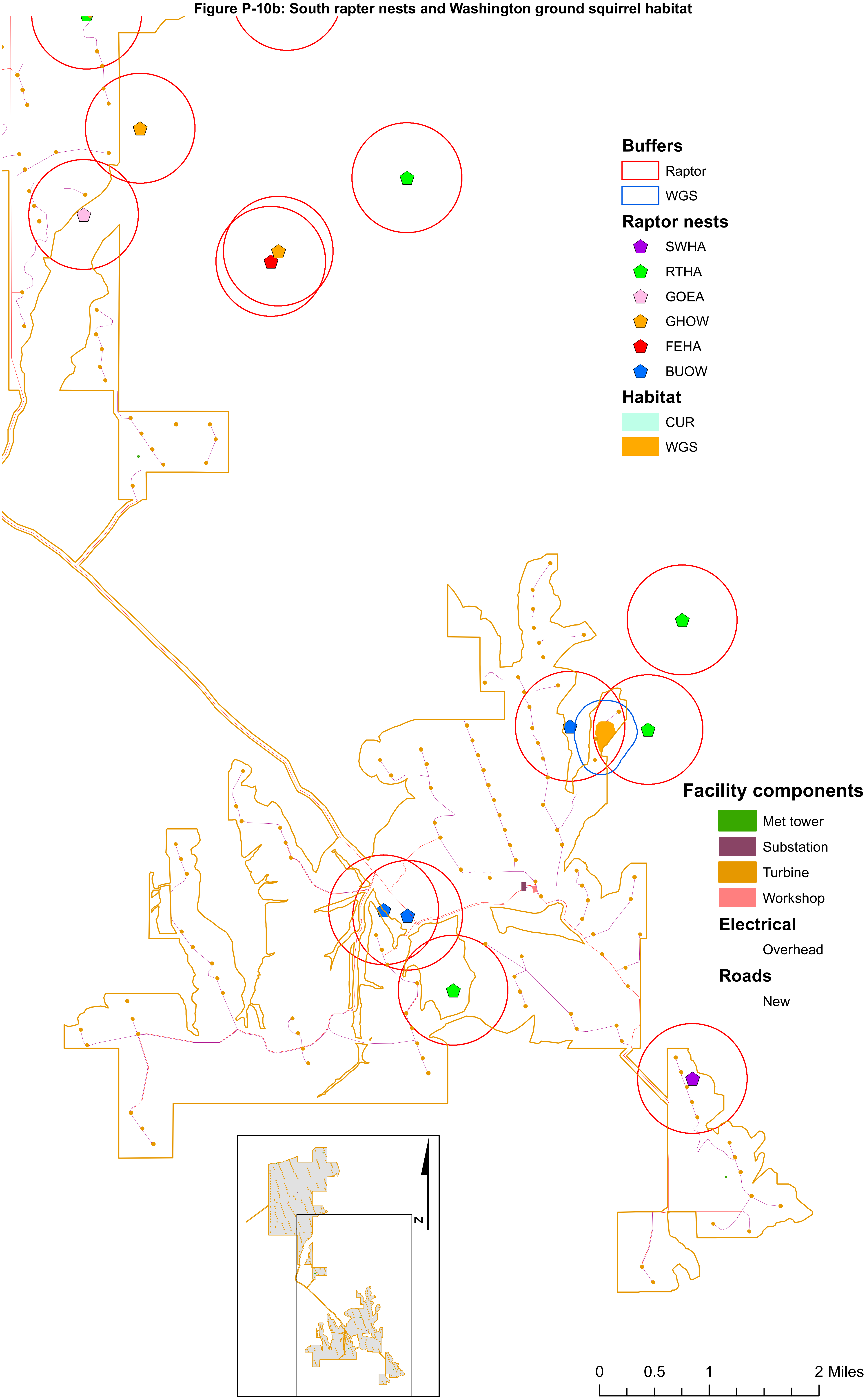
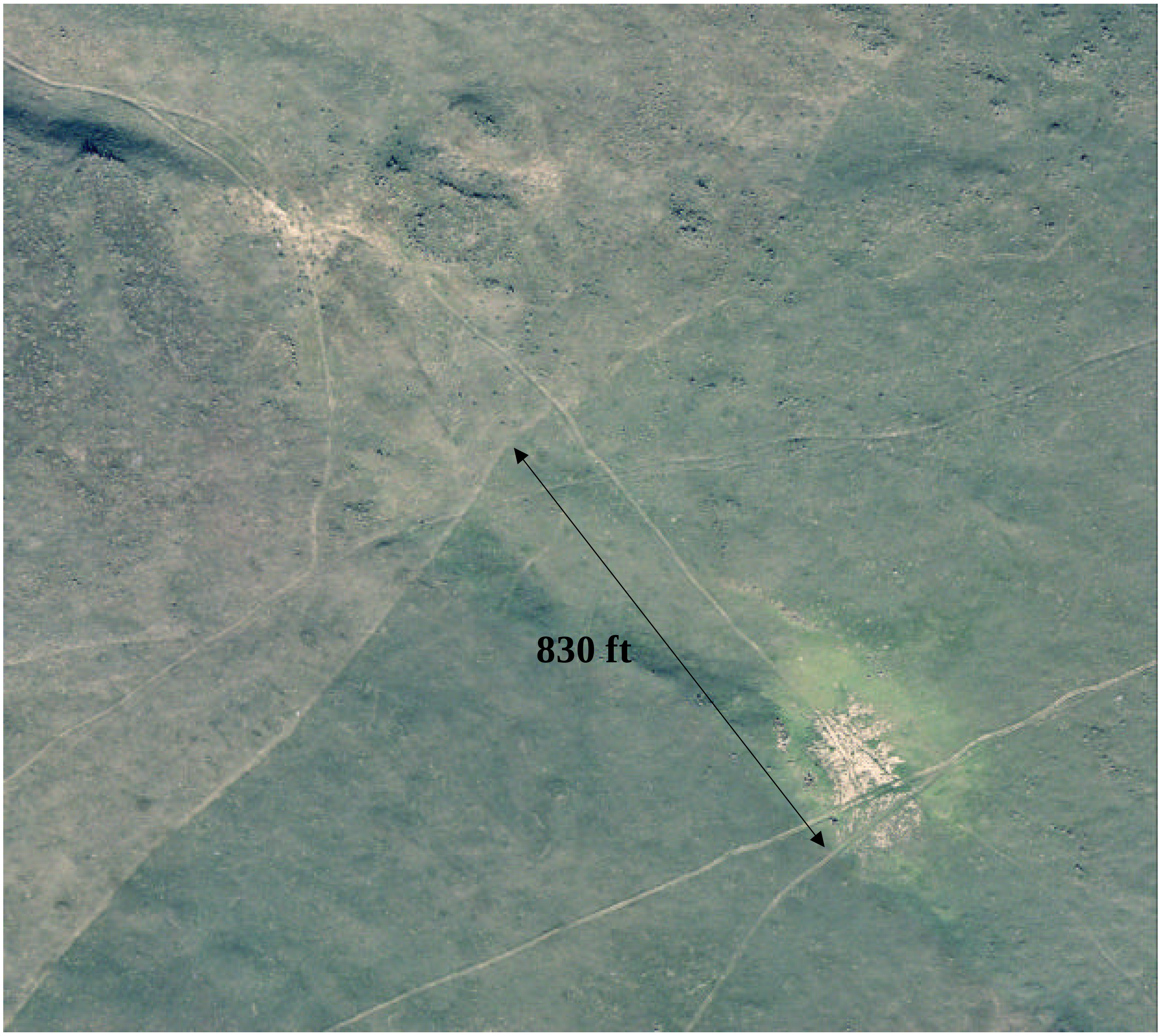
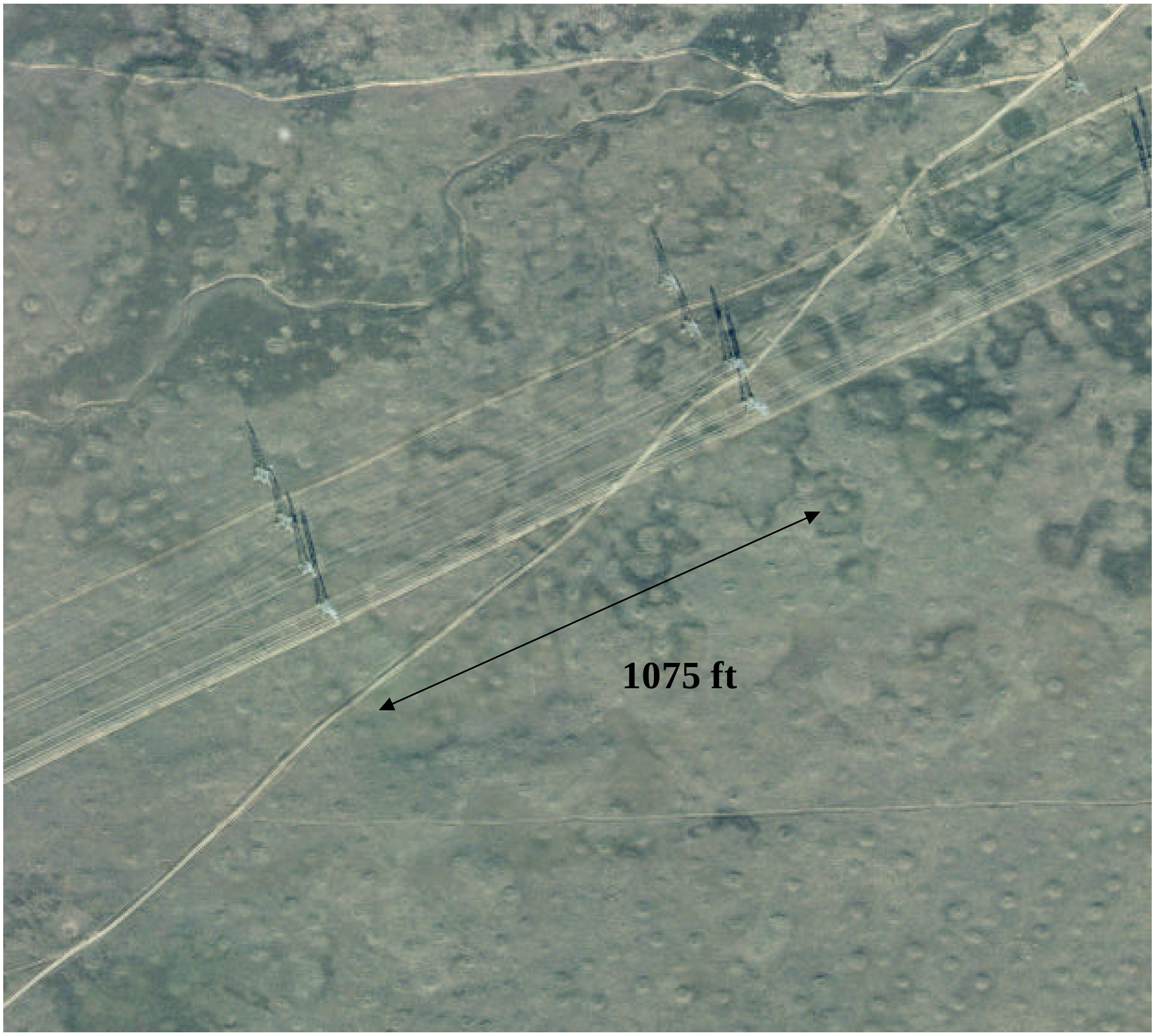


Figure P-10b: South rapter nests and Washington ground squirrel habitat

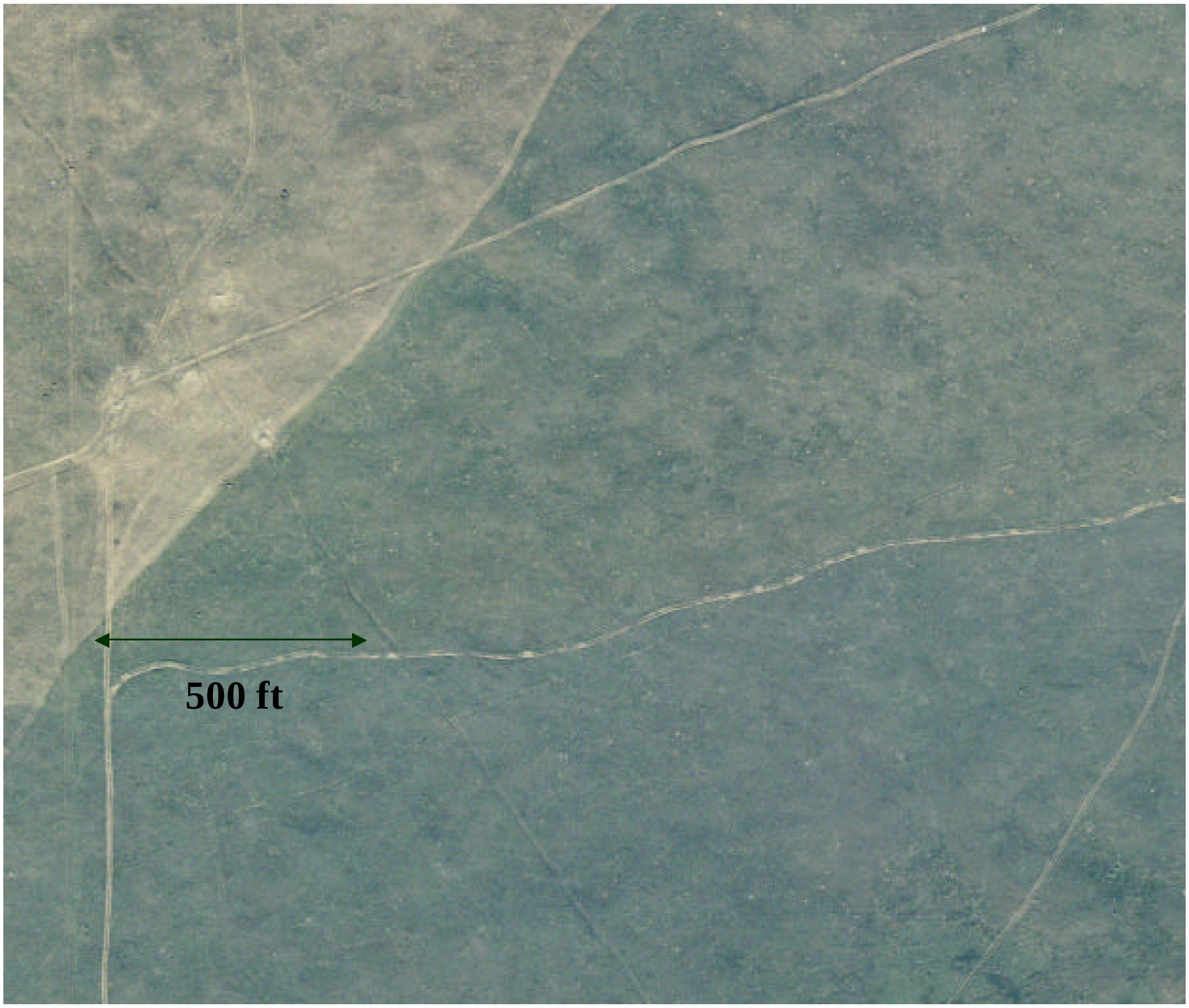




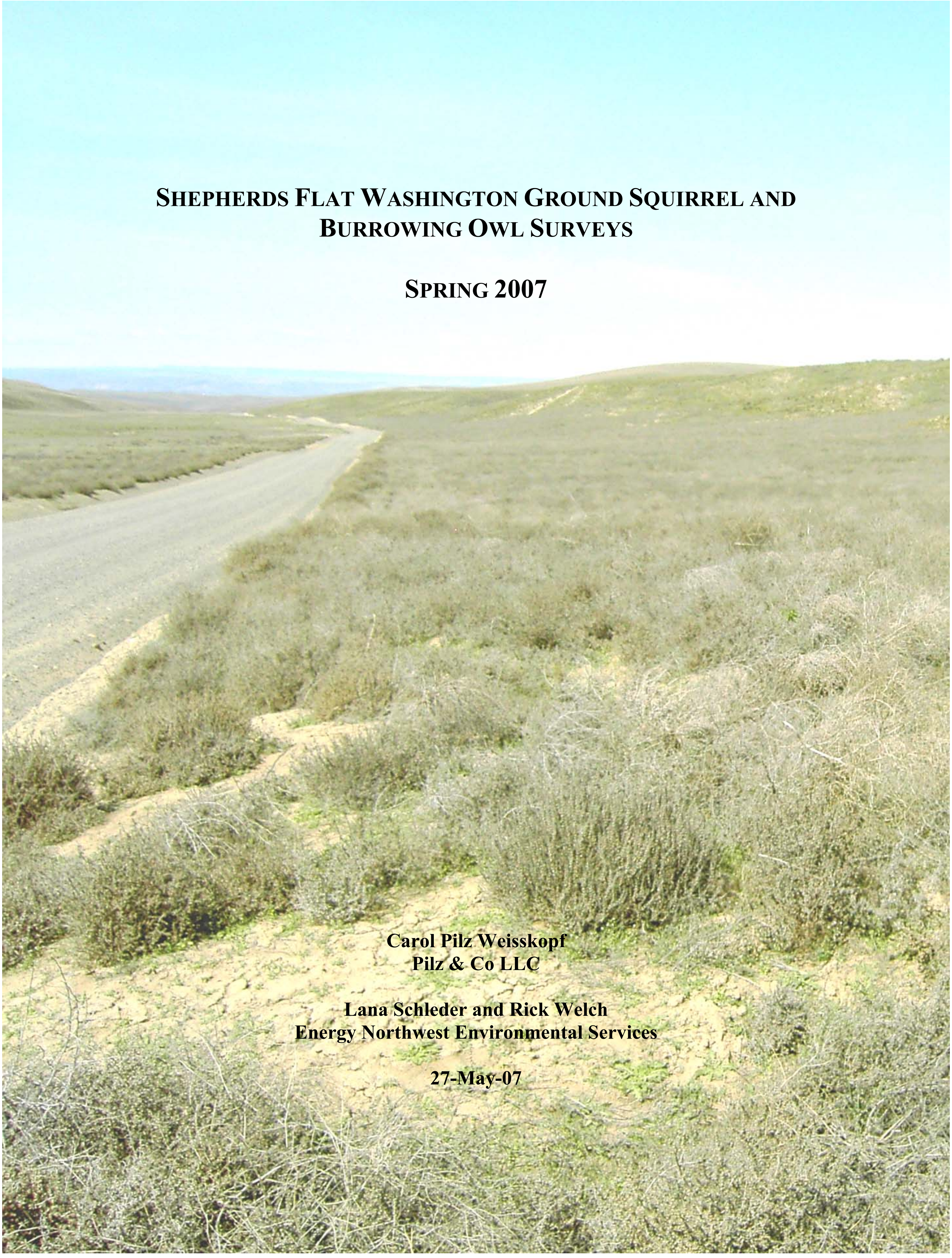
Photograph P-1: North site dirt roads at sheep station.



Photograph P-2: North site dirt roads at transmission lines.



Photograph P-3: North site dirt roads near met tower.



SHEPHERDS FLAT WASHINGTON GROUND SQUIRREL AND BURROWING OWL SURVEYS

SPRING 2007

Carol Pilz Weisskopf
Pilz & Co LLC

Lana Schleder and Rick Welch
Energy Northwest Environmental Services

27-May-07

INTRODUCTION

The Washington ground squirrel (*Spermophilus washingtoni*) is listed as endangered in Oregon and is also a candidate for federal listing. The squirrel is active only in the spring, and dormant in underground burrows the remaining seven to eight months of the year.[1] Observations of a Washington ground squirrel colony near the site of the Shepherds Flat Wind Farm (SFWF) by Energy Northwest (ENW) Environmental Services field biologists indicate the local squirrels become active approximately mid-March and remain active through May. This colony was used as a reference site to determine dates of squirrel activity, and as a training area for searchers.

During our planning for squirrel searches, the Oregon Department of Fish and Wildlife (ODFW) requested that surveys also be conducted on the SFWF site for the burrowing owl (*Speotyto cunicalaria*). This owl is listed as an Oregon state species of concern in the category of critical, but is not federally listed in Oregon. The squirrel and owl are both ground-dwelling species. Any burrowing owls using the SFWF site were expected to be present during the period ground squirrels were active, and the two surveys were combined.

Searches for both species generally involve looking and listening for signs of squirrel or owl activity (burrows, animals or warning noises) during transects of the site. Both subject species often stand at burrow openings watching searchers approach. Other than small birds hopping along the ground and an occasional disturbed rabbit, few other wildlife species in the SFWF area are active on the ground in the daytime.

METHODS

At the request of ODFW, the area under consideration for Washington ground squirrel surveys included a 1,000-foot buffer added outside of the site boundary. Within this total area, soil characteristics and use of the land were evaluated to develop the final survey area. Soil maps and descriptions of soil characteristics were obtained from the U.S. Department of Agriculture Natural Resources Conservation Service. Soils present within the site and buffer area were evaluated for suitability in Washington ground squirrel burrow construction, and the final list (Table 1) incorporated comments by ODFW. Unsuitable soil types, buildings, farmyards and fields under current or recent cultivation were mapped using ArcMap™ 9.2. ODFW received an outline of the ground squirrel search protocol, including distance between transects and inclusion of the 1,000-foot buffer. All areas other than unsuitable soils, buildings, farmyards and cultivated areas on the site or within the buffer were to be searched for squirrel and owl burrows.

Most property within the 1,000-foot buffer is owned by SFWF landlords. In the south project area, nearly all of the ravines and canyons removed from the original site boundary are within the Washington ground squirrel buffer and owned by SFWF landlords. For property in the buffer areas not owned by SFWF landlords, permission for searches was received from all but one landowner. According to that landowner, searches for Washington ground squirrels had already been performed on his land, and none had been found in the areas for which we sought permission. We refer the Siting Council to the Pebble Springs application for these data.

Searches began March 15 and ended May 23, 2007. Search teams were under the direction of ENW field biologists. Training of personnel unfamiliar with Washington ground squirrels, and review for those who were already familiar, took place at the location of the reference colony near the SFWF site. During searches, teams traversed parallel transects approximately 200 feet apart. The fidelity of transects was maintained using several methods depending on the locations at which searches occurred. Point-to-point

[1] U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form (October 11, 2005).

tracks using pre-entered GPS waypoints, tracing pre-entered GPS routes, tracking along visual cues such as fence lines, and GPS compass headings were all employed. Bluffs, cliffs, and slopes too steep to be scaled were carefully searched from above and/or below using binoculars. Remote portions of the site were accessed by road when it was possible, and by walking or by using all terrain vehicles when it was not. ENW field biologists confirmed all identifications of sensitive wildlife species.

Although areas of unsuitable soil were not scheduled to be searched, accessing locations between and beyond these soils resulted in transects of nearly all unsuitable soils in the search area. The foot of the basalt bluffs along the Columbia River at the project site's north boundary is off-site and considerably below the site elevation but is within the buffer. ODFW was consulted regarding the need to search off-site areas where ground squirrels would be separated from the site by elevation and rock wall barriers. ODFW's guidance resulted in performance of searches in those locations. Fortunately, the soils in the median and verges of Interstate 84 are unsuited for use by Washington ground squirrels, and they were not surveyed.

Areas that contained burrow openings that were of a size reasonably appropriate for squirrel or owl use, but with no sign of current squirrel or owl occupation, were examined and eliminated if tracks or scat indicated occupation by other species. The remainder were marked on a GPS and revisited on a different day and at a different time of day, and the searcher(s) were still and silent for at least 15 minutes. Occupied owl burrows were marked, the perimeter of occupied ground squirrel colonies was determined, and characteristics of the surrounding habitat noted. Burrow and colony locations were mapped in the GIS upon return from the field. Incidental observations of new raptor nests and encounters with white-tailed jackrabbits (*Lepus townsendii*) were also marked and mapped.

RESULTS

The project boundary encloses an area of approximately 35 square miles. Addition of the 1,000-foot buffer adds an additional 18 square miles to the evaluated area. After removal of unsuitable soils, cultivated areas, buildings and farmyards, the area searched on the site was 15.4 square miles, and the area searched within the buffer 10.4 square miles (40% of the total). Transect miles were not measured; at a transect spacing of 200 feet, 25.8 square miles require 650 miles of transects.

Washington ground squirrels

No Washington ground squirrels were found in the north project area (Figure 1). Although a substantial area of unsuitable soil was eliminated, in much of the remaining north search area basalt at the surface and in outcrops were nevertheless encountered. The south project area and vicinity contains the reference Washington ground squirrel site and five sites found in the course of searches. Of these, only one is included in Figure 2 as the remaining are off of the site and outside of the buffer.

The mapped Washington ground squirrel (WGS) colony complex consists of three areas of burrow entrances (Figure 2), one within the site boundary and two within the buffer. These are all on Ritzville silt loam soils, and the surrounding vegetation is scattered big sage (*Artemisia tridentata*) with significant bare ground, some Sandberg's bluegrass (*Poa secunda*), and an occasional broom snakeweed (*Gutierrezia sarothrae*). Cheatgrass (*Bromus tectorum*) is rare or absent.

The burrow entrances are in the open and not beneath the sage, and frequently occur on bare ground; all entrances are on a north-facing slope at the bottom of a ravine. A cattle path runs along the ravine bottom, and there are heavy deposits of manure along this path and on both sides of the ravine. The burrow entrances have substantial amounts of manure in their vicinity. The portion of this burrow complex on the project site contains fewer than 10 burrow entrances, and only two squirrels were observed. The squirrels were above ground and watching the searchers when initially observed, and did not enter their burrows until approached within 20 feet. The sage shrub steppe habitat (SS-S) in the vicinity of the colony was mapped as category 1 (1 WGS, Figure 3). The adjacent habitat type is grassland previously categorized as 4 GL, and now ranked as 2 WGS. The 2 WGS habitat is bordered to the west by an area of Gravden very gravely loam, which aside from a high rock content has a cemented pan at 10 – 20 inches. An existing farm road (6 RP) and the site boundary rims the remainder of the WGS habitat. A dryland wheat field (5 DW) is to the north. The 1 WGS habitat is approximately 100 feet lower than and 300 feet away from the closest part of the rocky soil. At its closest, the 1 WGS area is approximately 400 feet from the road and 700 feet from the wheat field.

The first of the unmapped colonies was encountered while searchers were in transit. It is located 1,760 feet from the closest site boundary and occupies both sides of a roadway to the southeast of the south project area. The colony complex occupies Ritzville silt loam soils. On the north side of the road, burrows are on a hillside facing to the south. The surrounding vegetation is predominantly native species, and includes Sandberg's bluegrass, an occasional gray rabbitbrush (*Ericameria nauseosa*) and broom snakeweed, and significant areas of bare soil. Part of this colony complex occupies a bare soil cut, and the bench above it also contains burrow openings. Several adults and young were observed. Below this bank the soil is Lickskillet stony loam, and there are no burrow openings evident. On the south side of the road the complex continues in a narrow band of nearly level Ritzville silt loam soil along the road. Some big sage and native grasses are present, and substantial areas of bare soil. Cheatgrass is rare or absent on both sides of the road. No squirrels were observed south of the road, but searchers may have been too close to the burrows. No squirrels were observed north of the road until the searchers had remained still and silent for at least 15 minutes, and searcher movement resulted in disappearance of the squirrels. The area shows evidence of cattle grazing, including manure and cropped vegetation.

The second of the unmapped colonies was identified in transit, 1,090 feet from the nearest site boundary and east of the south project area. It occupies Ritzville silt loam soils, and occurs in a narrow band one burrow-entrance wide approximately 5 to 8 feet away from and parallel to a fence line. The line of burrows extends for nearly ¼ mile. The vegetation is grass with no bare soil, very green, very closely cropped by cattle, and without seed heads or other characteristics useful for identification of the grass species. The cattle grazing the field have browsed heavily along the fence line, resulting in an area of very short grasses and high manure loads in the area of the burrow entrances. The squirrels were seen from the vehicle transporting searchers, and observed less than 5 minutes after stopping. The squirrels did not allow searchers to approach within 20 feet before returning to their burrows.

The third unmapped colony was encountered while on foot between survey locations. It is 1,210 feet from the nearest site boundary, to the east of the south project area, and surrounded by dryland wheat. It occupies Ritzville silt loam, and is located in a patch of very green, short-cropped and unidentified grass, and is overlain by cattle manure. Less than 10 burrow openings were observed, and one young and one adult squirrel were seen. These were evident within 5 minutes after the searcher located the site and stood still and quiet, but the squirrels did not remain above ground when approached closer than 20 feet.

The fourth unmapped colony was discovered on the last day of searches, while traveling a roadway to the west of the south project site. The colony is in Eightmile canyon, and is approximately 3,900 feet from the closest site boundary. The extent of the colony was not determined, but its characteristics were examined from the road. The complex appears to be quite large and active, with burrow openings in a cut bank and on both the slope above and flat area below. A large number of cow and calf pairs occupy the site, and the flat area has patches of bare soil, close-cropped grass and manure. The hillside vegetation includes some sage, native and alien grasses and broom snakeweed, and the site is on Warden silt loam.

The reference Washington ground squirrel complex is located 2,700 feet from the nearest site boundary and to the east of the south project area, on Warden very fine sandy loam. An extensive complex, it occupies very green, very short grassland with high manure loads, and it is near a cattle watering and feeding station. These squirrels are numerous, easily seen, and allow approach to within 10 feet before returning to their burrows.

Of the six Washington ground squirrel colonies or colony complexes discussed, four are within Willow Creek Valley, one is less than 2 miles from Willow Creek in a canyon leading into the Willow Creek Valley, and one is in Eightmile Canyon. All six sites are used by cattle, and five show signs of heavy grazing (and significant manure deposition). Four have vegetation unusual to encounter in the arid project region this time of year, and distinct from surrounding areas – very green, very dense grass spacing, very closely cropped and heavily manured. These Washington ground squirrel burrow entrances were as diagnostic as cups in a putting green, and as easy to discern.

Burrowing owls

Four occupied burrowing owl (BUOW) burrows were located – one in the north project area and three in the south project area (Figures 1 and 2). The burrow in the north is on the project site between a fence line and State Route 74. Accumulations of tumbleweed (*Salsola kali*) along the fence were burned by a road crew in late March. The area immediately surrounding the burrow is currently bare ground covered by ashes and burnt stems. Two of the south project owl burrows are on the project site in Fourmile Canyon, in an area that had previously been cultivated but is now fallow and covered by tumblemustard (*Sisymbrium altissimum*) and tumbleweed. The remaining owl burrow in the south project area is off of the site but within the buffer, on a grassy hillside.

Incidental observations

Sightings of white-tailed jackrabbits and active raptor nests were marked and mapped. Seven white-tailed jackrabbits (WTJR) were observed in the north project area (Figure 1) and none were observed in the south project area. Since this species is nocturnal, and is typically observed in the daytime only when a searcher is within 5 feet and disturbs them, the number observed are assumed to be a fraction of those occupying the site. We suspect the number of white-tailed jackrabbits in the northern project area approaches the number that can be supported by available food resources. They may be kept somewhat in check by the coyotes and sheepdogs also prevalent in the north project area. Although no white-tailed jackrabbits were observed in the south project area, we assume some occur there. The south project area contains limited jackrabbit food resources, as most of this area is fallow or planted in dryland wheat.

Three active raptor nests that had not previously been recorded were observed during the surveys: two in the north project area and one in the south (Figures 1 and 2). The north project observations included a red-tailed hawk nest (*Buteo jamaicensis,* RTHA) in a juniper (*Juniperus occidentalis*) within the site boundary and a golden eagle nest (*Aquila chrysaetos*, GOEA) on a basalt ledge in the buffer. In the south, there was one surprising observation within the site boundary: a Swainson's hawk nest (*Buteo swainsoni*, SWHA) on bare ground surrounded by dried tumbleweed – an indication of the scarcity of raptor-appropriate nesting opportunities in the project area.

Table 1: Soils found within the SFWF site and buffer (From the USDA Natural Resources Conservation Service)

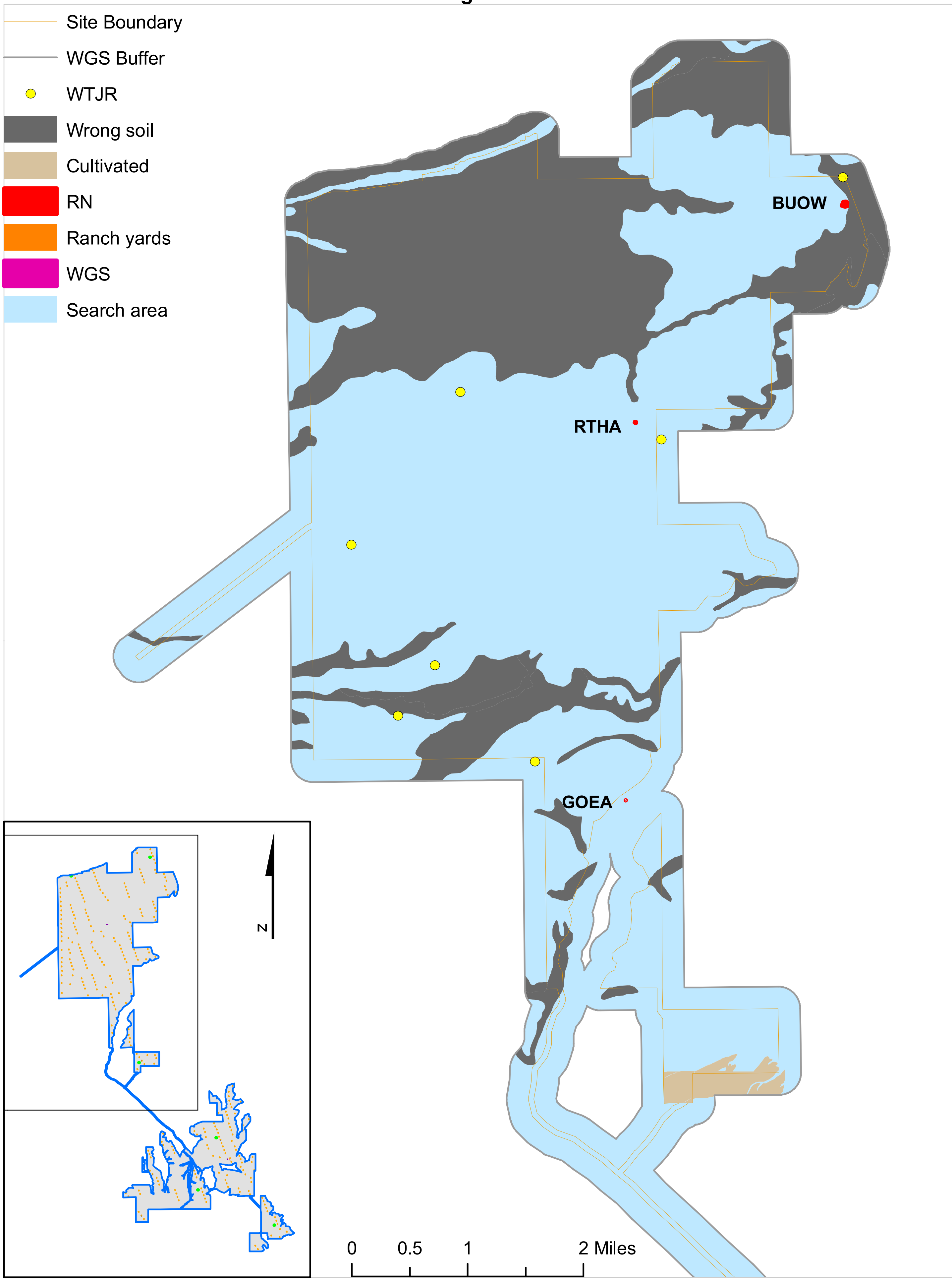
County	Code	Key	Survey?	Soil	Description
Gilliam	13	61036	Yes	Kimberly fine sandy loam	The Kimberly soil is over 60 inches deep to bedrock. It is loamy, well drained and occurs on floodplains. This soil is subject to flooding. Wind erosion is a potential hazard.
Gilliam	14B	61037	Yes	Krebbs silt loam	The Krebs soil is 40 to 60 inches deep to bedrock. It is clayey, well drained and occurs on mountains. Permeability is slow. Water erosion is a potential hazard.
Gilliam	14D	61038	Yes	Krebbs silt loam	The Krebs soil is 40 to 60 inches deep to bedrock. It is clayey, well drained and occurs on mountains. Permeability is slow. Water erosion is a potential hazard.
Gilliam	15E	61040	No	Lickskillet very stony loam	The Lickskillet soil, stony phase, is 12 to 20 inches deep to bedrock. It is loamy, high in rock fragments, well drained and occurs on plateaus. Water erosion is a potential hazard.
Gilliam	22F	61053	Yes	Nansene silt loam	The Nansene soil is over 60 inches deep to bedrock. It is silty, well drained and occurs on plateaus and mountains. Water erosion is a potential hazard.
Gilliam	23B	61054	Yes	Olex silt loam	The Olex soil is over 60 inches deep to bedrock. It is loamy, high in rock fragments, well drained and occurs on plateaus and mountains. Water erosion is a potential hazard.
Gilliam	23D	61056	Yes	Olex silt loam	
Gilliam	24D	61057	No	Olex gravelly silt loam	
Gilliam	24E	61058	No	Olex gravelly silt loam	
Gilliam	25D	61059	Yes	Olex-Roloff complex	
Gilliam	29D	61063	No	Quincy-Rock outcrop complex	The Quincy soil is over 60 inches deep to bedrock. It is sandy, excessively drained and occurs on terraces. Permeability is rapid. Wind erosion is a potential hazard. Rock outcrop consists of exposures of bare, hard bedrock other than lava flows and rock-lined pits. They consist mainly of unweathered volcanic, metamorphic or sedimentary rock. Rock outcrop has little or no vegetation.
Gilliam	32B	61074	Yes	Ritzville silt loam	The Ritzville soil is over 60 inches deep to bedrock. It is silty, well drained and occurs plateaus and mountains. Water erosion is a potential hazard.
Gilliam	32C	61075	Yes	Ritzville silt loam	
Gilliam	32D	61076	Yes	Ritzville silt loam	
Gilliam	33E	61077	Yes	Ritzville silt loam	
Gilliam	34E	61078	Yes	Ritzville silt loam	
Gilliam	38A	61082	Yes	Roloff silt loam	The Roloff soil is 20 to 40 inches deep to bedrock. It is loamy, well drained and occurs on plateaus and mountains. Water erosion is a potential hazard.
Gilliam	38B	61083	Yes	Roloff silt loam	

County	Code	Key	Survey?	Soil	Description
Gilliam	39D	61085	No	Roloff-Rock outctop complex	The Roloff soil is 20 to 40 inches deep to bedrock. It is loamy, well drained and occurs on plateaus and mountains. Water erosion is a potential hazard. Rock outcrop consists of exposures of bare, hard bedrock other than lava flows and rock-lined pits. They consist mainly of unweathered volcanic, metamorphic or sedimentary rock. Rock outcrop has little or no vegetation.
Gilliam	40B	61087	Yes	Sagehill fine sandy loam	The Sagehill soil is over 60 inches deep to bedrock. It is loamy, well drained and occurs on terraces. Water and wind erosion are potential hazards.
Gilliam	40C	61088	Yes	Sagehill fine sandy loam	
Gilliam	40D	61089	Yes	Sagehill fine sandy loam	
Gilliam	40E	61090	Yes	Sagehill fine sandy loam	
Gilliam	41B	61091	Yes	Sagehill fine sandy loam	
Gilliam	41C	61092	Yes	Sagehill fine sandy loam	
Gilliam	44	61096	Yes	Stanfield fine sandy loam	The Stanfield soil is over 60 inches deep to bedrock, a cemented pan is at 20 to 40 inches. It is silty, moderately well drained and occurs on terraces. This soil is alkaline. A water table is present during the late winter, spring and early summer. Wind erosion is a potential hazard.
Gilliam	45B	61097	Yes	Taunton loamy fine sand	The Taunton soil is over 60 inches deep to bedrock, a cemented pan is at 20 to 40 inches, It is loamy, well drained and occurs on terraces and plateaus. Water and wind erosion are potential hazards.
Gilliam	4C	61105	Yes	Blalock loam	The Blalock soil is 40 to 60 inches deep to bedrock, a cemented pan is at 10 to 20 inches. It is loamy, well drained and occurs on plateaus. Water erosion is a potential hazard.
Gilliam	55B	61113	Yes	Warden silt loam	The Warden soil is over 60 inches deep to bedrock. It is silty, well drained and occurs on terraces. The soil is alkaline. Water and wind erosion are potential hazards.
Gilliam	55C	61114	Yes	Warden silt loam	
Gilliam	55D	61115	Yes	Warden silt loam	
Gilliam	55E	61116	Yes	Warden silt loam	
Gilliam	56B	61117	Yes	Willis silt loam	The Willis soil is 40 to over 60 inches deep to bedrock, a cemented pan is at 20 to 40 inches. It is silty, well drained and occurs on plateaus. Water and wind erosion are potential hazards.
Gilliam	56D	61119	Yes	Willis silt loam	
Gilliam	58	61122	Yes	Xeric torrifluvents	Xeric Torrifluvents are over 60 inches deep to bedrock. They are loamy and sandy, somewhat excessively drained and occur on floodplains. Permeability is rapid. This soil is subject to flooding. Wind erosion is a potential hazard.
Gilliam	W	61131	No	Water	

County	Code	Key	Survey?	Soil	Description
Morrow	12	61282	Yes	Esquatzel silt loam	The Esquatzel soil is over 60 inches deep to bedrock. It is silty, well drained and occurs on floodplains. This soil is subject to flooding. Wind erosion is a potential hazard.
Morrow	13D	61283	No	Gravden very gravely loam	The Gravden soil is over 60 inches deep to bedrock, a cemented pan is at 10 to 20 inches. It is loamy, high in rock fragments, well drained and occurs on terraces. Water erosion is a potential hazard.
Morrow	13E	61284	No	Gravden very gravely loam	
Morrow	22	61297	Yes	Kimberly fine sandy loam	The Kimberly soil is over 60 inches deep to bedrock. It is loamy, well drained and occurs on floodplains. This soil is subject to flooding. Wind erosion is a potential hazard.
Morrow	28E	61306	No	Lickskillet very stony loam	The Lickskillet soil, stony phase, is 12 to 20 inches deep to bedrock. It is loamy, high in rock fragments, well drained and occurs on plateaus. Water erosion is a potential hazard.
Morrow	29F	61307	No	Lickskillet-Rock outcrop complex	The Lickskillet soil is 12 to 20 inches deep to bedrock. It is loamy, high in rock fragments, well drained and occurs on mountains. Water erosion is a potential hazard. Rock outcrop consists of exposures of bare, hard bedrock other than lava flows and rock-lined pits. It consists mainly of unweathered volcanic, metamorphic or sedimentary rock. Rock outcrop has little or no vegetation.
Morrow	45B	61338	Yes	Ritzville silt loam	The Ritzville soil is over 60 inches deep to bedrock. It is silty, well drained and occurs plateaus and mountains. Water erosion is a potential hazard.
Morrow	45C	61339	Yes	Ritzville silt loam	
Morrow	45D	61340	Yes	Ritzville silt loam	
Morrow	46E	61341	Yes	Ritzville silt loam	
Morrow	47E	61342	Yes	Ritzville silt loam	
Morrow	48	61343	No	Riverwash	Riverwash is unstabilized gravelly sediment that is flooded, washed and reworked frequently. It occurs mainly along main stream channels where stream velocity is rapid.
Morrow	70B	61381	Yes	Warden very fine sandy loam	The Warden soil is over 60 inches deep to bedrock. It is silty, well drained and occurs on terraces. The soil is alkaline. Water and wind erosion are potential hazards.
Morrow	70C	61382	Yes	Warden very fine sandy loam	
Morrow	70D	61383	Yes	Warden very fine sandy loam	
Morrow	71B	61385	Yes	Warden silt loam	
Morrow	71C	61386	Yes	Warden silt loam	
Morrow	71D	61387	Yes	Warden silt loam	
Morrow	71E	61388	Yes	Warden silt loam	

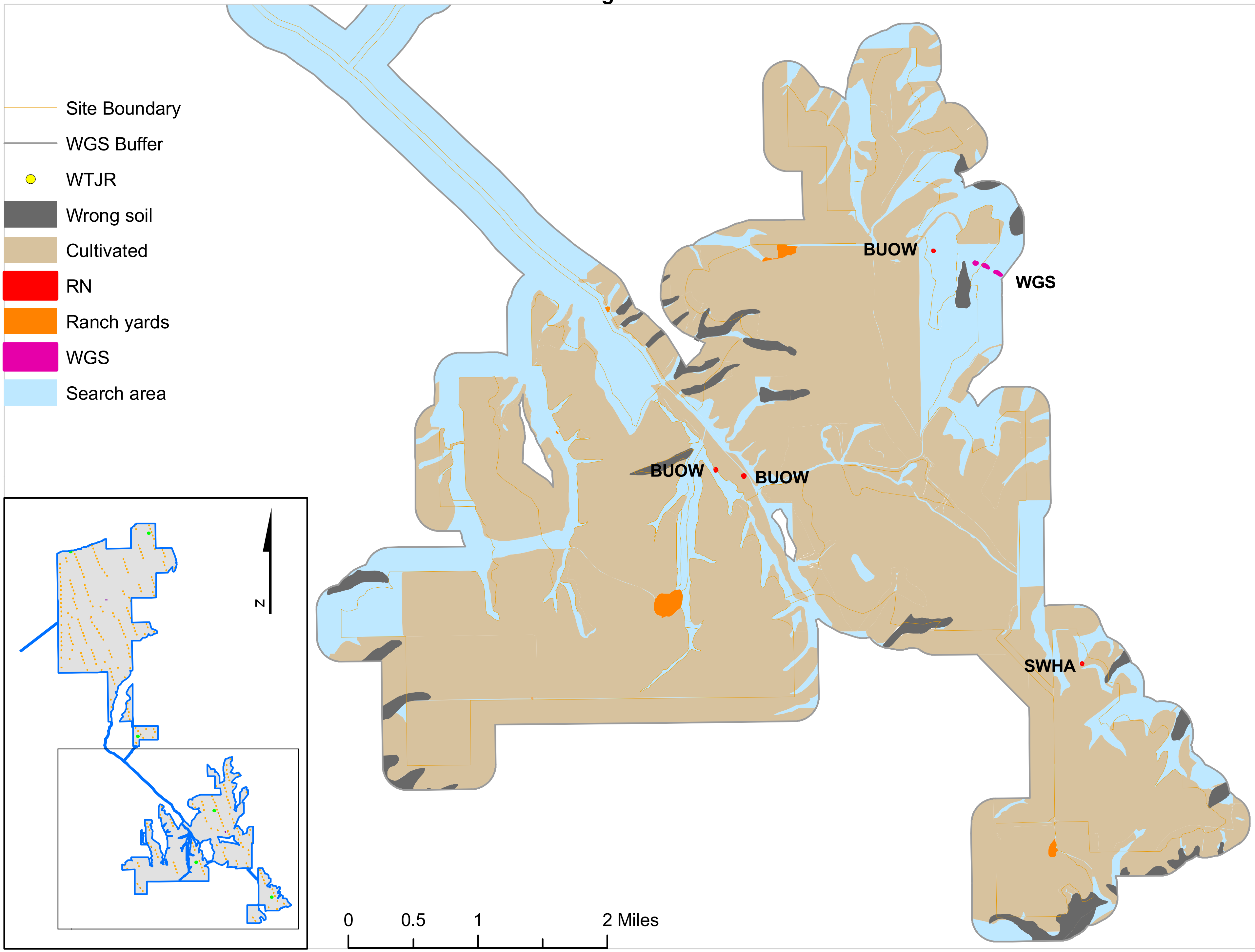
County	Code	Key	Survey?	Soil	Description
Morrow	75C	61394	Yes	Willis silt loam	The Willis soil is 40 to over 60 inches deep to bedrock, a cemented pan is at 20 to 40 inches. It is silty, well drained and occurs on plateaus. Water and wind erosion are potential hazards.
Morrow	75D	61395	Yes	Willis silt loam	
Morrow	77F	61397	No	Wrentham-Rock outcrop complex	The Wrentham soil is 20 to 40 inches deep to bedrock. It is loamy, high in rock fragments, well drained and occurs on mountains. Water erosion is a potential hazard. Rock outcrop consists of exposures of bare, hard bedrock other than lava flows and rock-lined pits. They consist mainly of unweathered volcanic, metamorphic or sedimentary rock. Rock outcrop has little or no vegetation.
Morrow	90D	61407	No	Olex gravelly silt loam	

Figure 1



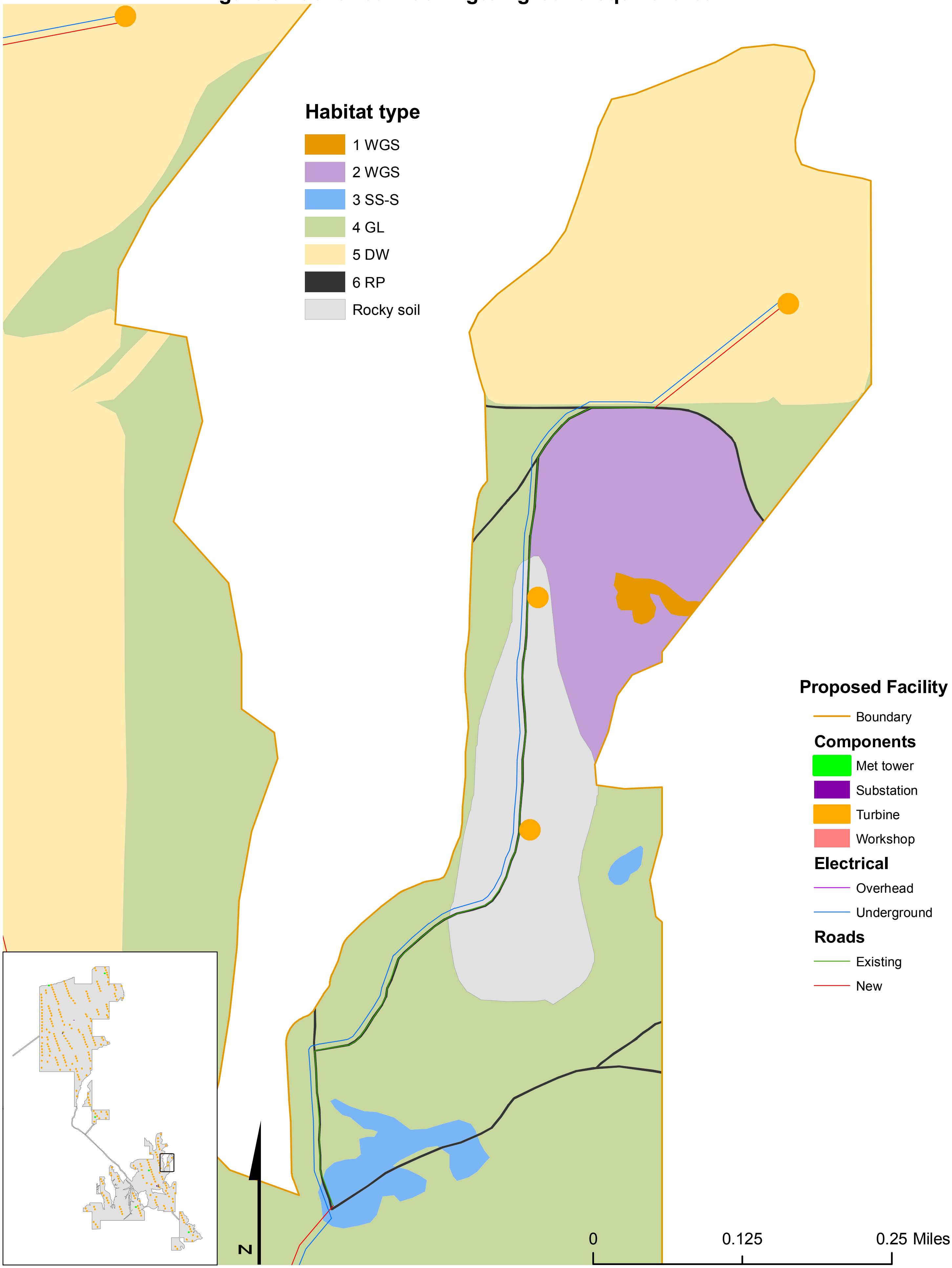
Site Boundary
WGS Buffer
WTJR
Wrong soil
Cultivated
RN
Ranch yards
WGS
Search area
BUOW
RTHA
GOEA
N
0
0.5
1
2 Miles

Figure 2



Site Boundary
WGS Buffer
WTJR
Wrong soil
Cultivated
RN
Ranch yards
WGS
Search area
BUOW
WGS
BUOW
BUOW
SWHA
N
0
0.5
1
2 Miles

Figure 3. Identified Washington ground squrrel area



avian or bat mortality. A standard carcass search study is contained in the current program, and the WRRS was eliminated when the long-term studies were eliminated. Although no formal ongoing program is proposed, if bird or bat carcasses are incidentally found on the site by project employees Applicant will comply with existing state and federal law. Applicant will report carcasses of any species covered by the migratory bird treaty or the eagle protection act to the U.S. Fish and Wildlife Service, and report any state-listed species or state species of concern to the Oregon Department of Fish and Wildlife.

Surveys for Three Oregon Avian Species of Concern on the Shepherds Flat Wind Farm Site

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Nancy LaFramboise

June 13, 2007

In early April 2007, the Oregon Department of Fish and Wildlife requested that surveys for several Oregon state species of concern be performed on the Shepherds Flat Wind Farm (SFWF) site. Included among these species were the grasshopper sparrow (*Ammodramus savannarum*, species of concern vulnerable), loggerhead shrike (*Lanius ludovicianus*, species of concern vulnerable) and sage sparrow (*Amphispiza belli*, species of concern critical). None is federally listed. Surveys for these species within appropriate habitat were performed in May 2007.

Methods

Loggerhead shrike and sage sparrow

Searches for the loggerhead shrike and sage sparrow were performed on May 23 and 25. Following guidance from the Oregon Department of Fish and Wildlife, sage steppe habitats larger than 35 acres were to be searched for these species. Three sage steppe areas within the site boundary meeting this criterion were located: one on the upland east of Eightmile Canyon, one in the road and transmission easements connecting the north and south project areas running through and above Fourmile and Eightmile Canyons, and one at the far southwest corner of the south project area above Eightmile Canyon (Figures 1a and 1b). In these habitats, transects approximately 200 feet apart were walked by searchers looking and listening for sage sparrows and loggerhead shrike. Searchers would frequently pause and scan for birds using binoculars.

Grasshopper sparrow

Prior to performing grasshopper sparrow surveys, searchers examined a nearby area in which large numbers of grasshopper sparrows had been observed. Searchers observed and listened to the sparrows and noted the characteristics of the vegetation. One searcher was unable to detect the bird's high-frequency song and did not participate in subsequent grasshopper sparrow searches.

Surveys for grasshopper sparrows were conducted on May 17, 25 and 31. Two types of grasshopper sparrow surveys were performed: transect searches and spot sampling of the site. Transects for grasshopper sparrows were spaced approximately 200 feet apart. Searchers looked and listened for the sparrow, with frequent pauses for careful listening. Transect searches took place in two locations: in the north project area along the fenceline between the SFWF site and the Pebble Springs Wind Project site, and in the south project area in a Conservation Reserve Program (CRP) parcel seeded in bunchgrass (Figures 2a and 2b).

Nine spot sampling sites were scattered throughout the north project area south of the main cluster of transmission lines, and one was located in the corner between the seeded CRP parcel and an area of category 3 grassland. In spot sampling, searchers generally remained at one location looking and listening for the sparrows. The range of detection for sparrows was approximately 250 feet from the searchers. Among all members of the survey teams, Lana Schleder was the most skilled at locating birds visually, and Nancy LaFramboise the most skilled at locating birds audibly. These two searchers performed all of the grasshopper sparrow spot sampling in the north project area, and one set of the north area fenceline transects.

Results

Loggerhead shrike and sage sparrow

All locations at which loggerhead shrike were observed were within the transmission corridor running along Fourmile and Eightmile Canyons. Eight individual loggerhead shrike were observed. Six of these locations were outside of the site boundary. Most shrike were located within the Eightmile Canyon portion of the transmission easement. No sage sparrows were observed in searched habitat.

Grasshopper sparrow

The off-site area in which relatively large numbers of grasshopper sparrows were observed is along a county road approximately 2 miles southwest of the SFWF north project area. Both sides of the road are CRP lands which were seeded with a variety of bunchgrasses approximately 18 years ago. Several rabbitbrush shrubs are now present and these, along with the barbed wire fences along the road, are used for perching by the sparrows. The sparrows were both seen and heard. The grass in May was approximately 18 to 24 inches tall.

The surveyed on-site CRP land was planted to bunchgrasses approximately 3 years ago, and still contains areas of tumbleweed and tumble-mustard. Some of these weedy areas appeared to have recently been treated with an herbicide. Cheatgrass provides a substantial proportion of the cover in some areas, and there are no shrubs present. The bunchgrass height in May was generally well over 24 inches. In the north project area, when searchers were in the habitat designated for curlew (3 CUR) it was noted that there was ‘no perch profile’ suitable for use by the grasshopper sparrow in that habitat.

Nine grasshopper sparrows were located on the SFWF site or near the boundary. Five of those locations were auditory only; the remaining four were visual locations. Omitting the 3-CUR habitat, approximately 6% of the remaining area in the north portion of the project site was searched. The number of sparrows located within the searched area indicates the total population within and adjacent to the north project boundary is no higher than 150 birds.

Figure 1a: Loggerhead shrike

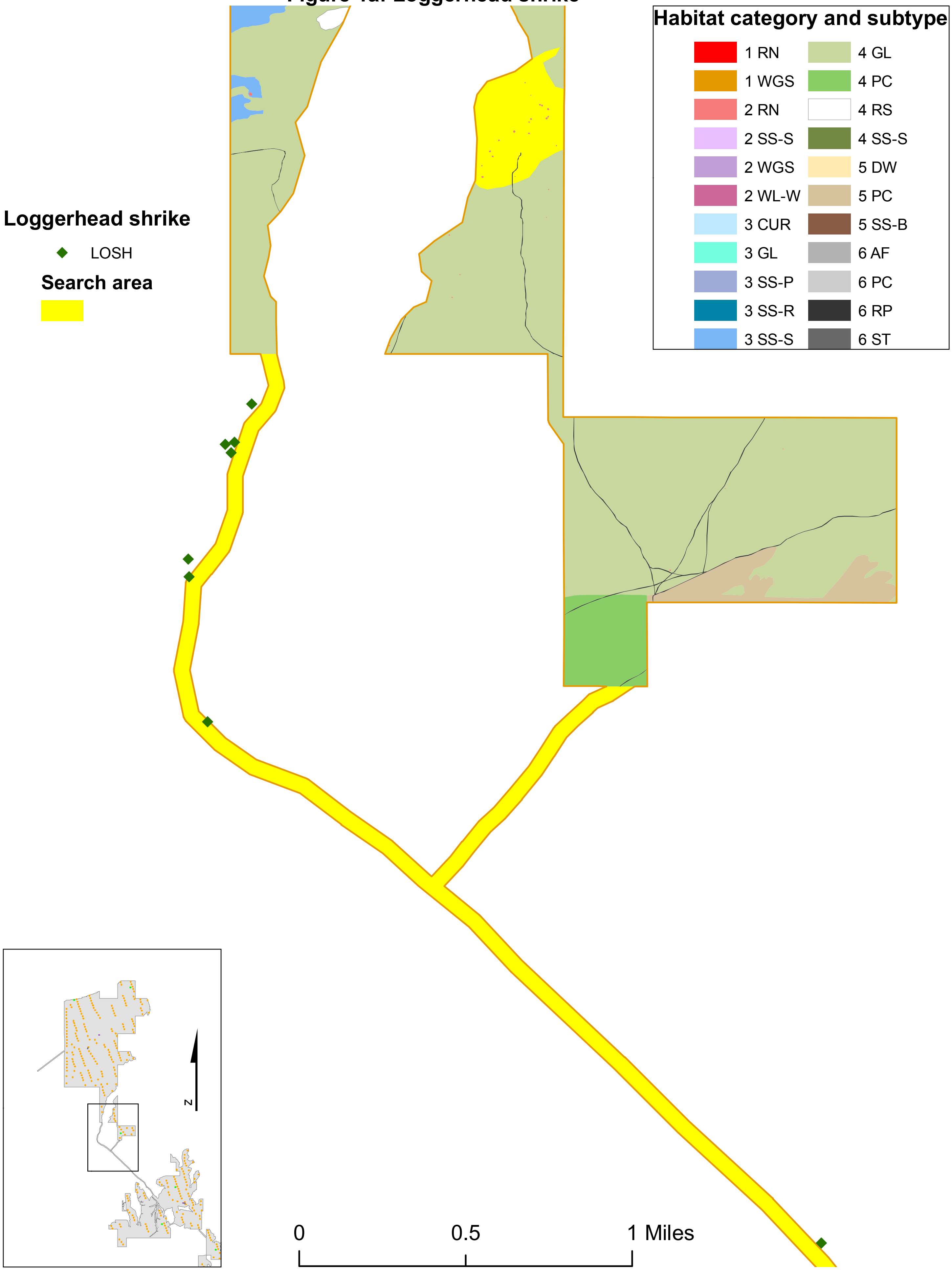


Figure 1b: Loggerhead shrike

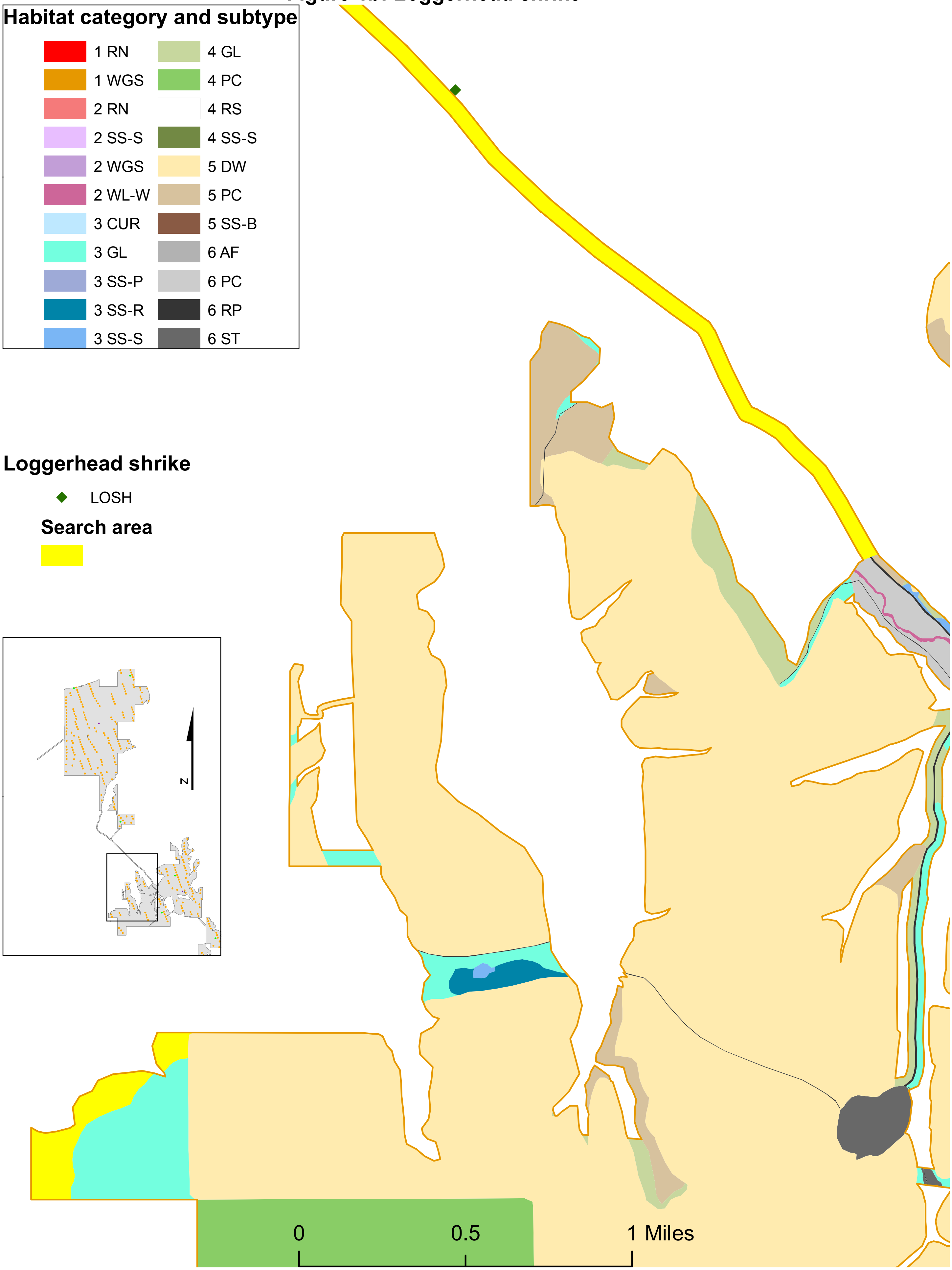


Figure 2a: Grasshopper sparrow

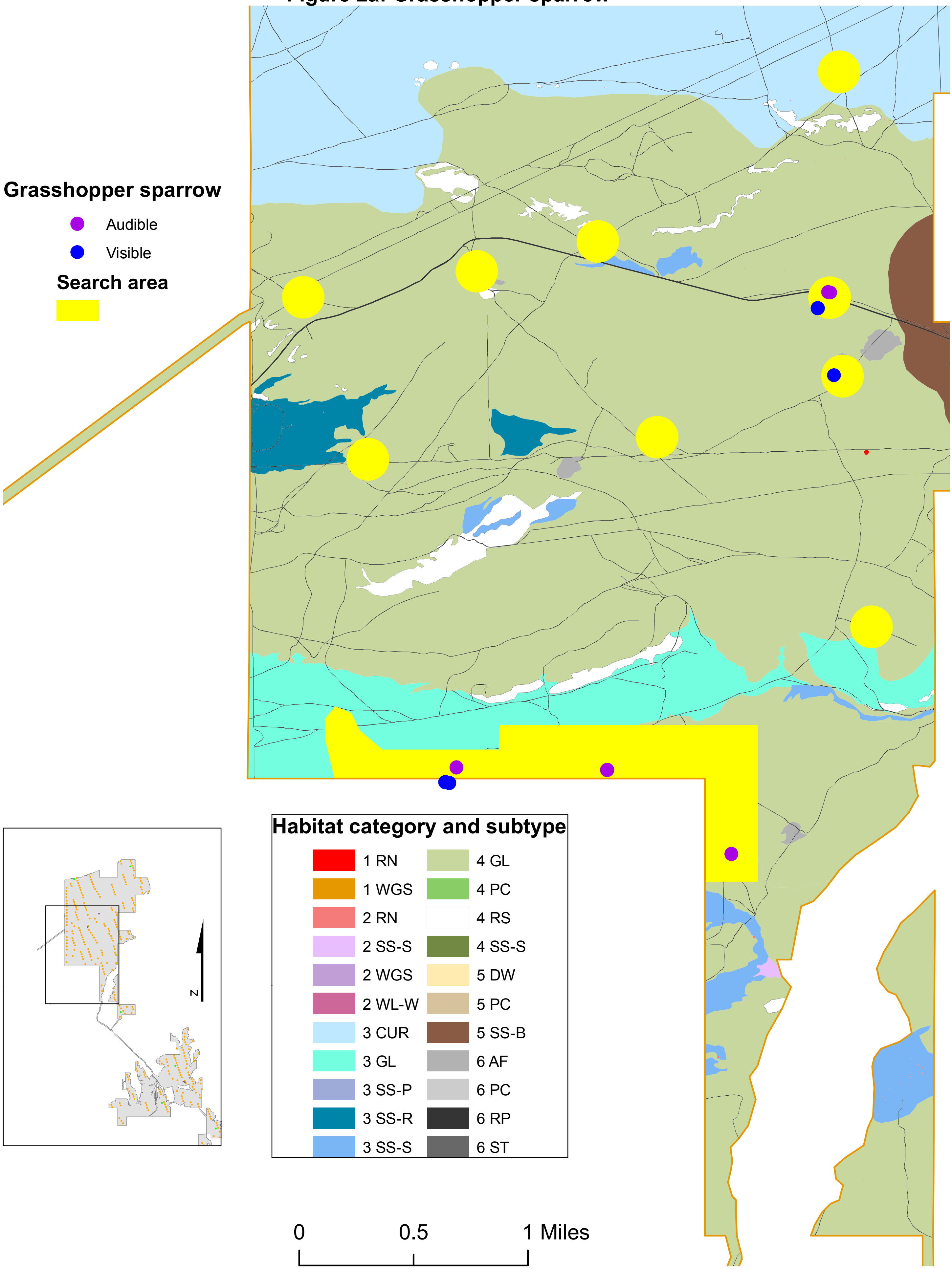
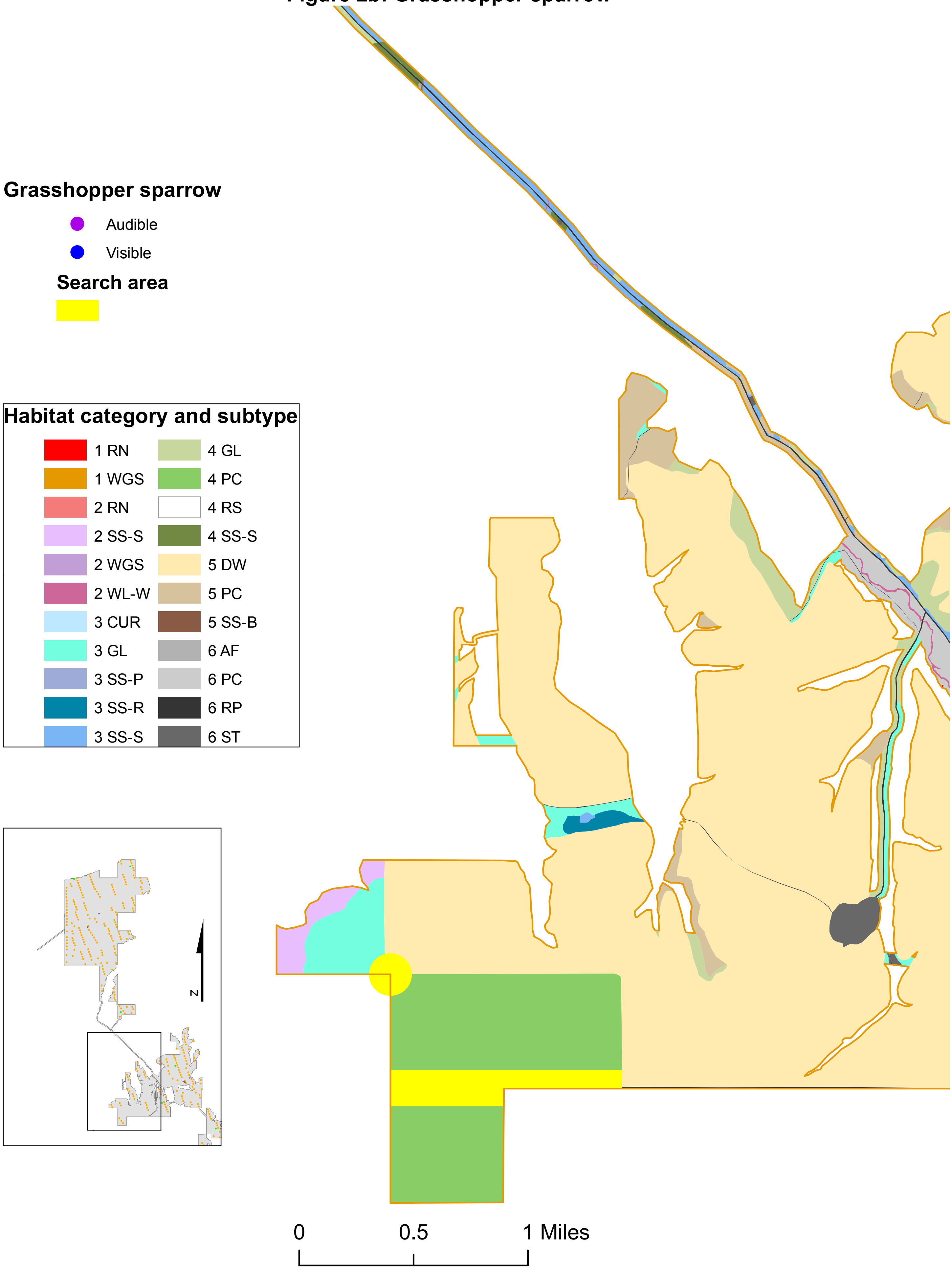


Figure 2b: Grasshopper sparrow



AVIAN AND BAT
CUMULATIVE IMPACTS ANALYSIS
SHEPHERDS FLAT WIND PROJECT
GILLIAM AND MORROW COUNTIES, OREGON

March 2007

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1.0 INTRODUCTION AND BACKGROUND

Over the last decade, there has been a surge of interest in wind power development in Oregon and Washington along the Columbia River corridor and within the Columbia Plateau physiographic region (ecoregion). A central issue for wind power developments is the potential impacts to avian and bat resources, and in particular direct impacts such as avian or bat fatalities. Wind power proposals are commonly reviewed by natural resource agencies, private conservation groups, permitting authorities and other stakeholders. Frequently, baseline studies are conducted that are designed to estimate avian presence and abundance at proposed development sites for use in the impact assessment and siting of the project followed by monitoring studies post construction which are designed to measure impacts from the project. As more wind power projects are constructed along the Columbia River and surrounding region, cumulative impacts from multiple projects have become a concern and are important to consider.

The proposed Shepherds Flat wind power project is located in Gilliam and Morrow Counties, in north-central Oregon. The proposed project would have from 300-326 turbines, each with a capacity of 2.3-2.5 megawatts (MW), for an overall project capacity of 750 MW. The total proposed project area using the lease area boundaries is approximately 31,270 acres (48.9 mi^2). The project boundary comes within 1 mile of the Columbia River to the north. Land use is typical of other existing and proposed wind projects in the region and consists primarily of dryland agriculture, of which small amounts have been converted to Conservation Reserve Program (CRP) lands, and areas of native grassland rangeland.

Most wind power development in northern Oregon and southern Washington has been within the Columbia Plateau Level III Ecoregion (Thorson et al. 2003; Figure 1). The Columbia Plateau was historically characterized by open, arid shrub-steppe and grassland-steppe habitats. The current predominant land use of the Ecoregion is dryland agriculture, CRP lands, and rangeland. Precipitation through the region is 6-12 inches per year (Thorson et al. 2003). Surrounding ecoregions are more mountainous, receive more precipitation, and are more forested than the Columbia Plateau. While the Columbia Plateau has less vegetative strata than surrounding ecoregions, and is an excellent place for wind power development, plant and animals species that are specialized for this type of habitat may be recipient of a larger portion of the cumulative impacts from wind development.

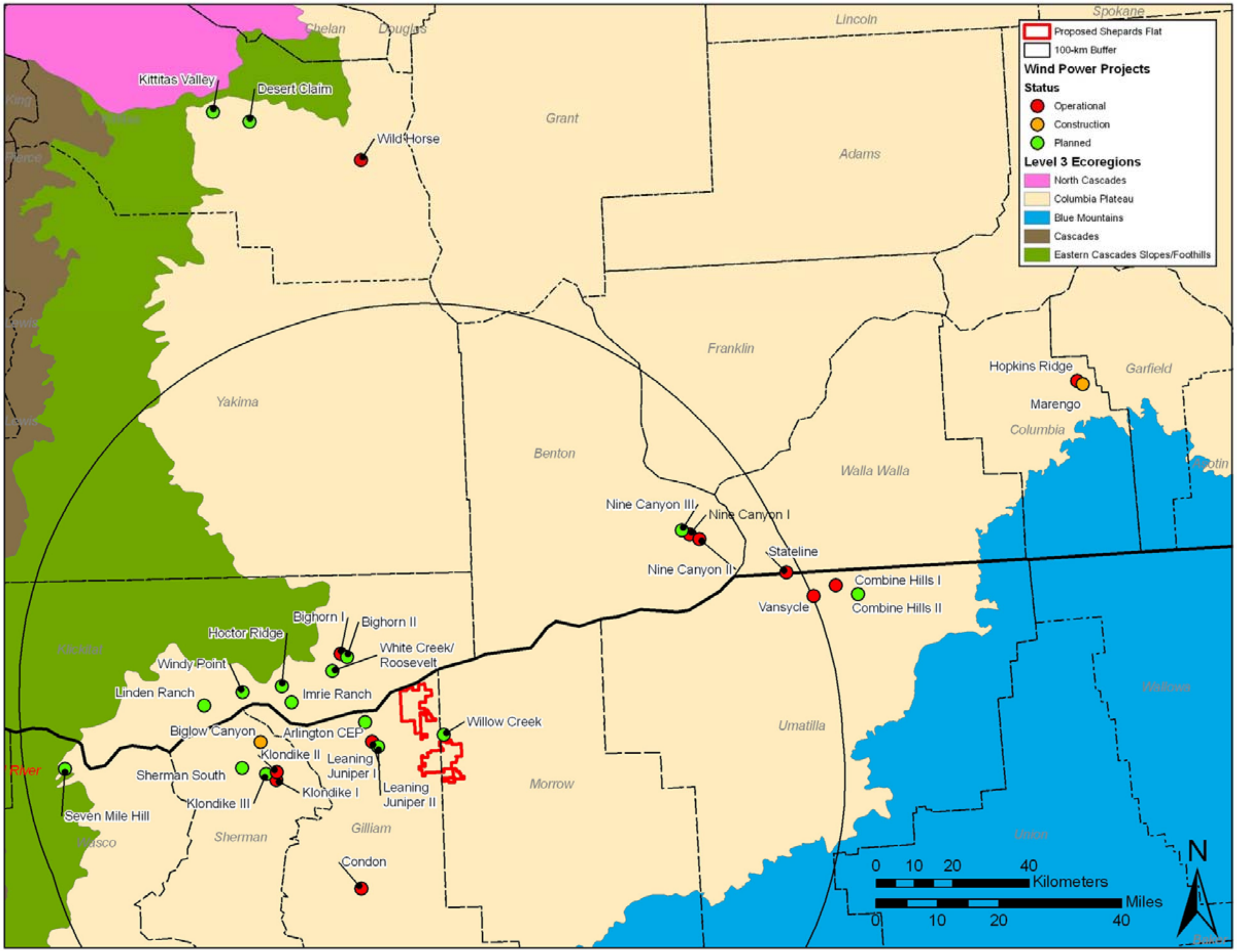
2.0 METHODS

This report is intended to provide a broad, qualitative analysis using existing public information about existing wind projects and wind project proposals in the region and results of monitoring (fatality) studies to compile a cumulative impact analysis for avian and bat resources. The analysis relies heavily on existing information from studies in the Columbia Plateau Ecoregion. Information about wind project proposals was gathered from a variety of sources such as federal and state agencies (e.g., BPA, Oregon EFSC), permitting agencies (e.g., Kickitat County), nonprofit renewable energy advocates (e.g. Renewable Northwest Project), and other public sources such as internet resources. Basic information such as the proposed capacity, turbine size and number, and location about each project identified was gathered and summarized to the extent possible. In many cases the actual boundary of the proposal could not be identified and only a general location was known.

The general approach to the cumulative effects analysis was to summarize results of fatality monitoring studies at operational wind projects within the same ecoregion, and then use the results to estimate impacts for all constructed and proposed wind projects within approximately 100 km of the proposed Shepherds Flat project (Figure 1). The 100km buffer is somewhat arbitrary but due to similarities of habitat and land use throughout the whole Columbia Plateau ecoregion the resources potentially impacted by wind projects are similar for all projects. The Vansycle and Combine Hills wind projects occur just outside a 100km distance from Shepherds Flat and are included in the analysis (Figure 1).

This cumulative effects analysis considers data from seven projects in the Columbia Plateau ecoregion where monitoring for fatalities has occurred. Predominant vegetation type and land use for all the projects where monitoring occurred is similar (dryland agriculture, grassland and shrub-steppe rangeland), and the fatality and avian survey data were all collected using similar methods. The data sets used in this report were collected using similar methods, where observed fatality rates calculated from standardized carcass searches were adjusted for searcher efficiency and carcass removal biases. The analysis operates under the assumption that the avian and bat communities are similar across all projects because of habitat and land use similarities throughout the ecoregion, and thus applicable to the new proposed projects in this same ecoregion. Details about results, methods, and estimates of potential avian impacts from each individual project are available in the referenced project reports.

Figure 1. Level III ecological regions and wind power development projects in southeastern Washington and northeastern Oregon.



3.0 RESULTS

3.1 Study Area and Wind Projects

As of early 2007, 12 wind projects were in operation in the Columbia Plateau Ecoregion and 10 of these were in operation within approximately 100 km of the proposed Shepherds Flat project (Figure 1, Table 1). Two operating facilities, Hopkins Ridge and Wild Horse, are about 180 km to the east and 140 km to the north respectively and still within the Columbia Basin ecoregion.

Currently, up to 19 other wind power projects are planned or being constructed within approximately 100 kilometers of the Shepherds Flat project (Figure 1, Table 1). While the capacity and number of turbines could not be determined for all proposals, when completed and including the Shepherds Flat project, they could result in up to 1600 additional turbines in the region, contributing over 4060 MW of power (Table 1).

Most of the operating facilities have had or will have some sort of avian or casualty monitoring associated with them and post-construction fatality monitoring data are available from five of the wind projects within approximately 100km of Shepherds Flat and six over all (Table 2). The Vansycle project was constructed in 1998 and avian/bat fatalities were monitored during 1999 (Erickson et al. 2000). The Stateline project was constructed in several phases starting in 2001. Avian observations and fatality monitoring were conducted at Stateline from 2001-2003 (Erickson et al. 2004). Klondike I was completed in 2001 and fatalities were monitored for one year following construction (Johnson et al. 2003) Combine Hills I was constructed in 2003 and fatality monitoring results are available for 2004 (Young et al. 2005). Nine Canyon I became operational in fall 2002 and fatalities were monitored for one year (Erickson et al. 2003). Nine Canyon II was online in 2004 but also only underwent some short term monitoring for one season. The Hopkins Ridge project was completed in 2005 and monitored in 2006 (Young et al. 2007). The Condon project was online by June 2002 and a short term non-standardized monitoring study took place in 2003[1]. Construction for Leaning Juniper was partially completed in 2006, with the second half of the project scheduled to come on line in 2007. The Big Horn project was completed in 2006. Both of these projects are being monitored in 2007.

For each of the individual study areas from which fatality results are available, the predominant land use was a mosaic of agriculture, mainly dryland wheat farming, and grassland or shrub-steppe rangeland used for livestock grazing. In general, the region where future wind power projects are being planned is similar in vegetation types although for any given project the amount of each type varies (Quigley and Arbelbeide 1997, Figure 2). It is assumed for the analysis that results from the existing studies, which are similar, would be applicable to new proposed projects.

[1] Monitoring at the Condon wind project took place for less than one year in 2002-2003 (Fishman 2003). This study did not use similar methods to the other studies and was not as rigorous. No searcher efficiency or carcass removal surveys were conducted so the reported results are simply observed number of fatalities for the study and not comparable to the other studies.

Table 1. Wind power projects constructed or planed in the Columbia Plateau ecological region of Washington and Oregon.

Project	Max. Capacity (MW)	No. Turbines	Turbine Size (MW)	General Habitat and Land Use	Dist. To Shepherds Flat (km)	Project Information Source
Existing						
Combine Hills I (Umatilla Co., OR)	41	41	1	dryland ag, grazed shrub steppe	105	http://www.rnp.org/News/pr_EurusCombineJun03.html
Vansycle Ridge (Umatilla Co., OR)	25	38	0.66	dryland ag,	100	http://www.rnp.org/Projects/vansycle.html
Stateline (Umatilla Co., OR)	300	399	0.66	dryland ag, grazing, shrub steppe	95	http://www.ppmenergy.com/cs_stateline.html
Klondike I (Sherman Co., OR)	24	16	1.5	dryland ag	35	http://www.rnp.org/Resources/Klondike%201%20pager.pdf
Klondike II (Sherman Co., OR)	75	50	1.5	dryland ag	35	http://www.portlandgeneral.com/about_pge/ current_issues/klondikeII/Default.asp?bhcp=1
Condon (Gilliam Co., OR)	50	83	0.6	farming, grazing	30	http://www.efw.bpa.gov/environmental_services/ Document_Library/Condon_Wind/RODwMAP.pdf
Leaning Juniper I (Gilliam Co., OR)	104	63	1.5	farming, grazing	5	http://www.efw.bpa.gov/environmental_services/ Document_Library/Arlington_PPM/ROD031105.pdf
Nine Canyon I (Benton Co., WA)	64	49	1.3	farming, steppe	80	http://www.energy-northwest.com/downloads/ninecan.pdf
Nine Canyon II (Benton Co., WA)	16	12	1.3	farming, steppe	80	http://www.energy-northwest.com/downloads/9Canyon.pdf
Hopkins Ridge (Columbia Co., WA)	150	83	1.8	farming, crp, grazing, steppe	180	http://www.rnp.org/News/pr_PSEHopkinsDec05.htm
Big Horn I (Klickitat Co., WA)	250	167	1.5	drylnd ag, crp, lithosol-grassland	13	http://www.efw.bpa.gov/environmental_services/ Document_Library/Big_Horn/BigHornROD03242005.pdf
Wild Horse (Kittitas Co., WA)	230	127	1.8	lithosol, shrub steppe	140	http://www.res-ltd.com/wind-farms/wf-wildhorse/htm
Under Construction						
Biglow Canyon (Sherman Co., OR)	450	211	1.65	farming, grazing	30	http://www.bpa.gov/corporate/pubs/ RODS/2006/RODKlondikeIIIBiglowCanyon.pdf
Marengo (Columbia Co., WA)	140	78	1.8	dryland ag, shrub steppe	180	http://www.pacificpower.net/Homepage/Homepage35750.html
Proposed						
Seven Mile Hill (Wasco Co., OR)	50				~90	http://www.oregon.gov/ENERGY/SITING/ review.shtml#Seven_Mile_Hill_Wind_Project

Project	Max. Capacity (MW)	No. Turbines	Turbine Size (MW)	General Habitat and Land Use	Dist. To Shepherds Flat (km)	Project Information Source
Klondike III (Sherman Co., OR)	272	165	1.8	farming, grazing	30	http://egov.oregon.gov/ENERGY/SITING/docs/ KWPPublicFilingNotice.pdf
Leaning Juniper II (Gilliam Co., OR)	279			farming, grazing	~5	http://www.oregon.gov/ENERGY/SITING/ review.shtml#Leaning_Juniper_Wind_Power
Arlington CEP (Gilliam Co., OR)	104	63	1.65	grazed shrub-steppe	6.5	http://www.bpa.gov/corporate/pubs/rods/2005/EFW/ Arlington-Wind-Interconnection-ROD-1-14-05.pdf
Shepherds Flat (Gilliam Co., OR)	750	300-326	2.3-2.5		0	Data provided by BPA
Willow Creek (Morrow Co., OR)	180			farming, grazing	<1	http://www.transmission.bpa.gov/PlanProj/Wind/willow.cfm
Combine Hills II (Umatilla Co., OR)	63	41	1.5	dryland ag, grazed shrub steppe	~105	http://www.efw.bpa.gov/environmental_services/ Document_Library/Combine_Hills/Combine_Hills_Cx.pdf
Big Horn II (Klickitat Co., WA)	150			agriculture, crp	~15	
White Creek/Roosevelt (Klickitat Co., WA)	205	166-200	1.5-1.8	farming, grazing	13	http://www.efw.bpa.gov/environmental_services/ Document_Library/Rock_Creek/RockCreekSubstationROD.pdf
Windy Point (Klickitat Co., WA)	242.5	97	2.5	farming, grazing	~32	http://www.bpa.gov/corporate/pubs/RODS/2006/ WindyPointI_IIRODFINAL.pdf
Hoctor Ridge (Klickitat Co., WA)	60			ag/grazing, woodland	31	
Linden Ranch/DNR (Klickitat Co., WA)	56			agriculture, grazing	52	
Imrie Ranch (Klickitat Co., WA)	100	35	2.8	agriculture, grazing	31	
Windtricity (Klickitat Co., WA)	12					
Mariah Energy (Klickitat Co., WA)	4					
Nine Canyon III (Benton Co., WA)	32	14	2.3	dryland wheat	~80	http://www.energy-northwest.com/news/2006/06_07.php
Desert Claim (Kittitas Co., WA)	180	90	2.0	grassland, agriculture shrub steppe	160	
Kittitas Valley (Kittitas Co., WA)	130	65	2.0	grassland, grazing	170	
Totals	~4800	~2950				

Figure 2. Terrestrial vegetative communities in southeastern Washington and northeastern Oregon.

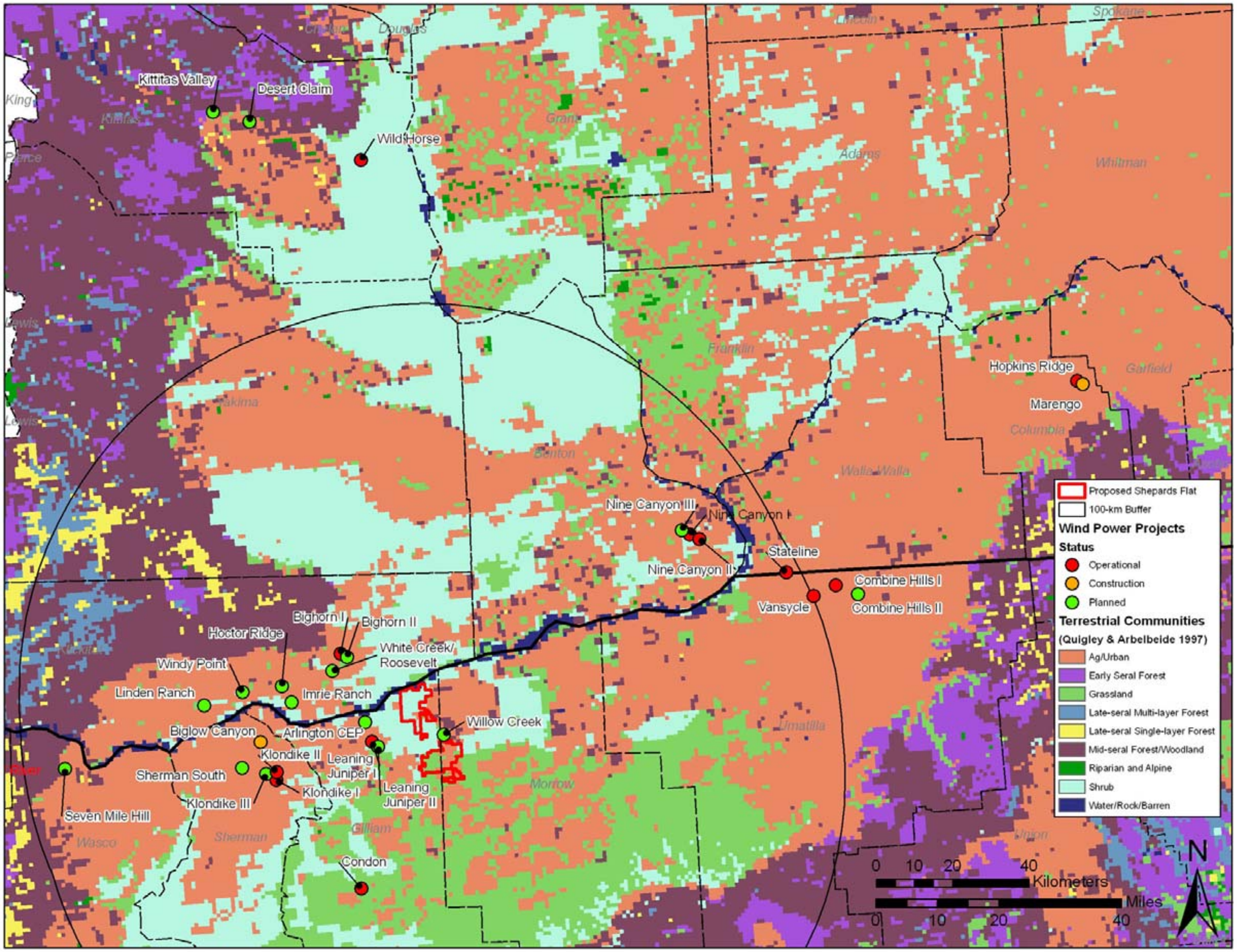


Table 2. Avian use estimates and avian fatality estimates for wind power projects in the Columbia Plateau Ecoregion.

Project	**Mean annual avian use** (#/20-min survey)		**Mean annual mortality** (#/MW/year)			Source
	Raptors	**All birds**	**Raptors**	**All birds**	**Nocturnal Migrants**	**Source**
Combine Hills, OR	0.60	6.0	0	2.6	0.27	Young et al. 2005
Klondike, OR	0.47	17.5	0	0.9	0.35	Johnson et al. 2003
Vansycle, OR	0.41	13.1	0	1.0	0.32	Erickson et al. 2000
Stateline, WA/OR	0.41	13.1	0.09	2.9	0.73	Erickson et al. 2004
Hopkins Ridge, WA	0.64	8.7	0.14	1.2	0.46	Young et al. 2007
Nine Canyon, WA	0.26	9.4	0.05	2.8	0.45	Erickson et al. 2001
Condon, OR	0.37	5.8	0.02[a]	0.05[a]	NR	Fishman 2003
Mean	**0.45**	**10.5**	**0.05**	**1.9**	**0.43**	

[a] not adjusted for searcher efficiency or scavenger removal; study methods differed from other projects and were not as rigorous; therefore this estimate should be regarded as a minimum mortality estimate and it was not used in calculation of the mean values.

3.2 Direct Impacts to Birds

Annual avian mortality estimates at wind farms in the Columbia Plateau Ecoregion ranged from 0.9 to 2.9 birds per MW (Table 2). The average for six projects with comparable data collection methods was 1.9 avian deaths/MW/year. All constructed, planned, and under construction projects within 100km and including Shepherds Flat would contribute about 4060 MW of power. Assuming that mortality rates are representative of the region, new wind power generation could cause between approximately 3,650 and 11,775 and on average 7,715 avian deaths per year in the region.

Raptors
At modern wind power projects in the Columbia Plateau Ecoregion, raptor species generally constitute only a small portion of avian use, ranging from 0.26 to 0.64 observation per 20-min survey. Raptor mortality has also been low ranging from 0 to 0.14 raptor fatalities per MW per year. An added 4060 MW of capacity in the region could result in between 0 and 568, and on average about 200 raptor deaths per year.

Red-tailed hawk, American kestrel, and northern harrier account for most of the raptor use at other projects where avian use was studied (see Erickson et al 2001, 2002). In the winter, rough-legged hawk and red-tailed hawk account for majority of the raptor use. If it is assumed that raptor use is correlated with mortality, these species are expected to be the raptor species with the highest collision risk across the projects. The potential exists for other species to collide with turbines, including Swainson's hawk, ferruginous hawk, turkey vulture, golden eagle, Cooper's hawk, sharp-shinned hawk, prairie falcon, and bald eagle; however, the mortality risk associated with these species is expected to be lower than the mortality for red-tailed hawks and American kestrel due to the lower use by these species in general. In addition, American kestrel and red-tailed hawk have been the most common fatality at regional wind projects (Table 3; Erickson et al. 2001, 2004, Young et al. 2007). Common owl species such as great-horned, which are typically not effectively surveyed during the day, may also be at risk of collision, although short-eared owl has been the only owl species fatality recorded at the regional wind projects (Table 3). While use is often high for turkey vultures, they appear less susceptible to collision than most other raptors (see Orloff and Flannery 1992, Erickson et al. 2001). In addition, there have been very few northern harrier, ferruginous hawk, rough-legged hawk, and *Accipiter* species fatalities recorded at wind projects (Table 3, Erickson et al. 2001, 2002).

Passerines

Passerines have been the most abundant avian fatality at wind projects studied (see Erickson et al. 2000, 2001, 2002, Johnson et al. 2002, Young et al. 2003, 2005, 2007), often representing more than 80% of the avian fatalities. For projects in the Columbia Plateau Ecoregion on average approximately 69% of the avian fatalities have been passerines (Table 4). Both migrant and resident passerine fatalities have been observed, with migrants generally making up 20-30% of the avian fatalities. Assuming that 69% of all bird mortality would be passerine fatalities between approximately 2,518 and 8,125 and on average 5,323 passerine deaths per year in the region would occur. Some impacts are expected for nocturnal migrating species, however, impacts are not expected to be great for the Columbia Plateau Ecoregion. Estimates for nocturnal migrant mortality at the regional wind projects have ranged from 0.27 to 0.73 per MW per year (Table 2). Assuming these estimates are representative of Columbia Plateau wind projects, between approximately 1,090 and 2,960 nocturnal migrant fatalities would be expected if 4060 MW of wind power were constructed.

Passerine species most common to the project sites will likely be most at risk, including horned lark, western meadowlark, and European starling, however, there is generally little concern over potential mortality of this non-native, non-protected species. Horned larks have been the most commonly observed fatality at several wind projects, including Vansycle, Combine Hills, and Stateline (Table 3, Erickson et al. 2003, Young et al. 2005, Erickson et al. 2004) and represent approximately 35% of the avian fatalities in the Columbia Plateau ecoregion at wind projects. Golden crowned kinglet, a tree/forest dwelling species, have been recorded as fatalities at a few projects and are generally considered migrants.

Table 3. Number and species composition of bird fatalities found at the seven Pacific Northwest regional wind projects.

Species	Number of Fatalities	Percent Composition
Horned lark	128	35.2
Ring-necked pheasant *(n)*	35	9.6
Golden-crowned kinglet	23	6.3
Chukar *(n)*	17	4.7
Western meadowlark	15	4.1
European starling *(n)*	15	4.1
Gray partridge *(n)*	14	3.8
White-crowned sparrow	12	3.3
Red-tailed hawk	9	2.5
American kestrel	9	2.5
Unidentified passerine	8	2.2
Yellow-rumped warbler	6	1.6
Winter wren	5	1.4
Rock dove *(n)*	5	1.4
Canada goose	4	1.1
Dark-eyed junco	4	1.1
Unidentified bird	4	1.1
House wren	3	0.8
Red-breasted nuthatch	3	0.8
Black-billed magpie	3	0.8
Northern flicker	3	0.8
Golden-crowned sparrow	3	0.8
Unidentified sparrow	2	0.5
Short-eared owl	2	0.5
Savannah sparrow	2	0.5
Ruby-crowned kinglet	2	0.5
Vesper sparrow	2	0.5
White-throated swift	2	0.5
Rough-legged hawk	2	0.5
Great blue heron	2	0.5
Red-winged blackbird	1	0.3
Ferruginous hawk	1	0.3
Grasshopper sparrow	1	0.3
American pipit	1	0.3
Mallard	1	0.3
Swainson's thrush	1	0.3
Swainson's hawk	1	0.3
Spotted towhee	1	0.3
Lewis's woodpecker	1	0.3
American robin	1	0.3
Macgillivray's warbler	1	0.3

Species	Number of Fatalities	Percent Composition
House finch	1	0.3
Virginia rail	1	0.3
American coot	1	0.3
Cooper's hawk	1	0.3
Gray catbird	1	0.3
Northern harrier	1	0.3
Townsend's warbler	1	0.3
Unidentified flycatcher	1	0.3
Totals (47 species)	363	100

n = non-native species

Table 4. Percent composition of avian fatalities by species group for the seven Pacific Northwest regional wind project monitoring studies.

Species	Number of Fatalities	Percent Composition
Passerines	251	69.1
Upland gamebirds *(n)*	66	18.2
Raptors	26	7.2
Other birds[a]	20	5.5
Totals	363	100
Non-protected species[b]	20	5.5

[a] Waterbirds, waterfowl, rails, doves, woodpeckers, swifts

[b] European starling and rock dove

Upland gamebirds

For projects in the Columbia Plateau Ecoregion, upland gamebirds have composed a higher percentage of avian fatalities than in other regions of the U.S., approximately 18% of all avian fatalities (Table 4). Three introduced species, ring-necked pheasant, chukar, and gray (Hungarian) partridge are the most commonly found non-passerine fatalities (Table 3). Estimates for upland game bird mortality in the Columbia Plateau Ecoregion have varied from 0.27 to 0.47 per MW per year. Provided these estimates are representative, between 1,090 and 1,910 upland gamebird fatalities would be expected per year for 4060 MW of wind power.

3.3 Direct Impacts to Bats

Results of fatality monitoring for the Columbia Plateau Ecoregion wind projects indicate mortality ranges of approximately 0.63 to 2.46 bats per MW per year (Table 5). Based on these results, and considering the similarities in the characteristics of the project areas and other regional projects, a conservative estimate of total bat mortality would be between 2,550 and 9,990 bats per year, assuming 4060 MW of wind power is constructed.

Table 5. Summary of Bat Mortality at newer generation wind project monitoring studies in the Columbia Plateau ecoregion.

Project Name [state]	**No. Bats /turbine/year**	**Bats per MW[1]**	**Reference**
Stateline [OR/WA]	1.12	1.70	Erickson et al. 2004
Vansycle [OR]	0.74	1.12	Erickson et al. 2000
Klondike [OR]	1.16	0.77	Johnson et al. 2003
Hopkins Ridge [WA]	1.13	0.63	Young et al 2007
Nine Canyon [WA]	3.21	2.46	Erickson et al. 2001b
Combine Hills [OR]	1.88	1.88	Young et al. 2005
Average	1.54	1.43	

[1] Most reports do not provide number per MW of energy produced so this number was calculated based on the mortality per turbine and capacity of turbines studied.

Only four species of bat fatalities have been documented for six wind projects monitored in the Columbia Plateau Ecoregion (Table 6). The vast majority of the fatalities were composed of two species: silver-haired bat (48%) and hoary bat (46%), two species of foliage (tree) dwelling migratory bats (see Erickson et al. 2003, 2004; Young et al. 2005, Johnson et al. 2003, Young et al 2007). Monitoring studies at other wind projects nationwide have documented impacts to bats with some common results for all regions (Johnson 2005). The species at highest risk appear to be foliage dwelling (forest, trees) fall migratory species. The annual period when most bat fatalities occur is in August and September. Hoary and silver-haired bats are wide spread across North America and breed into the boreal forests regions of Canada and migrate south to winter in the southern U.S., Mexico, and potentially further south in Central America. Many bats will migrate short distances to suitable hibernacula for the winter; however, short distance migrant species do not appear to be at as great a risk based on the monitoring studies results.

Table 6. Number and species composition of bat fatalities found at six Pacific Northwest regional wind projects.

Species	Number of Fatalities	Percent Composition
Silver-haired bat	115	48.3
Hoary bat	110	46.2
Unidentified bat	7	2.9
Little brown bat	3	1.3
Big brown bat	3	1.3
Totals (4 species)	238	100

Bat foraging areas such as riparian zones, shrublands, streams, and other water sources are generally limited in the Columbia Plateau Ecoregion and usually confined to river and stream corridors. The sites chosen for wind development in the ecoregion generally have few bat foraging or concentration areas. At several wind projects studied in the U.S., bat collision mortality during the breeding season was far less, despite the fact that relatively large populations of resident bats of several species were documented in proximity to the wind plant (see Gruver 2002; Johnson et al., 2002; Johnson 2005). Based on these studies, it appears that wind projects, especially those in open habitats, pose little risk to non-migratory bat populations.

3.4 Habitat Impacts

Grassland and shrub-steppe habitat is one of the most abundant habitat types in Eastern Oregon and Washington, but it is also highly subjected to development and conversion to agriculture (Johnson and O'Neil 2001). In addition to potentially thousands of new vertical structures, added wind generation in the region will result in more roads (mostly dirt and gravel) and increased human activity due to turbine construction and maintenance. Most habitat impacts will be to already heavily disturbed agriculture fields and moderately disturbed grazing/rangeland. The percent of direct impacts actually occurring in grassland or shrub-steppe habitat are difficult to predict and would be based on individual project design and layout.

Because of the location of the proposed wind projects (Figure 2, Table 1), it is expected that the majority of habitat impacts will occur in dryland agriculture vegetation. Under a set of assumptions about impacts and project location, the amount of cumulative impacts to vegetation communities can be estimated. Assuming that: (1) on average the permanent impacts associated with a turbine and the associated roads are between 1.5 and 2.5 acres per turbine; (2) 25% of a project layout occurs in non-agricultural vegetation types, which in many cases is a drastic overestimate; and (3) 1.5-2.5 MW turbines are used for the proposed build out identified (Table 1), then between 630 and 1750 acres of non-agricultural vegetation type, primarily grassland shrub-steppe vegetation, would be lost in the Columbia Plateau Ecoregion with 4060 MW of wind projects. These impacts would be spread over a large area geographically (see Figure 1) and are considered an overestimate because of efforts to locate projects in agricultural vegetation types. On a local (project) scale, these impacts are generally on the edge of native vegetation areas where they abut agriculture fields.

While the Columbia Plateau covers a large area, and characteristic grassland shrub-steppe habitat is widespread, it is also heavily fragmented by agricultural activities. Species that depend on native habitat face physical and ecological barriers within the region and at the region's edges. The Columbia River and other smaller rivers in the area cut deep canyons and present linear alteration to the general physiography and potential barriers to some animal species movement. Large swaths of agricultural land are less obvious, but may pose significant obstacles to small or less mobile animals. While many birds are not impeded by such physical barriers, some smaller, habitat specific birds that depend on brushy habitats for cover could be affected by such habitat fragmentation. Habitat specialists and obligates such as sage-grouse (*Centrocercus urophasianus*) and sage sparrow (*Amphispiza belli*) require large tracts of continuous sage habitat (Johnson and O'Neil 2001), which is largely missing from the Columbia Plateau, and the range for these species in the Columbia Plateau is already severely restricted. Assuming that agricultural vegetation types are not critical wildlife habitat, habitat loss impacts are not expected to be a significant loss to any given species.

4.0 DISCUSSION

This cumulative effects analysis was based largely on results of other studies of wind projects in the region and in particular monitoring studies that estimated the direct impacts of a particular wind project. The overall design for these studies incorporates several assumptions or factors that affect the results of the fatality estimates. First, all bird casualties found within the standardized search plots during the study periods were included in the analyses. It is assumed that carcass found incidentally within a search plot during other activities would have been found during a standardized carcass search. Second, it was assumed that all carcasses found during the studies were due to collision with wind turbines. True cause of death is unknown for most of the fatalities. It is highly likely that some of the casualties included in the data pool for the various projects were due to natural causes or background mortality such as predation, disease, other natural causes, or manmade causes such as farming activity or vehicles on county/project roads. The overall effect of these assumption is that the analyses provide a conservative estimate (an over estimate) of mortality due to the studied wind project.

A few wind studies in other regions of the country have provided information on background mortality. During a four-year study at Buffalo Ridge, Minnesota, 2,482 fatality searches were conducted on study plots without turbines to estimate reference mortality in the study area. Thirty-one (31) avian fatalities comprising 15 species were found (Johnson *et al.* 2000). Reference mortality adjusted for searcher efficiency and carcass removal for the study was estimated to average 1.1 fatalities per plot per year. At a second study, pre-project carcass searches were conducted at a proposed wind project in Montana (Harmata *et al.* 1998). Three bird fatalities were found during 8 searches of 5 transects, totaling 17.61 km per search. On average, approximately 1.8 km of transect is searched within the turbine plots in the referenced studies for the Columbia Plateau region (Table 2). The amount of transect searched at the Montana site per search was equivalent to searching approximately 7-9 turbines for the regional studies. The background estimate for observed mortality would be approximately 0.33 per turbine plot per year, unadjusted for scavenging and searcher efficiency. The background mortality information from the Minnesota and Montana studies suggests that the estimates of bird mortality include some avian fatalities not related to turbine collision, and this factor alone would lead to an over-estimate of true avian collision mortality for wind projects.

It should also be noted that the fatality estimates may vary from the expected range based on many factors that may influence bird and bat use of a project site such as habitat, topography, foraging areas, migratory patterns, as well as project characteristics such as turbine size, met towers, proximity to high bird use areas and other site specific and/or weather variables. It is difficult to determine the influence these parameters have on impacts from wind projects; however, because of the general similarities of results from the monitoring studies within the Columbia Plateau Ecoregion (see Table 2) it is generally believed that future direct impacts from new wind development in the region are also likely to be similar.

4.1 Significance of Impacts to Birds

Despite several thousand bird fatalities from 4060 MW of wind power, these impacts are divided across numerous species and groups of species and also across seasons, and thus the overall mortality to any given species or population of a species is substantially less and not expected to be significant.

Passerines
For most studies that have occurred in agricultural settings, a few common species make up the majority of bird observations and fatalities at the site, however, a variety of other species, including migrants, have been recorded as fatalities but typically in low numbers and frequency. The majority of avian deaths (69%) due to wind power facilities in the Columbia Plateau region were of common passerines in mixed agriculture and grassland habitat (see Table 3). Horned larks are the most common fatality at most of the projects studied. For example at the Stateline, Combine Hills, Nine Canyon I, horned larks were 39%, 41%, and 47% of all avian fatalities, respectively and a much higher percentage of the passerine fatalities. Other shrub-steppe and open country passerines such as western meadowlarks and European starling were also found regularly. For example, European starling made up 18% of the fatalities at the Hopkins Ridge project (Young et al. 2007).

Given that most of the mortality will be common species with widespread distribution and large populations, impacts are expected to be to individuals and not populations. For example, over all passerines recorded during the regional monitoring studies, horned lark made up over half (51%) of the fatalities. Assuming this pattern holds for the regional wind development, it could be expected that on average there would be 2,715 horned lark fatalities per year. Local populations of horned larks are difficult to define because of the vast amount of suitable habitat for this species in the Columbia Plateau. Based on data from the USGS Breeding Bird Survey routes in the Columbia Plateau, the long term average was 50.3 horned larks detected for 71 routes in the ecoregion (Saur et al. 2005). Each BBS route covers 25 miles with a survey plot radius of 0.25 mile for a total survey area of roughly 12.5 square miles or 8,000 acres. The total area surveyed in the 71 routes (~568,000 acres) represent ~2.8% of the 20,280,000 acre Columbia Plateau. The annual average observed number of horned larks for the 71 routes was approximately 3,573. Assuming this represents 2.8% of the breeding horned lark population in the Columbia Plateau, the total would be approximately 127,500 horned larks. This is a likely a minimum estimate because horned larks are a small bird that is detected with relatively low probability beyond 200 m. If it is further assumed that the 2,715 horned lark fatalities are spread equally over the year, then roughly one-quarter of these (~679) would be during the breeding season. This represents approximately 0.5% of the breeding horned larks and is not considered significant. It is likely that other background mortality of breeding horned larks is greater than this estimate.

While this example represents a plausible means of addressing potential population impacts under a number of assumptions, it illustrates the low level of effect on the common grassland/agricultural species that have been the most impacted. Similar examples could be used for the other species which illustrate lower effects. For example the BBS data indicates a long term average of 77.61 western meadowlarks for routes in the Columbia Plateau (Saur et al. 2005). Western meadowlark represents approximately 6% of the passerine fatalities at wind projects. Based on similar calculations the impact on the western meadowlark breeding population in the Columbia Plateau would be minor and insignificant. The number of fatalities from other species are even fewer (see Table 3) and unlikely to have any population effects.

Nocturnal Migrants

In general, while modern turbines are getting taller, new wind projects do not appear to have a large impact on migrant birds. Results of marine radar surveys for proposed wind projects have indicated that the vast majority of nocturnal migrants fly at altitudes that do not put them at risk of collision with turbines (Young and Erickson 2006). Also, there have been only two multiple individual mortality events during a migration season reported at newer wind projects in the U.S. At Buffalo Ridge, Minnesota, fourteen migrating passerine fatalities (vireos, warblers, flycatchers) were observed at two turbines during a single night in May 2002 (Johnson et al. 2002), and 33 migrating passerine fatalities (mostly warblers) were observed near one turbine and a well-lit substation at the Mountaineer, West Virginia, wind project in May 2004 (Kerns and Kerlinger 2004). In general for wind projects in the Columbia Plateau, approximately 25% of the fatalities have been considered migrants spread over many species. The most common migrant fatality was golden-crowned kinglet (Table 3). Approximately 9% of the passerine fatalities were of this species. Golden-crowned kinglets are typically associated with tree or wooded habitats during the breeding season so it is assumed that many of the impacted individuals were from surrounding more mountainous ecoregions or populations further north (e.g., Canada). As with horned lark, estimating the potential population size from which these birds came requires a number of assumptions. However, while it is unknown, it is possible that the individual fatalities came from multiple populations in surrounding or more northern ecoregions, thus diluting the impacts on any one population. Other potential migrant species were found in lower numbers. Cumulatively the impacts to migrants would be spread over a much larger population base and are not considered significant.

Raptors

Red-tailed hawk and American kestrel account for more than 69% of the raptor fatalities recorded at the regional wind projects studied (see Table 3). Assuming this trend holds true for all proposed wind projects in the Columbia Plateau, it would be expected that on average 70 red-tailed hawk and 70 American kestrels would be killed each year. Following a similar analysis as that used for horned lark (above) it would be expected that approximately 18 red-tails and kestrels fatalities would occur during the breeding season. An estimate of the breeding population in the Columbia Plateau based on the BBS long-term average data is approximately 6820 breeding red-tailed hawks and 6288 breeding American kestrels. The impact to the breeding population would represent approximately 0.26% and 0.28% respectively. Background mortality for these species is likely higher than this estimate and it is considered insignificant. The other species of raptors have been impacted far less and would represent a much smaller number of fatalities.

Upland Gamebirds

Upland gamebird species represent a higher percentage (18%) of the avian fatality pool in the Columbia Plateau than in other regions in the U.S., although it is believed that many of the fatalities that are recorded are not wind turbine related. A large percentage of the upland gamebird fatalities are feather spots, suggesting the possible cause of death was predation or other non-turbine related cause. The species impacted, ring-necked pheasant, gray partridge, and chukar are introduced species common in mixed agricultural native grass/steppe habitats. Habitat throughout the Columbia Plateau is highly suitability for these species and the large populations likely influence the higher mortality rate for the regional wind projects. As with non-native (non-protected) passerine species, there is generally low concern over impacts to upland gamebirds. These species are regulated by state agencies as game species. Impacts to these species are not expected to be significant and given the vast amounts of suitable habitat and other impacts to these species (i.e., hunting) it is unlikely that fatalities from wind development to these species would be significant.

4.2 Significance of Impacts to Bats

Unlike with birds, there is little information available about populations of bat species. For most species that are not threatened or endangered and have large distributions, very little is known about potential numbers that exist. Results of monitoring studies across the U.S. and Canada have found similar trends in impacts such as risk to bats from wind turbines is unequal across species and across seasons. The majority of bat fatalities at wind projects in the U.S. and Canada have been foliage/tree or forest dwelling long-distance migrant species. Species in the *Lasiurus* genus, hoary bat (*L. cinereus*) in the west and red bat (*L. borealis*) in the east, and silver-haired bats (*Lasionycteris noctivagans*) are the most abundant fatalities found at wind projects. Less common fatalities are of big brown bats and *Myotis* species. Numerous studies across the U.S. and Canada have shown this trend (see Johnson 2005). The highest mortality occurs during what is believed to be the fall migration period for bats from roughly late-July through September. Numerous studies across the U.S. and Canada have also shown this trend (see Johnson 2005). Much lower mortality rates, and particular in the Columbia Plateau Ecoregion, occur in the spring and summer.

More recently however, studies at different location in the U.S. and Canada, appear to indicate that bat mortality is not related to site features or habitat and dissimilar results for ecologically similar projects have been found. While it is hypothesized that eastern deciduous forests in mountainous areas may be the highest risk areas, higher bat mortality has also occurred at wind projects in prairie/agricultural settings (Alberta, Canada) and mixed deciduous woods and agricultural settings (Maple Ridge, New York). For example, a wind project in dryland agricultural prairie type habitats in southern Alberta has reported fairly high observed bat mortality (not corrected for searcher and carcass removal biases) of 12-15 bats per turbine per year or 7-8 bats per MW per year (Baerwald 2006). In contrast, other nearby (within 25 km) wind projects to that site have reported similar bat mortality (1-2 bats per MW per year) to the wind projects studied in the Columbia Plateau Ecoregion (Baerwald, pers. comm.).

Bat mortality in the Columbia Plateau Ecoregion would involve primarily silver-haired and hoary bats (see Table 6), and no impacts to threatened or endangered bat species are anticipated. The regional monitoring studies suggest resident bats do not appear to be significantly affected because in general, very low numbers of resident bat species have been observed fatalities. Hoary bats and silver-haired bats generally occupy forested or treed habitats during the breeding season – habitat distinctly lacking and localized in the Columbia Plateau Ecoregion. Most mortality is observed during the fall migration period and of these migrant species. The significance of this impact on hoary and silver-haired bat populations is difficult to predict, as there is very little information available regarding the overall population size and distribution of the bats potentially affected. Hoary bat and silver-haired bats are widely distributed in North America. In general, mortality levels on the order of 1-2 bats per turbine or per MW are thought to be on individuals and not significant to populations, however, cumulative effects may have greater consequences for long-lived low-fecundity species such as bats. Unlike many avian species that may have multiple clutches of multiple young per year, hoary bats and silver-haired bats likely only raise one or two young per year and only breed once per year (Shump and Shump 1982, Kunz 1982). Bats tend to live longer than birds, however, and may have a long breeding lifespan. The impact of the loss of breeding individuals to populations such as these is generally unknown but may have greater consequences.

Since it is most likely breeding populations from surrounding mountainous/forested ecoregions or from more northern area (e.g., Canada) that are affected at the Columbia Plateau wind projects during the fall migration, the dynamics of these populations would need to be know to predict population effects. If these populations are large and stable the level of impact is not expected to be significant. However, if population trends are decreasing the added impact from wind development may continue to cause population declines. This information is generally unknown and future study is needed before the significance of the impacts can be estimated.

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Draft Habitat Mitigation Plan

Mitigation area location

The site selected for the mitigation area (Figure 1) is a 275-acre area on the floor of Fourmile Canyon to the west of Fourmile Road. Approximately half of this acreage is within the Shepherds Flat Wind Farm (SFWF) site boundary. It is crossed by an existing ranch road that will be improved as a SFWF access road, and by the remnant of an abandoned unimproved ranch road. The submitted typical site layout includes two overhead transmission line crossings, and a corridor reserved for potential overhead transmission in the final project layout. The temporary disturbance areas and the permanent footprint of the project road and transmission lines will not be included in the final mitigation area acreage. Applicant proposes to secure 205 acres as the mitigation area.

Current condition, habitat and use of the mitigation area

The majority of the south portion of the habitat replacement parcel (HRP) has been in cultivation but is currently fallow. This habitat is covered by tumble-mustard, tumbleweed and other weeds, and has been mapped as category 6-Previously Cultivated (6 PC) (Figure 2). The majority of the remainder is mapped as category 4-Grassland (4 GL) although it may actually be 4 PC. This area has either been cultivated or badly burned in the past, as undisturbed areas of Fourmile Canyon are predominantly sage shrub steppe. The dry wash running down Fourmile Canyon is contained within the HRP except for a small segment in the south end of the parcel. Portions of the wash bank are basalt and 2 to 4 feet high. In some locations, scattered big sage and other native vegetation grows in the bottom of the wash and along its edge, and the wash has been mapped as category 2-Wetland Wash (2 WL-W). Two burrowing owl burrows were located within the parcel in the spring of 2007, and are mapped as category 1-Raptor Nest (1 RN). Roads are mapped as category 6-Roads and Parking (6 RP). The 205-acre area under consideration within this parcel contains a typical distribution of habitats:

Habitat	Acres
1 RN	0.23
2 WL-W	15
4 GL	90
6 PC	99
6 RP	0.68

The 6 RP acres shown are due to the abandoned dirt road; the tabulation does not include the proposed SFWF access road.

The site is relatively flat. A band of Kimberly fine sandy loam runs on either side of the dry wash, with Warden silt loam between the Kimberly soil and the lower Canyon slopes (Figure 3). Small patches of Ritzville silt loam, Sagehill fine sandy loam, Quincy loamy fine sand and Xeric torrifluvents are also within the parcel.

Soils	Acres
Kimberly	157
Warden	112
Ritzville	3.5
Sagehill	0.99
Quincy	0.10
torrifluvents	0.02

The HRP is not currently used for agriculture or grazing, and does not appear to be used for any recreational activities. Wildlife use of the 6 PC portion is nearly non-existent, where palatable forage and feed for avian and mammalian species are limited or entirely absent. Common grassland birds, small mammal burrows and deer have been observed in the 4 GL habitat. Loggerhead shrike use sage areas to the immediate east and in Fourmile Canyon to the north of the HRP, and may be finding food resources within the HRP. Reptiles and small mammals may be using the bottom of the wash, but large areas are filled with dried tumbleweed and observations are difficult.

The HRP and the habitat it is to replace

The permanent footprint of the proposed facility in both the typical and worst-case layout is 173 acres (Table 1a) with 171 of these acres category 5 or higher. The total acres of category 4 or higher habitat is 106 and 151 for the typical and worst-case layouts, respectively (Table 1b). For both scenarios, grassland is the predominant subtype impacted (Table 1c). No category 1 or 2 habitat is impacted in either layout.

Applicant believes that the best route to ensure 'no net loss' of habitat categories 4 or higher is to create those habitat categories from lower value habitat, and the HRP was selected specifically for that purpose. The HRP contains some of the worst habitat in the area. However, this circumstance is not due to chemical contamination, poor soil quality or lack of soil—conditions which would prevent significant improvement of habitat quality. The HRP soils are deep and productive, and include those favored for use by Washington ground squirrels. Other special status species are on or near the site, including burrowing owls and loggerhead shrike, and the current habitat provides few resources for their use. The two owl burrows currently within the 6 PC habitat are particularly poorly served. Although the ground around the burrows was relatively clear when they were first sighted in early April, the burrows are now completely obscured by tumble-mustard. The owls prefer sites with much better visibility, and these burrows may not be reoccupied. The HRP site contains the dry wash and its vegetation, with sage stands to the north and east of the HRP. These ensure the site is not isolated from existing wildlife, and improving the site would decrease habitat fragmentation in the Canyon.

Applicant proposes to ensure 'no net loss' to permanently impacted category 4 and 3 habitats by development, within the HRP, of equivalent acreage of category 4 and category 3 habitat. These will fall into the GL and PC subtypes. Applicant proposes to provide 'net benefit' for permanently impacted category 5 habitat by developing the equivalent acreage into category 5 or better habitat in the PC subtype.

When the ‘as built’ for the SFWF is available, development goals will be reassessed against the habitats in which components were placed. This will ensure that the HRP mitigates for habitats actually, rather than theoretically, impacted. Habitat enhancement activities in the initial years of HRP development are necessary to meet habitat replacement goals for the worst-case or typical layout, and will also provide for development of appropriate habitats to replace those actually impacted.

Habitats temporarily impacted

The rating of wind turbine generators under consideration for the SFWF ranges from 1.5 to 3.0 MW, and the duration of facility construction at a rate of 250 MW/year would be 1.8 to 3.6 years. Erection of 150 turbines in less than a year is impractical, and construction of the SFWF is expected to take a minimum of three years.

With a three-year construction period, much of the habitat temporarily disturbed during the first year will have recovered from the impact by the end of construction. Habitat in category 4 grasslands, dryland wheat, and previously cultivated fields are expected to recover in 2 years or fewer with intervention. An analysis of the impact of construction duration and habitat category was performed using the following recovery periods.

Habitat	Recovery	Habitat	Recovery
3 CUR	2 years	3 GL	4 years
3 SS-R	3 years	3 SS-S	10 – 20 years
4 GL	2 years	4 PC	2 years
4 RS	0 years	4 SS-S	10 – 20 years
5 DW	0.5 years	5 PC	0.5 years
5 SS-B	2 years		

A recovery period of 2 years was used for 3 CUR and reflects the nature of the grassland the curlew uses. The habitat category was determined by wildlife use, not by the quality of the vegetation. In the 3 CUR habitat, basalt protrusions and the shallow soil do not support luxuriant growth. The curlew area is heavily grazed by sheep, and these factors all keep grass short and sparse. Evaluating by vegetation quality alone, portions of the 3 CUR grasslands would be category 3 GL, and others 4 GL, and there is no noticible discrimination by the curlews in their use between categories. Disturbed 3 CUR habitat will achieve functionality for curlew well before it reaches 3 GL vegetation diversity.

A HRP of 205 acres provides for ‘no net loss’ of category 3 and 4 habitats from temporary impacts under the typical or worst-case layout (Tables 2a and 2b). At the end of the first year of construction, total disturbance would equal 105 acres in either scenario. This is 100 acres less than the HRP area, in effect providing replacement credit for later impacts. This credit is used up over years 2 – 4, when the sum of permanent and temporary impacts exceeds 205 acres. By year 5, acres of habitat that have not recovered from temporary impacts are few, and total impact falls below 205 acres. Long-term temporary impact after year 5 is between 7 and 15 acres. Applicant proposes to mitigate for these by improving an additional 15 acres within the HRP to category 3 or higher.

The number of acres needed to mitigate for short-term temporary impacts through the fifth year after initiation of construction is 14 acres for the typical layout and 15 for the worst-case layout over the 173 acres needed for permanent impacts. If construction lasts longer than three years, fewer acres will be necessary. Through the fifth year after initiation of construction, the HRP is 2 – 11 acres larger than necessary to mitigate for identified temporary and permanent impacts under the worst-case and typical layout, respectively. After the fifth year, the HRP is 17 – 25 acres larger than necessary to mitigate for permanent and long-term temporary impacts under the worst-case and typical layout, respectively.

In the two layout scenarios, category 5 habitats total 13 to 61 acres (Table 1b) and temporary impacts to them will last less than one year. 'Net benefit' for temporary disruption of category 5 habitat will be provided by retaining the 17 – 25 acre 'excess' within the HRP. Other than that needed for the planned roadway and cattle feed/water station, the balance will be developed to category 5 or higher habitat.

E: Provisions for protection of the HRP for the life of the facility

The HRP landowner is also a landlord of the SFWF, and is willing to cooperate in use of the parcel for the SFWF HRP. Applicant will secure an easement from the landowner for exclusive use of the HRP for a period of 3 years beyond the life of the facility. The three-year extension beyond the project life allows the HRP to be used for mitigation of temporary disturbance caused by any facility decommissioning, after which the landowner can return the HRP to agricultural use. The HRP lease will also provide for removal, at project expense, of any impediments to agricultural use such as Applicant-constructed burrowing owl nest boxes, planted shrubs, perches and fencing.

The HRP will be posted to prevent hunting and trespass. The adjacent road is rarely traveled, and no other protection against unauthorized access is necessary. Cattle access to this part of Fourmile Canyon is prevented by fences and cattle guards. No fencing is currently within the HRP, and areas to be grazed will be enclosed by barbed wire fencing.

The HRP will be included in the SFWF fire protection plan. The road accessing the area at which feed and water will be provided to cattle will be compacted and kept clear of vegetation to prevent vehicle-caused fires. Clearing out the existing dried tumble-mustard and tumbleweed in the 6 PC habitat, or burning it during the appropriate time of year, will significantly reduce the risk of fire on that portion of the HRP. An increase in native species and reduction of cheatgrass through habitat improvement will also help reduce fire risk and severity.

F: Improvement of habitats within the HRP

Applicant intends to lease the HRP and begin habitat enhancement activities as soon as the SFWF Site Certificate is issued. Along with improvement of vegetation cover and diversity, management for attraction of several target species is planned, including the burrowing owl, long-billed curlew, common avian grassland species, the Washington ground squirrel and the grasshopper sparrow. All of these species can use grassland habitats. For most, grassland habitats are either the preferred or predominant habitat used. Monitoring of HRP use by these species will be conducted.

HRP activities are also designed to allow development of category 3 habitat, the highest value impacted. The majority of potentially impacted category 3 habitat occurs in the north project area, which is entirely grazed by sheep. Cattle grazing within the HRP will assist development of habitats of similar characteristics to those being replaced, and benefit efforts to attract target wildlife species. One grazing advantage includes manure, which provides the soil with needed nutrients and organic material, and attracts insects for avian insectivores. Even an artificial water supply rates as category 1 habitat in the region due to its rarity, and will supply water to birds, insects, elk and deer along with cattle (although troughs are generally to small to provide water for bats). With grazing, the preference for short-grass habitat by burrowing owls and Washington ground squirrels adds to the HRP's appeal to special status species. The long-billed curlew nests in short to mid-range grass, and the grasshopper sparrow also prefers mid-range grass heights. Preferred grass heights can be maintained by properly timed grazing in grasslands stocked at an appropriate level, with cattle excluded from some areas during part of the year to provide taller grass. Grazing is a method more conservative of resources than other management options such as mowing or burning.

For the following estimated schedule, each HRP year is assumed to start on January 1. Some seasonal activities may take place during an earlier or later year than shown. The 4 GL and 6 PC habitats will be designated using their current descriptors, even though HRP activities will alter their habitats.

Year 1: Vegetation in the 4 GL section will be examined for areas to which herbicide will be applied. Tumble-mustard and tumbleweed will be treated with a wide-spectrum herbicide with low residual activity such as glyphosate. Any located noxious weeds will be managed as recommended by the Gilliam County Weed Control Program. The first herbicide treatment will take place in the spring when target species can be identified, with a review of treatment efficacy and any necessary re-treatment at the end of spring and once more in early summer. Herbicide applications will be performed by professionals. Applicators of restricted-use products will have the appropriate license.

In the 4 GL section, reseeding of ground currently bare or sparsely vegetated, and areas bare from herbicide treatment, will use no-till methods such as drilling or broadcast seeding. Bluebunch wheatgrass and Idaho fescue would be native grass species appropriate for HRP soils, along with rabbitbrush and/or big sage. Herbicide applications in the 6 PC section will result in loss of sprouting shrubs should they be included in the seed mix. The final seed mix(s) will be determined following consultation with the Oregon State University Extension Service, the Siting Council, the Oregon Department of Agriculture and the Oregon Department of Fish and Wildlife. Both the parcel landowner and the grazing right lessee will have the opportunity to approve or reject species.

Barbed wire fencing enclosing the area planned for cattle grazing will be installed, and a feed/water station constructed. Portions of the wash containing vegetation to be protected from cattle will be fenced. The abandoned farm road or another suitable area will be improved for access to the feed and water station. The road will not be graveled, but will be leveled and compacted to discourage vegetation within it. Initiation of grazing will depend on the minimum number of cattle to which water and feed are economical to transport. The available vegetation needs to accommodate them at a stocking rate consistent with the target habitat categories, a rate that will change with alterations to the habitat. It will be a number of years before the 6 PC portion is suitable for grazing, but it is assumed that there is sufficient 4 GL habitat now to meet the economic threshold. The grazing right will be leased, and the lessee will provide water and feed. As soon as there is water and sufficient grass and fencing, grazing in the 4 GL section can commence.

Feed and water for the cattle will be sited on Warden soil near a slope that has not previously been cultivated. The majority of the west edge of the HRP meets these conditions. Warden soil is known to be favored by Washington ground squirrels, and their association with short-cropped grass and cattle (and their manure) was the most noteworthy aspect of the 2007 Washington ground squirrel surveys of the SFWF site. If the apparent association is actual rather than circumstantial, the proposed arrangement of soil and cattle provides a good opportunity to attract Washington ground squirrels to the HRP.

Removal of dried tumble-mustard and tumbleweed would best be accomplished in the 6 PC area and in the wash by burning in late winter. Sage, primarily occurring along and within the wash, would be protected from burning by clearing the dried vegetation from around them. Weed removal would be followed by cultivation except in identified drainages, and the land would be left fallow for the summer. Herbicide treatment, using a broadleaf herbicide such as 2,4-D, would occur in the spring at the same time the dryland wheat in the area is treated. It may be necessary to reapply broadleaf herbicide later in the spring or early summer. Tumble-mustard and tumbleweed around any native shrubs will be treated with a wide-spectrum herbicide, avoiding application to the shrubs. In the fall, the area will be plowed again if necessary, and planted. Planting will use two passes, each applying seed at half the necessary rate, with the planting directions at an angle to each other. The alignment of grass will appear to be more natural, and bare spots are less likely.

Five nest boxes for burrowing owls will be constructed and installed, along with a short perch post at each. Nest box entrances will be ‘hardened’ as is done in areas where free-roaming dogs dig up burrows. This should protect the burrows against coyotes and will also prevent collapse of the openings by cattle. Two will be installed within 500 feet of the burrows identified in 2007. Perch posts will also be installed at the two existing burrows early in the year, before owls arrive and before any cultivation. The posts will also serve to identify the location of the burrows during plowing so they can be avoided. The constructed nest boxes will not be installed in time for occupation during the first year. Installation of the pair that will be sited near burrows occupied in 2007 will be delayed until after nesting season if the burrows are reoccupied.

Year 2: In the spring, treatment of the 6 PC section with broadleaf herbicide, and spot treating the 4 GL site and areas around 6 PC shrubs with a wide-spectrum herbicide, will take place on the same schedule as in Year 1. Removal of tumbleweed and tumble-mustard along fences and in the wash, by burning or other methods, will also take place. Range condition and cattle impacts will be evaluated and the stocking rate assessed. The 4 GL and 6 PC sections will be evaluated for areas to be scheduled for additional seeding in the fill. Areas in which soil compaction is evident will be deep tilled or ripped, and also reseeded in the fall.

Year 3: It should be possible to suspend broadleaf herbicide treatment of the 6 PC section, and continue spot-treatment with a wide-spectrum herbicide in the 4 GL and 6 PC sections. Tumbleweed and tumble-mustard removal will continue. Range conditions and reseeding needs will also be evaluated. Ten additional burrowing owl nest boxes will be constructed and installed, along with perch posts.

Year 4: General activities are the same as for year 3 (herbicide spot treatment, tumbleweed and tumble-mustard removal, and evaluation of range quality and stocking rate).

Inclusion of the 6 PC section in the area grazed will also be evaluated. Grazing may be advantageous for burrowing owls (i.e. occupation of constructed or natural burrows in the grazed area may be significantly higher than occupation in the un-grazed area). If development of habitat quality within the HRP is satisfactory, the 6 PC section will be fenced for cattle and joined to the area currently grazed.

Year 5 and beyond: Standard annual activity is limited to a spring spot-treatment with herbicides, tumble-mustard and tumbleweed removal, and evaluation of range quality and stocking rate. If institution of grazing in the 6 PC section did not occur in the previous year, the suitability of grazing it will be re-evaluated.

G: Enhancement action success criteria

Wildlife use

Although one enhancement goal is to substantially increase wildlife use of the HRP, other than burrowing owls and Washington ground squirrels no use data for the site exists. During the evaluation of habitat progress in the fourth year after acquisition of the HRP, avian use data and incidental wildlife sightings gathered in the previous three years will be used to develop success criteria for wildlife use by species other than the Washington ground squirrel and burrowing owl.

The success criteria for enhancement of habitat suitable for burrowing owls includes construction and installation of five nest boxes and 7 perch posts by the end of the first year after acquisition of the HRP, and ten more boxes and posts by the end of the third year. Continued success is maintenance of 15 nest boxes, and maintenance of all perch posts in non-grazed habitat. Although optimistic speculation places the number of occupied constructed or natural owl burrows by the 14th year of the HRP at 6, burrowing owl habitat enhancement success criteria are limited to installation of nest boxes and perching posts.

Enhancement actions related to Washington ground squirrels include installation of the cattle feed and water station on Warden soil at the west edge of the HRP, and commencement of grazing. The success criterion is initiation of cattle grazing no later than the end of the 4th year following HRP acquisition. No predictions about eventual Washington ground squirrel use of the HRP are made.

Vegetation and habitat categories

Estimation of HRP habitat category development contains the following assumptions for the maximum rate (with year 0 the 2007 condition): one acre will be needed for road access for cattle feed and watering and 5 acres designated as 6 AF for the immediate feed and water area; half of category 5 PC habitat can advance to category 4 condition in three years, and half of category 4 GL or 4 PC habitat can advance to category 3 GL in three years. This would develop habitat category acreage equivalent that impacted by construction of the facility in approximately three years for the typical layout and 14 years for the worst-case layout.

Maximum rate of habitat development within the HRP

Subtype	Year 0 (acres)	Year 1 (acres)	Year 2 (acres)	Year 3 (acres)	Year 4 (acres)	Year 8 (acres)	Year 11 (acres)	Year 14 (acres)
1 RN	0.23	0.23	0.35	0.35	0.46	0.58	0.69	0.69
2 RN		0.58	0.46	1.6	1.5	1.4	1.3	1.3
2 WL-W	15	15	15	15	15	15	15	15
3 GL				45	45	67	101	125
4 GL/4 PC	90	90	90	45	45	69	57	46
5 PC		93	93	93	93	46	23	12
6 PC	99							
6 AF		5.0	5.0	5.0	5.0	5.0	5.0	5.0
6 RP	0.68	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Totals	**205**	**205**	**205**	**205**	**205**	**205**	**205**	**205**

As in evaluation of the SFWF habitats, use of the HRP by special status species will result in reassignment of that area to the appropriate category regardless of the condition of surrounding vegetation.

No success criteria were formulated for development of category 1 or 2 RN habitat other than for construction of next boxes (above). Two known burrowing owl nests are within the HRP, and 15 burrowing owl nest boxes will be constructed. Occupied natural burrows or constructed nest boxes meet the definition of category 1 RN. Unoccupied burrows known to have previously hosted burrowing owls, and unoccupied constructed nest boxes, meet the definition for category 2 RN. Although Applicant is not aware of any structures within the HRP suitable for raptor nesting, in the course of the 2007 Washington ground squirrel and burrowing owl survey a ground-nesting Swainson's hawk was discovered. Nesting within the HRP by raptor species other than burrowing owls cannot be ruled out, but it will not be encouraged. Occupied nests will be categorized as 1 RN, and previously occupied nests as 2 RN.

Alterations to category 2 WL-W are limited to clearing out tumble-mustard and tumbleweed, and making it more accessible to wildlife through alteration of the surrounding habitat. No change of categorization is anticipated, and no criteria for success evaluation formulated. This habitat is expected to have a positive impact on surrounding habits under development by providing seeds for native species not included in the seeding mixture.

Success criteria for category 3 and 4 GL vegetation rely on the measured vegetative cover and native species presence now existing in the habitats replaced. Seventeen sample plots in the 3 CUR habitat, three in 3 GL habitat, and fourteen in 4 GL habitat have been assessed for plant coverage and proportion of coverage provided by native species. These provide the basis for HRP vegetation evaluation.

Vegetation assessments show that bare ground in the 3 CUR subtype averages 13%, and native plant species provide an average of 52% of the vegetative coverage. The results for 3 GL are similar, with 22% bare ground and 59% of the vegetative coverage provided by native species. The criteria for development of category 3 GL habitat within the HRP are less than 25% bare ground and 55% native species coverage. Native species coverage provided by native shrub vegetation outside of the wash (sage, purshia or rabbitbrush) increases the percentage of acceptable bare ground and reduces the percentage of acceptable coverage provided by alien species by 4 times the shrub coverage percent.

Category 4 GL vegetation was evaluated at 14 locations, and it provides an average of 11% bare soil with 24% of the plant coverage provided by native species. The criteria for development of category 4 GL within the HRP are: less than 15% bare soil, and 25% of the vegetation coverage provided by native species. Appearance of a significant number of existing or new native shrubs in this habitat is an indication that the immediate area should be re-evaluated for classification to a different category and/or subtype.

The criteria for development of category 6 PC into category 5 PC is the action of initial plowing and herbicide treatment, with coverage by broadleaf weeds to total less than 20% of the area in the first year as category 5 PC and 10% or lower thereafter. Weed coverage will be measured by simple inspection.

<u>Evaluation of overall HRP progress and success</u>

Acreage criteria for evaluation of overall success will vary based on the status of SFWF construction. If construction is complete, criteria for category acreage to be developed to assure ‘no net loss’ and those developed to assure ‘net benefit’ will be based on long-term temporary and permanent impacts to the currently mapped habitat caused by the ‘as built’ layout.

If a substantial portion of construction is complete, long-term temporary and permanent impacts from the constructed portion will be determined. The same ratio of habitat category and subtype acres impacted by the current worst-case layout will be used for the remainder. If construction has not started or is in its early stages, the worst-case layout will determine category acreage development goals.

At the end of the fourth year, the criteria for measuring the progress of habitat replacement is improvement to 3 or higher categories acreage sufficient to replace a minimum of 35% of permanently impacted category 3 habitat, an equal acreage improved to category 4, and the remaining acreage not occupied by the 6 RP and 6 AF habitat improved to category 5 or higher.

In the eighth year, progress criteria are development to 3 or higher categories acreage sufficient to replace a minimum of 50% of the category 3 habitat permanently impacted by SFWF construction, advancement to category 4 habitat an equal acreage, and other than 6 RP and 6 AF habitats the remaining habitat at category 5 or higher.

In the eleventh year, the progress criteria are development to 3 or higher categories sufficient acreage to replace 75% of the permanently impacted category 3 habitat, and no increase in category 5 PC, 6 RP or 6 AF acres. In the fourteenth year, the progress criterion is replacement of all category five or higher habitat with permanent or long-term temporary impacts by an equivalent acreage of the same category or better habitat, signifying successful completion of habitat development.

At the end of each 10-year period thereafter, continued success is defined as maintaining all habitats that are category 5 and higher at acreages sufficient to replace permanently impacted habitat with the same or higher category habitat.

H: Monitoring of installations and vegetation

The following will be examined annually for the life of the HRP:

- The condition of the gate(s), fence wire and posts. To ensure the cattle remain confined, deteriorated posts and missing wire will be replaced;
- The water tank and feed station. Excessive leaking and broken boards will be repaired or replaced;
- The access road. It will be leveled and compacted if it is deteriorating, and vegetation appearing within the roadway treated with herbicide;
- Trespass postings. Missing or illegible signs will be replaced.
- Vegetation will be qualitatively assessed for adjustments of stocking rate and the need for herbicide use or spot-reseeding.

During burrowing owl surveys (see wildlife surveys, below) the condition of constructed nest boxes and perch posts will be evaluated, and repaired or replaced when necessary. If cattle are found to consistently knock some perch posts over, frequency of post use by owls in the grazed area may indicate they are not needed in areas of high cattle use.

Vegetation status will be quantitatively evaluated 4, 8 and 11 years after HRP acquisition, and then at 10-year intervals for the life of the HRP. Vegetation coverage and species diversity will be measured at 10 locations, 5 each in the 6 PC and 4 GL sections, using methods similar to those described in Attachments J-1 and P-4.

I: Mitigation of failure to develop habitat of adequate quality

The HRP contains sufficient acreage, but the proposed activities may not be adequate to develop replacement habitat categories within the desired time frame. If a high proportion of the HRP needs to be developed to category 3 or higher habitats, as in the worst-case layout, this acreage will take the longest time to develop and is the most likely to lag behind.

At the first failure to meet the criteria described in 'Evaluation of overall HRP progress and success', activities in the interval until the next assessment will focus on correcting identified shortfalls. If native species coverage is too low in comparison to alien species, alteration of grazing practices, increased monitoring for specific weeds and increased herbicide applications, and reseeding with a different native grass species mix are possible options. The appropriate action(s) depend on the alien and native species identified in the vegetation samples. If too much bare soil is present, reseeding of the affected areas will use a seed mix containing the native species that were most successful in the initial seeding.

If the next vegetation analysis shows continued failure to meet progress goals, and the acreage shortfall is less than 20% of the target, actions to correct measured shortfalls will be adjusted and continued. If the shortfall is greater than 20%, and it is due to fire, herbicide overspray, drought or another acute cause, vegetation in the affected areas will be restored. Restoration methods will be based on the techniques initially used, and will incorporate improvements gained from experience with the HRP.

If there is no identified cause for the shortfall, mitigation methods will require evaluation of the soil and/or the existing vegetation to identify the problem. Oregon State University Extension specialists will be consulted in an attempt to discover the underlying cause. Soil nutrients, physical properties and other soil characteristics will be tested as appropriate, and plant growth examined for evidence of herbicide residues or disease and insect problems. The information gained will guide mitigation measures, and may include the need to increase HRP acreage to compensate for uncorrectable soil problems.

J: Pre- and post-construction wildlife surveys

The HRP was surveyed for burrowing owls and Washington ground squirrels in spring of 2007, and for raptor nests in 2003 and 2004. A survey for burrowing owls and other raptor nests, and avian use measurement at three point-count stations, will be performed every year from HRP acquisition through the 2^{nd} year after completion of SFWF construction. Wildlife observed incidentally during these studies will be recorded. The burrowing owl/raptor nest survey and one set of point-count observations will occur in spring during raptor nesting season. Two more sets of point-count observations will occur in late spring and early summer during grassland species nesting season. The same surveys will also be conducted in the fifth year after completion of SFWF construction. After the fifth year, a burrowing owl/raptor nest survey, and the early spring point-count observations, will occur at five-year intervals for the life of the project, and reconnaissance for Washington ground squirrels in grazed areas along the west border of the HRP will be performed on the same schedule.

Table 1a: Disturbance impacts for individual habitat categories and subtypes

Category and subtype	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
1 Raptor nest	0.57	0	0	0	0
1 Washington ground squirrel	1.1	0	0	0	0
2 Raptor nest	0.92	0	0	0	0
2 Shrub steppe – sage	78	0	0	0	0
2 Washington ground squirrel	22	0	0	0	0
2 Wetland-wash	6.3	0	0	0	0
3 Curlew	6444	37	43	92	88
3 Grassland	736	5.3	5.1	22	16
3 Shrub steppe – purshia	4.3	0	0	0	0
3 Shrub steppe – rabbitbrush	122	1.5	1.5	4.1	3.6
3 Shrub steppe – sage	261	4.1	4.4	7.2	8.6
4 Grassland	6116	54	56	23	19
4 Previously cultivated	522	3.1	2.5	2.9	1.7
4 Rock and soil	149	0.33	0.53	0.29	0.16
4 Shrub steppe-sage	29	0.010	0.29	0.013	0.36
5 Dryland wheat	6598	54	50	18	11
5 Previously cultivated	585	9.5	7.5	1.4	1.0
5 Shrub steppe – broom snakeweed	263	2.5	3.1	0	0
6 Animal facility	74	0.24	0.35	0	0
6 Previously cultivated	95	0.23	0.34	0.56	0.33
6 Road and parking	244	0.61	0.70	1.4	0.98
6 Structures	39	0.23	0.18	0.26	0.16
Total	**22390**	**173**	**176**	**173**	**151**

Table 1b: Disturbance impacts for individual habitat categories

Category	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
1	1.6	0	0	0	0
2	107	0	0	0	0
3	7568	48	54	125	116
4	6816	57	60	26	21
5	7445	66	61	20	13
6	452	1.3	1.6	2.3	1.5
Total	**22390**	**173**	**176**	**173**	**151**

Table 1c: Disturbance impacts for individual habitat subtypes

Subtype[1]	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
Raptor nest	1.48	0	0	0	0
Washington ground squirrel	22.6	0	0	0	0
Wetland-wash	6.3	0	0	0	0
Grassland	13818	100	107	136	124
Shrub steppe – purshia	4.3	0	0	0	0
Shrub steppe – sage	369	4.1	4.7	7.2	9.0
Shrub steppe – rabbitbrush	122	1.5	1.5	4.1	3.6
Shrub steppe – broom snakeweed	263	2.5	3.1	0	0
Rock and soil	149	0.33	0.53	0.29	0.16
Agricultural	7182	63	58	20	13
Disturbed	452	1.3	1.6	2.3	1.5
Total	**22390**	**173**	**176**	**173**	**151**

1. Category 4 PC and 3 CUR were added to the grassland subtype, and category 6 PC and 6 AF added to disturbed. Agricultural includes 5 DW and 5 PC.

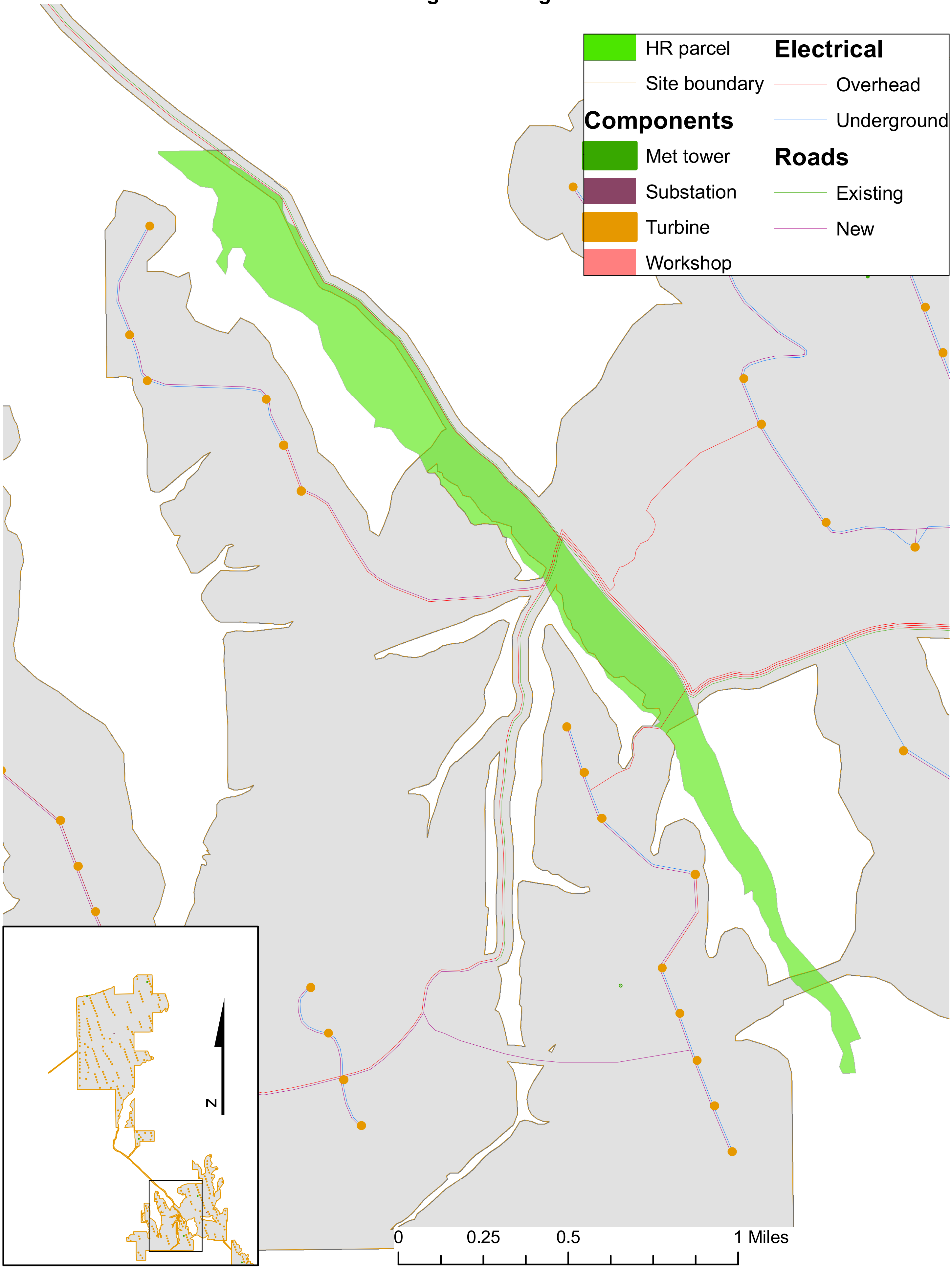
Table 2a: Worst-case layout disturbance impacts

Category & subtype	Impacted acres Year 1			Impacted acres Year 2			Impacted acres Year 3			Impacted acres Year 4			Impacted acres Year 5		
	perm	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**
3 CUR	31	29	60	61	59	120	92	59	150	92	29	121	92	0	92
3 GL	7.3	5.2	12	15	10	25	22	16	37	22	10	32	22	5	27
3 SS-R	1.4	1.2	2.6	2.8	2.4	5.2	4.1	3.6	7.8	4.1	2.4	6.5	4.1	1.2	5.3
3 SS-S	2.4	2.9	5.3	4.8	5.8	11	7.2	8.6	16	7.2	8.6	16	7.2	8.6	16
4 GL	7.6	6.3	14	15	13	28	23	13	35	23	6.3	29	23	0	23
4 PC	0.97	0.55	1.5	1.9	1.1	3.0	2.9	1.1	4.0	2.9	0.55	3.5	2.9	0	2.9
4 RS	0.10	0	0.10	0.19	0	0.19	0.29	0	0.29	0.29	0	0.29	0.29	0	0.29
4 SS-S	0.01	0.12	0.13	0.01	0.24	0.25	0.01	0.36	0.38	0.01	0.36	0.38	0.01	0.36	0.38
5 DW	6.1	1.9	8.1	12	1.9	14	18	1.9	20	18	0	18	18	0	18
5 PC	0.46	0.17	0.63	0.91	0.17	1.1	1.4	0.17	1.5	1.4	0	1.4	1.4	0	1.4
5 SS-B	0	0.01	0.01	0	0.01	0.01	0	0.01	0.01	0	0.01	0.01	0	0	0
Total	**57**	**48**	**105**	**114**	**93**	**207**	**171**	**103**	**273**	**171**	**58**	**229**	**171**	**15**	**186**

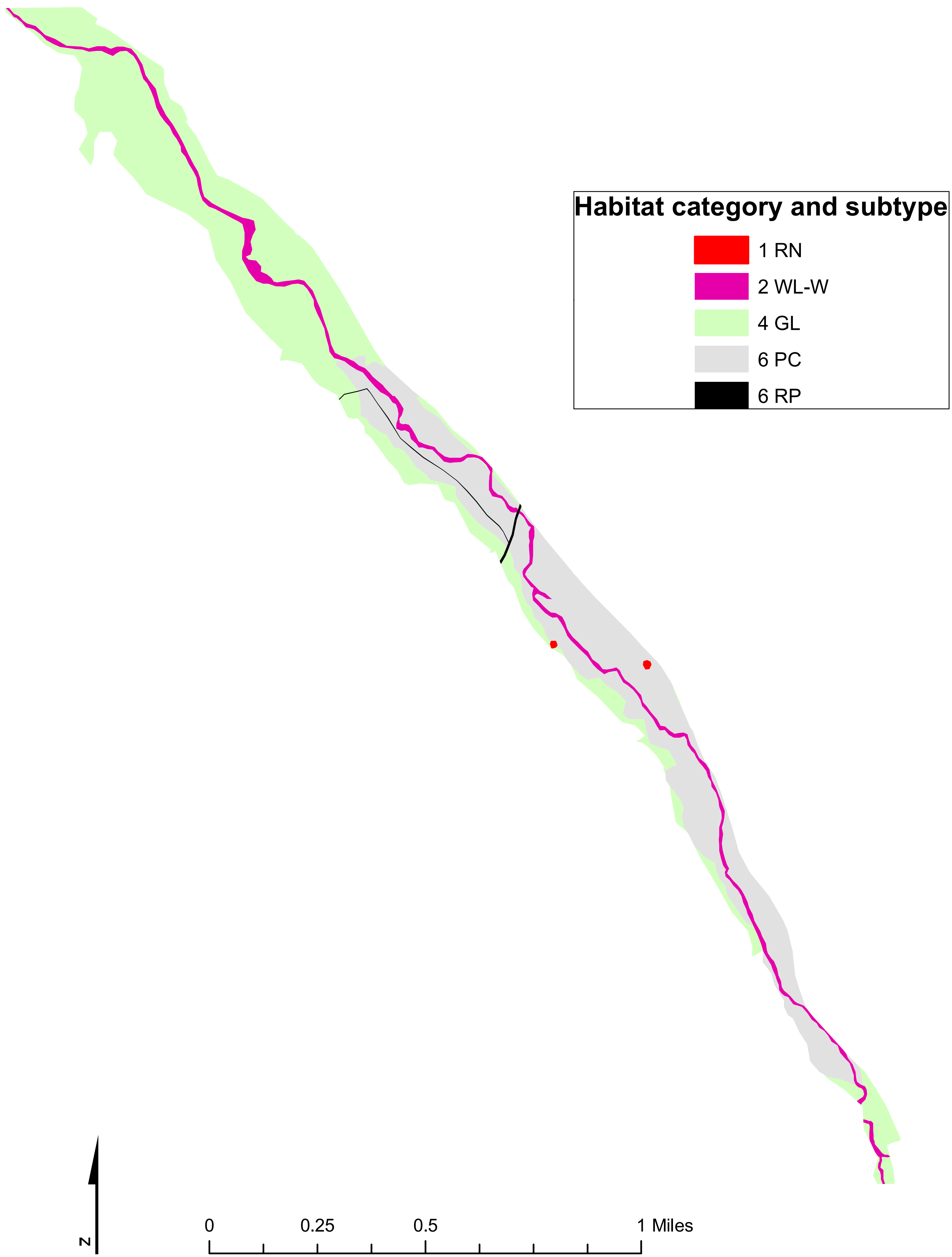
Table 2b: Typical layout disturbance impacts

Category & subtype	Impacted acres Year 1			Impacted acres Year 2			Impacted acres Year 3			Impacted acres Year 4			Impacted acres Year 5		
	perm	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**
3 CUR	12	14	27	25	29	54	37	29	66	37	14	52	37	0	37
3 GL	1.8	1.7	3.5	3.6	3.4	6.9	5.3	5.1	10	5.3	3.4	8.7	5.3	1.7	7.0
3 SS-R	0.49	0.49	0.98	0.97	0.98	2.0	1.5	1.5	2.9	1.5	0.98	2.4	1.5	0.49	2.0
3 SS-S	1.4	1.5	2.8	2.7	2.9	5.7	4.1	4.4	8.5	4.1	4.4	8.5	4.1	4.4	8.5
4 GL	18	19	37	36	38	73	54	38	91	54	19	73	54	0	54
4 PC	1.0	0.83	1.9	2.0	1.7	3.7	3.1	1.7	4.7	3.1	0.83	3.9	3.1	0	3.1
4 RS	0.11	0	0.11	0.22	0	0.22	0.33	0	0.33	0.33	0	0.33	0.33	0	0.33
4 SS-S	0	0.10	0.10	0.01	0.19	0.20	0.01	0.29	0.30	0.01	0.29	0.30	0.01	0.29	0.30
5 DW	18	8	26	36	8.3	44	54	8	62	54	0	54	54	0	54
5 PC	3.2	1.3	4.4	6.4	1.3	7.6	9.5	1.3	11	9.5	0	9.5	9.5	0	9.5
5 SS-B	0.83	1.0	1.9	1.7	2.1	3.8	2.5	2.1	4.6	2.5	1.0	3.5	2.5	0	2.5
Total	**57**	**48**	**105**	**114**	**87**	**201**	**171**	**91**	**262**	**171**	**44**	**215**	**171**	**6.9**	**178**

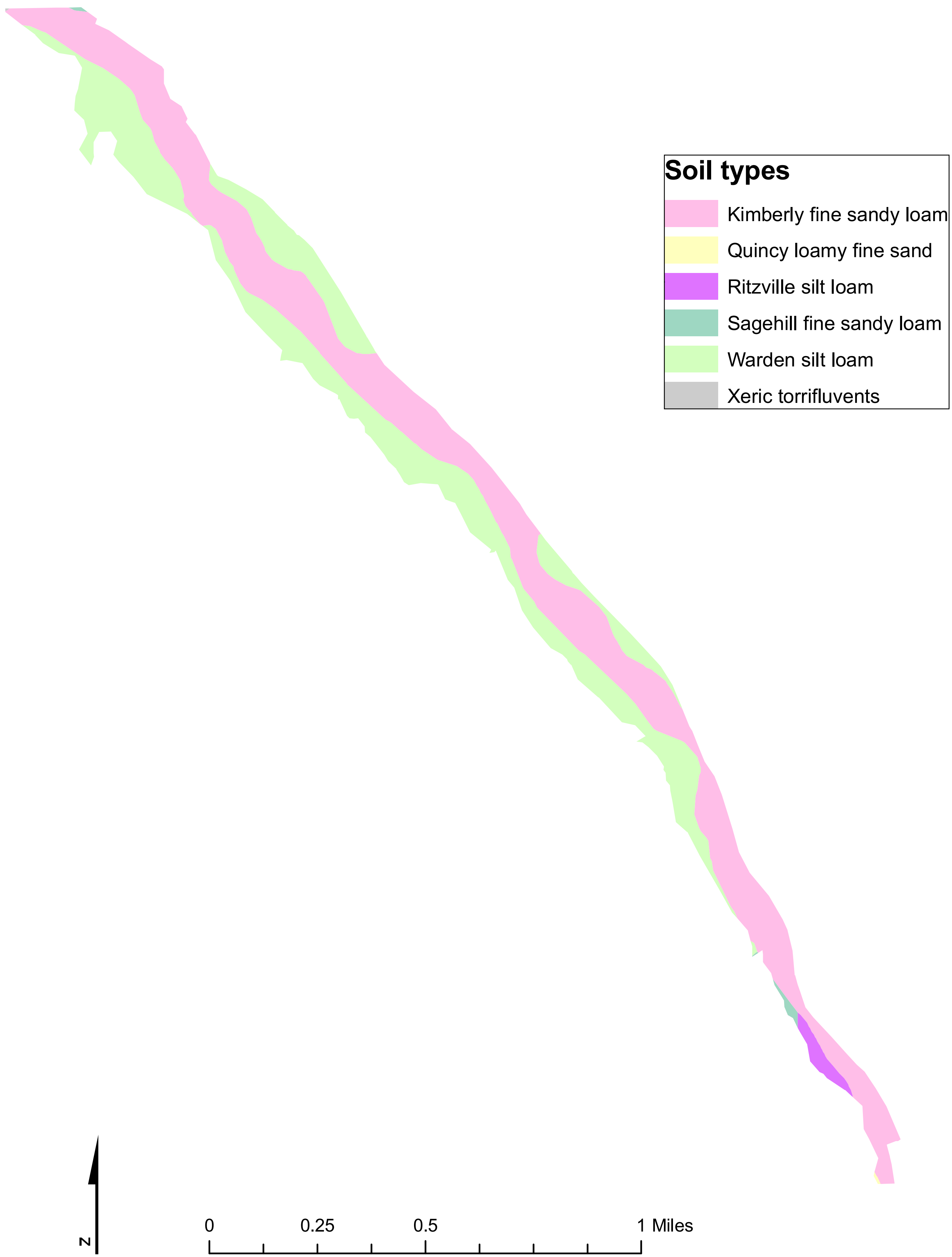
Attachment P-7 Figure 1: Mitigation area location



Attachment P-7 Figure 2: HRP habitats



Attachment P-7 Figure 3: HRP soils



Draft Wildlife Monitoring and Mitigation Plan

After review, Applicant has determined that developing a plan that would break new ground in post-construction avian monitoring is not in the best interest of the Shepherds Flat Wind Farm (SFWF). The following plan is based generally on standard monitoring studies and procedures, and more specifically on portions of the Klondike III plan. The benefits of such a plan include ready comparison of the study results to results from facilities located in similar habitats and ecoregions, and for general comparison to all other wind facilities similarly monitored. Standard monitoring also provides regulators and interested parties a product with which they are familiar. The shortfalls of such a monitoring program are: the study product is a tabulation of dead birds and bats found within a specified distance from turbines, usually without analysis of background or natural avian and bat mortality in the area or any certainty that the the death was related to a facility-associated cause; and determination of the relationship between these tabulated carcass numbers and potential population-level effects is tenuous at best.

Applicant has proposed measures to avoid any impact to all identified habitat important for raptors, including trees and rock walls, and all identified habitat important for Washington ground squirrels, and to minimize impacts to the sage habitat important to the greater sage grouse, black-throated sparrow, loggerhead shrike, sage sparrow and bighorn sheep (Exhibit P). Effects to and recovery of impacted vegetation in all habitats will be monitored throughout the project's life (Exhibit P). Monitoring of habitat use by all avian species and by Washington ground squirrels is proposed within the Habitat Replacement Parcel for the life of the project (Attachment P-7). Monitoring of on-site Washington ground squirrel habitat and monitoring to estimate the mortality of any avian species are described, below. No other monitoring of habitat important to raptors, state sensitive species or Washington ground squirrels is proposed.

Washington ground squirrel monitoring

From issuance of the SFWF site certificate through the second year after the facility is commercially operational, the status of the colony complex located within the site boundary will be assessed annually. This assessment will take place when the squirrels are active, approximately mid March through May.

The located burrows represent a small outpost of the larger complex off-site. It may expand or contract over the survey years as rainfall and vegetation affect the total population of the complex. There should be sufficient data collected before facility components are installed in the colony's vicinity to gain some indication of natural colony fluctuation. The extent of the on-site colony will be determined, and the number of squirrels present estimated. The surroundings will be examined for evidence of project-caused conditions that might increase erosion or result in a decline in vegetation quality and adversely impact the colony.

Washington ground squirrel mitigation

The only planned mitigation measure other than those already in place (Exhibit P) is establishment and enforcement of a 5 MPH speed limit on any road abutting the identified category 2 Washington ground squirrel habitat. Vehicular traffic is expected to be the only source of project-related squirrel mortality, and this speed limit should avert any vehicle strikes even to squirrels darting across the roadway. Should any facility-related Washington ground squirrel mortality occur, or should colony contraction be measurably greater than normal fluctuation after facility construction, additional mitigation measures will be determined through discussions with the Siting Council and with the Oregon Department of Fish and Wildlife. Such measures may include protection of Washington ground squirrel critical habitat, sponsorship of needed research or, for vehicular collision, abandonment of the road and construction of an alternate.

Avian fatality monitoring

Fatality monitoring will be performed by an independent contractor experienced in data collection, data quality and documentation methods, and in performing mortality calculations. These studies will be performed in a manner that minimizes agricultural crop loss or interference with agricultural and ranching activities.

<u>Fatality monitoring methods</u>

Search frequency

The seasons used will correspond to those used for avian point counts, with fall defined as August 16 to October 31, winter as November 1 to March 15, spring as March 16 to May 15, and summer as May 16 to August 15. Two searches per month will be performed in spring and fall, and one per month in summer and winter. Searches will be performed for two years; the first year will begin one month from commencement of commercial operations, and the second year of searches will directly follow the first.

Search plots

Circular search plots will be used, and will have a radius equal to half the maximum blade tip height of the installed turbine model. Approximately 30% of the installed turbines will be searched, proportionally distributed among habitat categories and subtypes, with the turbines to be searched randomly selected among those in each category and subtype combination. On the second year of carcass searches, those searched the first year will be eliminated from the pool of turbines to be searched, and a different set of turbines selected. Over the two years of proposed facility searches, 60% of the installed turbines will be searched.

Carcass searches

Trained searchers will walk transects approximately 20 feet apart and flag all bird or bat carcasses discovered. In the first search of each turbine, located carcasses will be removed and not included in the data set used to calculate facility mortality. Flagged carcasses will be removed from the area and handled according to U.S. Fish and Wildlife Services direction. Carcasses are defined as a complete carcass or body part, 10 or more feathers, or three or more primary feathers in one location. When parts of carcasses and feathers from the same species are found within a search plot, use of relative positions will assess whether or not these are from the same fatality.

Located carcasses will be photographed, and the nearest two or three structures (turbine, power pole, fence, building or overhead line) identified and distances to them recorded. The species and age of the carcass will be determined when possible, the extent to which it is intact, and an estimation of time since death. All evidence that might assist in determination of cause of death, such as evidence of electrocution, vehicular strike, wire strike, predation or disease, will be described. When assessment of the carcass is complete, all traces of it will be removed from the site.

Bias trials

Carcass removal: the removal rate (by scavenger, plowing or other activities) of dead bats or birds from the search plots will be measured by placing carcasses representative of large, medium and small-bodied species at specific locations, and assessing the rate at which no evidence of their presence is evident (in a standard carcass search the location would no longer be classified as containing a carcass). The preferred source of test carcasses is from those recently found in standard carcass searches, but game birds and other legal sources of avian species with the same coloration and size attributes of species found within the site boundary may be used. To prevent inclusion of test carcasses in mortality searches, prior to distribution of the carcasses feathers will be clipped, or other identifiable markings will be applied. During each of the two years of fatality monitoring, one carcass removal study will be conducted during each season, involve 10 to 15 carcasses each, proportionately distributed among habitat categories and subtypes. Carcass removal study plots will be placed at least 1000 feet from any search plots.

An approximate schedule for assessing removal status is once daily for the first 4 days, and on days 7, 10, 14, 21, 30 and 45. This schedule may be adjusted depending on actual carcass removal rates. The condition of scavenged carcasses will be documented during each assessment, and at the end of the trial all traces of the carcasses will be removed from the site. Scavenger or other activity could result in complete removal of all traces of a carcass in or distribution of feathers and carcass parts to several locations. This distribution will not constitute removal if evidence of the carcass remains within an area in which it would be discernable to a searcher during a normal survey. If it is likely a scattered carcass would be determined to be two or more carcasses during a turbine search, correction for carcass removal bias will also address carcass 'generation' bias.

Searcher efficiency: The ability of the search team to detect carcasses within search plots will be assessed by placing carcasses representing small through large-bodied species within plots to be searched. Recently located carcasses are preferred for this evaluation, but game birds and other legal sources of avian species with the same coloration and size attributes of species found within the site boundary may be used. Marking of these carcasses to differentiate them from others that may be found within the search plot will follow methods similar to those used to mark removal test carcasses as long as the procedure is sufficiently discreet and does not increase carcass visibility. During each of the two years of fatality monitoring, one searcher efficiency study will be conducted during each season, and involve 40 carcasses each with 1 – 3 carcasses placed per search plot.

Test carcasses will be placed randomly within search plots on the day the plots are to be searched. The searchers will not be notified of carcass placement or test dates, and the numbers of carcasses located and missed will be tabulated. Following plot searches, all traces of test carcasses will be removed from the site.

Mortality calculations

Calculation procedures will follow those in use at the time facility construction is complete, and are expected to be similar to those used for monitoring of the Stateline Wind Project[1] or the Combine Hills Turbine Ranch.[2] Carcasses will be omitted from the mortality calculation when a non-facility related cause of death is probable. All others found within search plots will be included. Adjusted mortality (bias corrections included) will be calculated on a per-MW basis for all avian species combined, and separately for raptor, passerine, nocturnal migrant, upland gamebird, waterfowl and waterbird species groups. Mortality will also be calculated for individual raptor species.

Incidental carcasses

Study or facility personnel may discover carcasses within the facility boundary unrelated to fatality searches. The carcass will be documented as for search plot carcasses. If the carcass is located outside of a search plot, all traces of the carcass will be immediately removed. If the carcass is within a search plot, it will be documented *in situ*, appropriately marked, and left until the next scheduled search. This will provide searcher detection and scavenger removal information derived from an authentic carcass, and will be used to evaluate the accuracy of rates derived using test birds.

Incidental carcasses found outside of study plots will not be tabulated among those used to determine overall mortality but will be separately reported. Incidental carcasses found within search plots will be included in mortality calculations.

Injured birds

If possible, injured native birds will be captured and transported to a wildlife rehabilitation facility. Capture, transport, and treatment will be performed by trained professionals. Applicant will bear any associated cost.

Mitigation of avian mortality impacts

If any raptor carcass is found with evidence mortality was caused by wire strike or electrocution caused by a facility-owned transmission line, Applicant proposes immediate measures to avoid recurrence. For wire strike, avian line markers will be installed on transmission lines. For electrocutions, perch guards or other deterrents will be applied to the pole.

Cumulative impact analysis (Exhibit P-6) indicates no population-level impacts to avian species are expected from mortality levels experienced at wind facilities in the Columbia Plateau ecoregion. Mortality within the range found during monitoring of facilities in the region provides an indication of levels that are expected to cause impacts to individual birds but not to the species, and these mortality data used as a guide in SFWF mortality assessments.

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[1] Stateline Wind Project Wildlife Monitoring Final Report (2004). Western EcoSystem Technology, Inc. and Northwest Wildlife Consultants, Inc.

[2] Young, Jr., D.P., J.D. Jeffrey, W.P. Erickson, K. Bay, K. Kronner, B. Gritski and J. Baker. Combine Hills Turbine Ranch Wildlife Monitoring First Annual Report (2005).

Avian and bat mortality estimates for facilities in the Columbia Basin ecoregion

	Mortality (deaths/MW/year)	
Species/group	**Mean**	**Maximum**
Raptors	0.05	0.14
Nocturnal migrants	0.43	0.73
All avian species	1.9	2.9
Bats	1.4	2.5

If the total or species group mortality at the SFWF does not exceed the maximum levels experienced by other facilities in the ecoregion, one can conclude the adopted mitigation measures for facility siting and construction (Exhibits P and Q) were effective. At the end of two years of carcass searches, SFWF average annual mortality will be compared to ecoregion mortality. Should SFWF mortality for any group exceed the ecoregion maximum, or should mortality for any one species exceed the ecoregion mean for the group, additional mitigation may be appropriate.

Such mitigation will be guided by discussions with the Siting Council and the Oregon Department of Fish and Game. Depending on the species, these discussions may also include the U.S. Department of Fish and Wildlife. The habitat replacement parcel (Attachment P-7) is expected to offset impacts to some avian species (e.g. the burrowing owl), and wildlife surveys of the parcel will indicate if these sufficiently mitigate for the mortality level experienced. There also may be specific habitat enhancement activities within the parcel that could provide such mitigation. If additional mitigation methods are appropriate, they should benefit the species or group affected and could include sponsorship of research or protection of critical nesting habitat.

RAI#3, P10: FISH AND WILDLIFE HABITAT

[Comment: ODOE will provide a discussion draft that reformats your draft in a document similar to the WMMP for Leaning Juniper II. We anticipate several iterations of the discussion draft before the application is complete.]

(Follow-Up)

A. Please confirm whether you propose to calculate fatality rates in a manner that is identical to the calculations laid out in the LJ WMMP (if you are proposing a different method, please explain).

B. You have not included any ongoing program for reporting and handling incidental avian or bat fatality finds by facility personnel during facility operation. Are you proposing not to monitor or report those finds?

WILDLIFE MONITORING

A. The fatality calculation formulas described in the Leaning Juniper Wildlife Mitigation and Monitoring Plan are the same as those used by Western EcoSystems Technology, Inc. (WEST) in many fatality monitoring reports, including those for the Klondike I, Nine Canyon, and Stateline facilities. An alternate calculation for estimation of carcass removal rates has been discussed during development of the California Energy Commission's guideline document for avian risk reduction (in preparation). There is a high probability that WEST will be engaged to perform the mortality study for the Shepherds Flat Wind Farm, but use of another firm is also possible. Different firms use different notation for their formulas, and other than those used for adjustments for scavenging they are usually mathematically identical. One example is a fatality report released in 2007 by Curry and Kerlinger, LLC.[1] This group is also very active in post-construction monitoring of wind facilities. They use different notation for searcher efficiency and facility mortality estimates, but these formulas are mathematically equivalent to those used by WEST. However, the approach used by Curry and Kerlinger for scavenging correction is different, in both notation and mathematics, than that used by WEST. Both approaches are valid. The exact formulas to be used in mortality calculations for the Shepherds Flat Wind Farm will be discussed with statisticians in the firms considered for the work.

B. Applicant is not proposing an ongoing program for monitoring avian fatalities after the formal two-year study. The Wildlife Response and Reporting System (WRRS) originally discussed in the February 12 2007 Exhibit P submission was an adjunct to the proposed 10-year raptor and curlew nesting surveys and horned lark census. As these long-term studies did not provide an assessment of fatality rates, the WRRS was intended to warn of unusual levels or patterns of

[1] Annual Report for the Maple Ridge Wind Power Project, Postconstruction Bird and Bat Fatality Study – 2006. Curry and Kerlinger, LLC, 2007. http://horizonwind.com/projects/whatwevedone/mapleridge/documents/06-25-07_MapleRidgeAnnualReport2006.pdf

avian or bat mortality. A standard carcass search study is contained in the current program, and the WRRS was eliminated when the long-term studies were eliminated. Although no formal ongoing program is proposed, if bird or bat carcasses are incidentally found on the site by project employees Applicant will comply with existing state and federal law. Applicant will report carcasses of any species covered by the migratory bird treaty or the eagle protection act to the U.S. Fish and Wildlife Service, and report any state-listed species or state species of concern to the Oregon Department of Fish and Wildlife.

P11

These attachments appear to assess impacts associated with the "Shepherds Ridge Wind Farm." Please explain how the information in these attachments could be useful to the Council's consideration of the proposed SFWF.

DUPLICATE INFORMATION

Attachments P-2 and P-3 refer to the Shepherds Ridge Wind Farm, a proposed facility that included some land now within the site boundary of the proposed Shepherds Flat Wind Farm (SFWF).

These attachments were included to ensure the completeness of the public record with respect to the site and surrounding area, but because the information is repeated in Attachment P-1, and the potential raptor corridor evaluated in P-3 is no longer within the current site boundary, these attachments are not otherwise useful to the council's consideration of the proposed SFWF.

RAI#3, P12: FISH AND WILDLIFE HABITAT

You suggest that "potential cumulative habitat and wildlife impact from these [wind power] facilities should be compared to that from facilities with equivalent generating capacities in the same region." You have not provided any analysis that would enable the Council to make such a comparison. Please provide copies of any studies addressing comparative habitat and wildlife impacts of other (non-wind) facilities.

GENERATION IMPACTS

A comprehensive analysis of comparative impacts is provided by *Methods to Assess the Impacts on the Natural Environment of Generation Options*, Ontario Power Authority 2005.[1] Impacts were evaluated for generation technologies and ranked by their 'environmental footprint'.

Land use: the site to the facility boundary. Hydroelectric generation included the reservoir. Wind facilities extended to the site boundary. Rank reflected the value of the landscape in which facilities exist (wilderness valued more than brownfields) and compatibility with other use (farming around turbines and boating on reservoirs valued more than a permanent footprint extending to the site boundary). The footprint of the SFWF would be 0.12 km^2/MW, rather than the 0.0009 km^2/MW of the permanent footprint. Land use did not include securing the fuel.

Water use: thermal plant cooling, fuel extraction and processing, and the change in water levels for hydroelectric plants. Ranking weight depended on the presence of fish in the water used.

Waste generation: coal, oil and biomass combustion ash, crude oil waste, radioactive, hazardous or decommissioning waste. It did not include ash from gasification. Ranking depended on the length of waste containment (radioactive waste ranked worse than hydrocarbon waste), the engineering effort required for waste containment, and the consequence of releases.

Greenhouse gases: CO_2 equivalents for greenhouse gasses emitted during fabrication, construction and operation of facilities. Ranking was related to global warming potential.

Other air pollutants: fuel mining, refining and operational health-related pollutants (e.g. NO_x, SO_2 and PPM_{10}), hazardous air pollutants (e.g. benzene and mercury) and radioactivity (e.g. radon from mining or stack emissions). Ranking was by kg/MWh.

Radioactive emissions: included radioactive air emissions from fuel mining, nuclear fuel enrichment and energy facility operation.

Sustainability: fuel supply. Ranked by renewability and the reserves remaining. Water was considered to be, like wind, an infinite and renewable resource; however, due to competing needs for water and a somewhat limited supply, a ranking of 1 was used for hydroelectric power.

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[1] http://www.powerauthority.on.ca/Storage/25/2082_Part_4.4_SENES_Updated_Final_Report (November).pdf

The following table is a summary of the report's Table 9.2 (air impacts) and Table 9.3 (land, waste, water and sustainability impacts).

Generation option	**Land use (km^2/MW)**	**Land use rank**	**Water use rank**	**Waste rank**	**Sustainability rank**	**Total non-air rank**	**Warming potential (tonnes CO_2 eq/MWh)**	**Radioactivity air rank**	**Total air rank**
Thermal, coal, cooling tower	0.0057	1.0	4.0	10.0	2.0	**17.0**	0.59 – 1.14	10	**17 – 25**
Nuclear, cooling tower	0.00043 – 0.0026	1.0	5.0	1.0	5.3	**12.3**	0.01	5 – 6	**7 – 8**
Thermal, natural gas, cooling tower	0.00014 – 0.00022	1.0	2.0	0.0	8.0	**11.0**	0.25 – 0.35	0	**4 – 5**
Thermal, oil, cooling tower	0.0013	1.0	1.5	1.0	8.0	**10.5**	0.87 – 1.52	1	**10 – 16**
Hydroelectric, impoundment	0.057 – 0.13	4.0	5.5	0.0	1.0	**10.5**	0.02 – 0.03	0	**1**
Thermal, biomass, cooling tower	0.0037 – 0.013	1.0	4.0	1.0	1.0	**7.0**	0.06 – 1.10	0	**3 – 10**
Wind	0.10 – 0.15	4.5	0.0	0.0	0.0	**4.5**	0.01	0	**2**
Photovoltaic	0.0013	1.0	0.0	0.0	0.0	**1.0**	0.13	0	**3**

In the Ontario Power Authority analysis, wind energy compares very favorably to other generation technologies. There are factors that some may consider to be inadequately addressed, primarily the impact of wind power on avian species. Although discussion of energy generation impact to birds is largely focused on wind energy facilities, there is substantial evidence that impacts extend to other generation technologies as well.

Deaths of birds from collision with man-made structures, particularly prevalent for nocturnal migrants, are well documented. World Wildlife Fund Canada compiled a summary of citations for 180 documented avian collision incidents.[2] Five of the obstacles at which bird carcasses were reported were power plant stacks. The 2,200 MW Lennox gas and oil-powered plants in Ontario Canada found 7,550 bird carcasses during seven years of monitoring the stacks. This equates to a mortality rate of 0.49 deaths per MW per year. The 4,100 MW Nanticoke coal plant, also in Ontario Canada, located 5,088 bird carcasses at its stacks during 7 years of monitoring, for 0.18 deaths per MW per year. The 2,600 MW Cheshire Ohio coal plant located 2,000 carcasses from one stack impact incident, yielding an annual mortality estimate of 0.77 birds per MW per year. The 1,500 MW Sherco Minnesota coal plant stack was monitored for three years, with 69, 49 and 23 carcasses found per year, for an average of 0.4 deaths per MW per year. Finally, the 620 MW Beverly Ohio natural gas-fired plant had a stack collision incident that killed 68 birds, resulting in an annual mortality of 0.1 birds per MW per year. Applicant could not locate any reports on avian mortality at the Boardman coal plant. As the stacks are among the tallest man-made obstacles in the Oregon, we assume these mortality records are available to the Siting Council in the plant's annual monitoring report. Average avian mortality at the seven Pacific Northwest wind facilities tabulated in the SFWF cumulative impacts assessment was 1.9 deaths per MW per year, with nocturnal migrants at 0.43 deaths per MW per year.

Power generation can cause avian impacts in addition to collision mortality, including impacts due to procurement and delivery of fuel. According to U.S. Fish and Wildlife Service estimates[3] "Up to two million birds are killed annually in oil and wastewater pits, mainly in the western states." In addition, they state "Oil spills may kill hundreds of thousands or more, depending on the severity and timing of the spill." The effect of the Exxon Valdez spill on wildlife has been described as catastrophic. The estimated death toll included an estimated 500,000 birds, 4,500 sea otters and 300 harbor seals.[4] Although tanker spills are the most dramatic, oil spills to the terrestrial and aquatic environments are frequent and are not without adverse consequences.[5] Wind energy does not have a comparable impact from fuel procurement or delivery.

Mining for nuclear fuel and coal also add to facility footprint and environmental impacts, which were not considered in the Ontario Power Authority analysis. The Boardman coal plant currently secures its coal from the Buckskin Mine in Wyoming.[6] The 230.000 – 270,000 tons of coal used annually by the Boardman plant comprise approximately 1.3% of the mine's annual twenty million ton output. Buckskin Mine is a strip mine, and "moves over 25,000,000 cubic yards of

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[2] http://www.flap.org/new/ccourse.pdf
[3] http://www.fws.gov/birds/mortality-fact-sheet.pdf
[4] http://www.evostc.state.ak.us/Publications/Downloadables/AnnualStatus/1994AnnualReport.pdf
[5] http://oils.gpa.unep.org/facts/oilspills.htm
[6] http://www.idacorpinc.com/pdfs/10k/10k2006.pdf

overburden annually."[7] The Boardman plant proportion would be approximately 312,500 cubic yards of 'overburden' annually. The impacts of surface mining have been addressed by the Bureau of Land Management in *Final Environmental Impact Statement on Proposed "3809" Surface Mining Regulations*. Chapter 3 *Affected Environment and Environmental Consequences*, deals with impacts to habitat and wildlife.[8] Impacts include loss of soil structure and subsequent alteration in vegetation communities after reclamation, long-term habitat loss, surface and groundwater impacts from acid rock drainage and contamination from heavy metals in tailing leachate. Loss of nesting sites has been of particular concern for Appalachian mountaintop removal, and impacts to sage grouse, sage-obligate species, raptors and other arid lands birds are of concern in the western states. Wind energy has no comparable impact.

Thermal generating plants in the SFWF project vicinity are either coal (the Boardman plant) or natural gas (the Coyote Springs plants and others near Umatilla and Hermiston). The environmental consequence of natural gas is largely limited to the footprints of the pipelines, drilling equipment and wellhead structures. Delivery of liquefied natural gas (LNG) adds leakage and spill concerns. The potential environmental consequences of LNG facilities are detailed in the Environmental Impact Statement (EIS) for the Bradford Landing Project in Clatsop County.[9] This facility is described as needed to supply additional natural gas to the region for power generation. Chapter 4 of the EIS includes an extensive list of potential impacts to listed and special status terrestrial and aquatic species. Wind energy has no comparable impact.

Greenhouse gas production and global warming affects more than polar bears and the sea level. The American Bird Conservancy and the National Wildlife Federation have evaluated avian species ranges against climate change models produced by the Canadian Climate Center, including an assessment of global warming impacts on songbirds in Oregon.[10] Avian species whose range in the future may exclude Oregon include the state-sensitive species bank swallow, vesper sparrow and sage sparrow. Avian species expected to have reduced ranges in Oregon include the state-sensitive species olive-sided flycatcher, willow flycatcher and western meadowlark. Wind energy facilities produce negligible greenhouse gas emissions during component fabrication and none thereafter.

Although hydroelectric power fares well in the Ontario Power Authority analysis, the impact of dams on salmonid species in the Pacific Northwest is not reflected in that assessment. The extent of the effort towards recovery of endangered salmonid species is detailed in a report from the U.S. General Accounting Office.[11] This document describes the financial contributions and infrastructure improvements that have been applied in an attempt to restore salmonid populations in the Pacific Northwest. Although few quantitative assessments on impacts to fish are available, a comment letter from the U.S. National Oceanic and Atmosphere Administration pointed out that passage survival for spring/summer Snake River Chinook salmon was 10 – 13% in the 1970s, and rose to 31 – 59% through 1999. These estimates do not include mortality caused by other dam operation effects, such as predation, altered water temperature and decreased flow rate

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[7] http://www.kiewit.com/markets/pro_buckskin.html
[8] http://www.blm.gov/nhp/Commercial/SolidMineral/3809-EIS/1ch-3.html
[9] http://www.ferc.gov/industries/lng/enviro/eis/2007/08-17-07-eis.asp
[10] http://www.abcbirds.org/climatechange/Oregon.pdf
[11] http://www.gao.gov/new.items/d02612.pdf

in reservoirs, high dissolved gas levels, and loss of spawning habitat. Mortality data were not provided for individual dams. If each of the eight dams the salmon traverse contributed equally to passage mortality, the John Day, McNary and The Dalles dams could together account for 4,800 MW annually and the death of 15 – 26% of the Chinook salmon traversing them. No wind facility mortality estimates have shown avian deaths to be a similar fraction of the birds using the site. The analysis area used in the impacts assessment commissioned for the SFWF included the sites of all three dams. The assessment estimated bird mortality from current and proposed wind facilities producing 4,800 MW per year, and concluded they would kill at most 0.5% of the regional breeding population.

RAI#3, P13: FISH AND WILDLIFE HABITAT

Please explain by example how you calculated temporary construction disturbance of 0.18 acres per turbine.

<u>TEMPORARY CONSTRUCTION DISTURBANCE</u>

Temporary disturbance of the turbine pads was estimated as 7,650 square feet per turbine (Exhibit P Table P-7).

7,650 sq ft disturbed ¸ 43,560 sq ft/acre = 0.1756 acres disturbed = 0.18 acres (rounded).

RAI#3, P14: FISH AND WILDLIFE HABITAT

Please expand on the paragraph at the top of page 43. Explain how you calculated that "the maximum number of turbines that can be sited per acre is estimated at 0.036." This figure would equate to 1 turbine per 28 acres. Explain how you calculated that "the temporary disturbance associated with this density of turbines, new roads to service them, and associated met towers and substations, is 1.4% of the habitat." In this calculation, what is the total area of habitat?

Explain your statement that "temporary disturbance for the submitted typical layout of the SFWF is 0.8% of the total area." Show your calculation to arrive at this percentage.

You appear to be saying that, were there no restoration of temporary disturbance areas, "a 1.4% increase in bare ground and/or alien plant species is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance." Does this mean that you do not believe that restoration of the disturbed areas is necessary?

TEMPORARY CONSTRUCTION DISTURBANCE

Computation of Turbines per Acre

For the worst-case facility layout, the closest spacing between turbines within a string was determined, using the typical layout, to be approximately 750 feet. The closest spacing between two turbine strings in the typical layout was determined to be approximately 1,700 feet. These distances generate arrays 750 by 1,700 feet centered at each turbine.

750 ft × 1,700 ft = 1,275,000 sq ft per turbine
1,275,000 sq ft per turbine ÷ 43,560 sq ft/acre = 29.26 acres per turbine
1 turbine ÷ 29.26 acres per turbine = 0.034 turbine per acre

The total area of 3 CUR habitat within the site boundary is 6,444 acres. In the worst-case layout, the maximum number of facility components that could fit were sited in 3 CUR habitat, resulting in 226 turbines.

226 turbines ÷ 6444 acres = 0.035 turbines per acre

The maximum number of turbines that could be sited per acre was given as 0.036 in Exhibit P to avoid underestimation.

Temporary Disturbance Percentage and Impacts

In the worst-case layout, 1 meteorological tower, 1 substation and associated access roads and transmission were also placed in the 3 CUR habitat along with the 226 turbines. The total temporary disturbance for these is 88 acres (Exhibit P Table P-6a). The percent of 3 CUR acreage temporarily disturbed is:

88 acres disturbed ÷ 6444 acres 3 CUR = 1.366% disturbed = 1.4% (rounded)

In considering temporary impacts strictly to vegetation from construction, the 3 CUR habitat was considered to be part of the 3 GL habitat.

88 acres disturbed 3 CUR + 16 acres disturbed 3 GL = 104 acres disturbed 3 GL
6444 acres 3 CUR + 736 acres 3 GL = 7180 3 GL acres within the site boundary
104 acres disturbed ÷ 7180 acres 3 GL = 1.448% disturbed = 1.4% (rounded)

The same type of calculation (disturbed acres ÷ total acres), using the acreage for the worst-case layout in Table P6a, produces temporary disturbance of 3.0% of the 3 SS-R habitat and 3.3% of the 3 SS-S habitat. In all other category/subtypes, 1.4% or less is temporarily disturbed. In the typical layout, the only habitat with more than 1.4% temporarily disturbed is 3 SS-S at 1.7%. The next highest temporary disturbance is of the 4 PC habitat at 1.3% and the 3 SS-R and 5 SS-B habitats at 1.2% each.

The maximum worst-case temporary disturbance to vegetation in all habitat category and subtype combinations other than 3 SS-S was considered to be 1.4%, so this maximum expected disturbance was used in describing impacts to habitats other than to 3 SS-S. In Exhibit P, the use of 1.4% maximum temporary disturbance impact to 3 SS-R habitat was in error. The percentage used should have been 3.0%.

Under OAR 635-415-0025, it is necessary to address net loss of quantity for habitat Categories 1 through 4. Replacement of permanently lost habitat acreage from within the site boundary is addressed by category in the Habitat Mitigation Plan, as well as provision for replacement, for the duration of the predicted impact, of habitat acreage lost from temporary disturbance. This insures there will be no net loss of category within the temporary disturbance footprint.

Calculation of the maximum probable percentage of temporary disturbance in each category and subtype was intended to put temporary disturbance impacts into perspective. Applicant wished to determine whether the level of temporary disturbance was sufficient to cause a change *in category* for the surrounding undisturbed habitat category/subtype patch in which temporary disturbance occurred. Applicant believed that there might be scenarios which would result in reclassification of undisturbed habitat to a lower-quality category.

If a significant portion (e.g. greater than 25%) of a small parcel of Category 3 habitat were to be disturbed, re-categorization of the remaining undisturbed habitat to Category 4 or 5 might be appropriate, and there would be a net loss of Category 3 quantity in addition to that lost directly from temporary and permanent disturbance.

A specific example may be produced by assuming that the crane tread path traveled through a small patch shrub steppe. Loss of most shrubs in small stand of sage could sufficiently change the vegetative characteristics and alter the undisturbed habitat's category and subtype. Large facility components (field workshops and substations) could impact small adjacent habitat patches in the same manner. Applicant proposes, in addition to restrictions already described in Exhibit P, to restrict construction of field workshops and substations to habitat categories 4 through 6. Temporary and permanent disturbance from turbines, roads and electrical lines are distributed over larger areas, and are likely to cause significant change in habitat category or subtype of undisturbed areas in small habitat patches. To reduce this possibility, Applicant has already proposed to exclude several category/subtype patches that are small in area (typically smaller than 10 acres) from component siting and disturbance.

For Category 6 habitats (animal facilities, roads and parking, and ranch yards), even large areas of temporary disturbance will either cause no change or result in an improvement in quality (the case with some stands of previously cultivated land). Disturbance impacts should not result in a change of category for Category 6 disturbed or undisturbed areas.

Category 5 habitats include plowed wheat fields (DW) as well as previously cultivated areas. The presence of bare or disturbed ground will not change categorization of the undisturbed habitat, even if most of the area were to be disturbed. A patch of Category 5 previously cultivated (PC) habitat may be sufficiently disturbed to change the subtype of the undisturbed area, but the category would remain the same. Disturbance of Category 4 rock and soil habitats which are not vegetated would not produce a change in category.

Loss of a significant number of shrubs through temporary disturbance of Category 4 sage shrub steppe (SS-S) might change the undisturbed habitat subtype from 4 SS-S to 4 grasssland (GL), but the maximum anticipated temporary disturbance of 1.4% (as calculated above) is unlikely to result in a change in the undisturbed habitat to Category 5. Therefore, no net loss of category quantity is expected.

4 GL and 4 PC habitats are characterized by areas of bare soil which occupy, on average, 11% of the habitat. Some 4 GL habitat has bare soil covering up to 41% of the area surveyed. These habitats usually cover large contiguous areas. The anticipated worst-case temporary disturbance to 4 GL and 4 PC habitats is unlikely to result in a change in the categorization of the undisturbed areas to Category 5, and no net loss of category quantity is expected.

The smallest discrete area of Category 3 rabbitbrush shrub steppe (SS-R) is less than 3 acres. Disturbance within this area could change the rating of the remaining undisturbed habitat to 3 GL or 4 GL, depending on the quality of the understory vegetation and the proportion of shrubs removed. Applicant has proposed to avoid this area. Neither the worst-case nor the typical layout sites a workshop or substation within rabbitbrush shrub steppe, and Applicant proposed, above, to avoid such siting. Applicant believes that damage to or loss of 3.0% (as calculated above) of the rabbitbrush or understory in larger patches is not sufficient to change categorization of the remaining undisturbed habitat to Category 4, and no net loss of category quantity is expected.

Applicant has proposed avoidance of the one area of Category 3 purshia shrub steppe within the site boundary. For 3 SS-S habitat, Applicant has proposed avoidance of any disturbance in habitats of less than 5 acres, and proposed, above, to avoid siting of field workshops or substations in any 3 SS-S habitat. Applicant has proposed to avoid, whenever practical, removal of sage shrubs, and believes avoidance measures will result in a loss of less than 2% of sage shrubs within these habitats. Applicant believes this level of temporary disturbance in larger patches is not sufficient to change categorization of the undisturbed habitat to Category 4, and no net loss of category quantity is expected.

Category 3 grasslands and Category 3 curlew habitat patches are generally fairly large. Applicant proposed, above, to avoid siting of field workshops or substations within these areas. Applicant believes a worst-case temporary disturbance impact to 1.4% of the habitat is not sufficient to change categorization of the undisturbed habitat to Category 4, and no net loss of category quantity is expected.

Applicant has proposed no disturbance of Category 1 and 2 habitats.

Total Temporary Impact to the Project Site

The maximum acreage of estimated temporary disturbance is for the typical site layout, at 175.79 acres (Exhibit P Table P-7). The area within the site boundary is estimated as 22,390 acres.

175.79 acres disturbed ¸ 22,390 acres = 0.785% disturbed = 0.8% (rounded)

Revegation of Temporarily Disturbed Areas

Applicant believes that temporary disturbance will cause net loss of category quality for the contiguous habitat category/subtype in which disturbance occurs. Applicant believes the loss of quality and extent of disturbance, with the mitigation measures Applicant has proposed, will not be sufficient to cause net loss of habitat category. Applicant believes that revegation of disturbed areas is necessary – to replace habitat category in the disturbed area, restore habitat quality to the contiguous area, reduce noxious weed infestation, prevent degradation of landscape esthetics, and preserve good landlord relations.

RAI#3, P15: FISH AND WILDLIFE HABITAT

You state that aboveground electrical poles would have avian protective devices (APLIC compliant). Would this apply to every pole within the facility? If not, within what distance from turbines would protective devices be installed on poles?

APLIC COMPLIANCE

The APLIC compliance statement in revised Exhibit P was intended to address only avian electrocutions. As electrocution risk is not correlated with the distance of a power pole from a wind turbine, Applicant proposes to ensure that all facility-owned electrical poles are constructed to be APLIC compliant.

As discussed in the Draft Wildlife Monitoring and Mitigation Plan, facility-owned electrical poles or lines directly implicated in raptor fatalities will have perch guards, line markers or other protective measures installed to prevent recurrence. These measures will depend on carcass location rather than turbine proximity.

Post-construction searches may detect raptor carcasses near turbines in close proximity to power poles. The perching opportunity provided by the pole may increase raptor use near turbines and add to collision risk. Applicant proposes to install perch prevention devices on facility-owned power poles within 0.5 miles of turbines at which raptor carcasses are found.

RAI#3, P16: FISH AND WILDLIFE HABITAT

In the report on the Spring 2007 WGS and BUOW surveys, please clarify the discussion of the WGS sites observed. A table might help here (with a key to map locations). We are unclear which site is the "mapped Washington ground squirrel (WGS) colony complex." Weren't all of the sites "mapped"? Does the paragraph that begins on the bottom of page 3 refer to this same "mapped" colony? The discussion on page 4 refers to four "unmapped" colonies. Please show the locations on a map. Each of these is described as being located more than 1,000 feet from the nearest site boundary. Wouldn't that place each of these locations outside of the survey area? If they are outside the survey area, how were they observed? Please reference a map that shows the "reference Washington ground squirrel complex."

WASHINGTON GROUND SQUIRRELS

During the 2007 survey, five Washington ground squirrel colonies were encountered; one of these colonies was found within the site boundary extending into the search buffer, and four were incidental finds outside of the site boundary and beyond the 1,000-foot search buffer. Before the 2007 survey, the location of another colony was known by the wildlife biologists directing the work. The colony is outside of the site boundary and beyond the 1,000-foot buffer.

To protect off-site colonies from interference and disturbance, no colonies outside of the site boundary and surrounding 1,000-foot buffer were mapped. Only one colony lay within the site boundary and surrounding buffer, therefore only one colony is shown on the maps (at the northeast of Figure 2 and at much closer scale in Figure 3). The paragraph beginning at the bottom of page 3 of the report describes this colony.

The four incidental sightings were either from the car or while on foot as searchers were passing by between survey area locations. These colonies were on private property for which search permission had not been secured, and the exact locations could not be marked. GPS readings were taken on public land (the roads) or on private property for which permission to search had been secured. These readings were taken at the closest accessible point, and in all cases it was possible to take a GPS reading between the colony and the closest site boundary. These GPS points were reviewed to confirm that all four of the colonies found incidentally were well outside of the project site boundary and the surrounding 1,000-foot search buffer. The first full paragraph on page 4 of the report begins the descriptions of these four colonies.

The colony at the location known before the 2007 survey was used for searcher training and to ensure that the squirrels were active during the period the 2007 searches took place. The colony was referred to as the reference site. A GPS reading from the roadway between the colony and the nearest site boundary confirmed the colony was well outside of the site boundary and surrounding 1,000-foot search buffer. A description of the reference colony starts in the paragraph that begins at the bottom of page 4 of the report.

As in previous wildlife surveys within and around the project site, all incidental findings of special status species, including the Washington ground squirrel, were included in the report.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]

Sent: Monday, May 21, 2007 9:18 AM

To: 'John White'; 'jflarson@pacificenergysystems.com'

Cc: 'Rose Owens'; Carol; Derrel A. Grant

Subject: SFWF habitat descriptions

Hi John,

Please find, attached, our master habitat type table. The whole table is probably too big for insertion in our response to RAI#2 P1, and so some of the descriptions will be in the text, instead. But for now, this organization seems useful to us, and we hope that it is useful to you as well.

Regards,
Pat

Patricia Pilz
Pilz & Co, LLC
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Habitat type	Symbol	Cat.	Subtype description	Criteria/rationale	Potential uses	Acres
Raptor nesting structures	RN	1	Structures or areas with active or inactive raptor nests. Includes electrical towers, a defunct water windmill, burrowing owl burrows, a Swainson's hawk ground nest, junipers and a basalt ledge	Subtype and category defined as any structure/area with an active raptor nest, and natural structures with inactive raptor nests. Nests are extremely rare, and suitable structures may be more limiting than prey availability in determining raptor population levels in the immediate project area. This habitat is essential, limited and irreplaceable.	Raptor nesting and perching; perching, nesting and over-wintering for non-raptors; shade and storm protection for mammals, including porcupines and deer. Basalt ledges and bare ground beneath trees also of use to reptiles.	Pending agreement on categories and subtypes
	RN	2	Natural structures potentially of use for raptor nesting	Subtype and category defined as basalt ledges, junipers or other trees taller than 3 feet without active or inactive raptor nests. This habitat has not not yet been used for raptor nesting, perhaps due to location or size. The habitat is essential and limited, but not irreplaceable as raptors currently nesting in the vicinity have chosen to nest in other locations.	No raptor nests; otherwise as above.	Pending agreement on categories and subtypes
Wetlands	WL	1	Wetlands	As defined by wetlands surveys. Surface water resources are essential, limited and irreplaceable on the project site.	Pending report of wetland surveys.	Pending agreement on categories and subtypes
	WL-W	2	Dry washes, generally basalt-walled. Scattered sage in the bottoms, as well as native bunchgrasses and annual weeds. Heavy thunderstorms produce brief periods of running water.	Subtype defined as dry washes in canyon floors. This habitat is relatively undisturbed in relation to surrounding areas which are grazed or cultivated. The washes may provide linkages between larger habitat areas for reptiles and small mammals. If the washes provide connectivity to other habitats for wildlife species, they are essential and limited but not irreplaceable, as alternate routes providing connectivity are also present within the canyons.	Mammal and reptile sheltering; travel between habitats.	Pending agreement on categories and subtypes
Shrub steppe	SS-S	2	Sage steppe. Big sage with patches of bare ground, native bunchgrasses (primarily Sandberg's bluegrass) and cheatgrass. Scattered rabbitbrush, bitterbrush and broom snakeweed present in some areas, but big sage is the predominant shrub.	Subtype defined as shrub stands with sage as the predominant shrub, and shrubs the predominant vegetation. Sage habitats are now rare within the project site. Although there are few acres of category 2 sage steppe within the site boundary, they are connected to substantial stands in good condition either to the east of the north project area or to stands in canyons adjacent to the south project boundary. Sage steppe in this condition is essential and limited but replaceable.	Important to loggerhead shrike, sage sparrow, sagebrush lizard and white-tailed jackrabbit. May also be used by other shrub-nesting avian species, and by other small mammals and reptiles including the Western rattlesnake.	Pending agreement on categories and subtypes
	SS-S	3	As above, but either an isolated small stand or sage and other shrubs are sparse and widely scattered.	Subtype defined as shrub stands with sage as the predominant shrub, but the total number of sage plants is either small or small in proportion to the area. The stands are too small or the sage too sparse to provide good habitat for sage obligate species. Small clumps and scattered stands of sage are not essential habitat, but they are important and somewhat limited in the area.	Of less value to loggerhead shrike, sage sparrow and sagebrush lizard than category 2 SS-S. May be used by white-tailed jackrabbit and grasshopper sparrows. May also be used by other shrub or grassland-nesting avian species, and by other small mammals and reptiles including the Western rattlesnake.	Pending agreement on categories and subtypes
	SS-S	4	As above, but the sage is in poor condition from burning and many branches are dead. Cheatgrass is the predominant grass.	The existing sage is of little use to wildlife. The cheatgrass is neither important nor limited, but with time the sage may recover.	Ground-nesting birds; raptor prey hunting.	Pending agreement on categories and subtypes
	SS-R	3	Rabbitbrush steppe. Shrub coverage is higher than in category 3 SS-S, and few areas of bare soil are present. Grass cover is provided by native grasses (predominantly Sandberg's bluegrass with some bluebunch wheatgrass and six-weeks fescue) and cheatgrass. Sage and bitterbrush are absent or rare.	Subtype defined as shrub stands with gray rabbitbrush as the predominant shrub. Non-sage shrub habitat is not essential, but is important to many species and reasonably limited within and near the project site.	Although of little value to loggerhead shrike and other sage-dependent species, the habitat is useful to white-tailed jackrabbits and other birds, reptiles and mammals.	Pending agreement on categories and subtypes

Habitat type	Symbol	Cat.	Subtype description	Criteria/rationale	Potential uses	Acres
	SS-B	5	Broom snakeweed steppe. Shrub (or sub-shrub) coverage is dense and other shrub species are absent. Although cheatgrass is widespread in the limited space between shrubs, some native grasses are also present.	Subtype defined as shrub stands with broom snakeweed as the predominant shrub. This habitat is of marginal value to wildlife. Broom snakeweed is, however, a native species that is part of the normal succession in the return to sage steppe following fire. Broom snakeweed steppe is neither essential nor important, but has high restoration potential.	Although a poor forage plant, broom snakeweed can provide food for seed eating species and nectar for butterflies and bees. The plants are generally too small to provide good daytime cover for jackrabbits.	Pending agreement on categories and subtypes
Washington ground squirrel	WGS	1	Habitat with an active complex of Washington ground squirrel burrows. No inactive or historically documented burrows were identified within the site boundary or a 1000 foot buffer around it. The underlying habitat type is shrub steppe with the same characteristics as category 2 SS-S.	Subtype and category defined by the presence of Washington ground squirrel burrows. The habitat is essential, limited and irreplaceable.	In addition to Washington ground squirrels, use is as described for category 2 SS-S.	Pending agreement on categories and subtypes
	WGS	2	Habitat and soils appropriate for Washington ground squirrel use adjacent to an active burrow complex. The underlying habitat type immediately adjacent to the complex is shrub steppe with the same characteristics as category 2 SS-S. The underlying habitat type for the balance of the surrounding area within this category and subtype is category 4 grassland.	The extent of this subtype and category is defined by nearby habitat types, soils, and other identified locations of Washington ground squirrels. The burrow complex is located at the edge of the site boundary, with the only other nearby burrow complexes in the direction leading off the site. This category extends to a region of unsuitable soil, an existing roadway, and a dryland wheat field, at distances of 400 to 750 feet from the closest burrow. This habit is essential and limited due to the rarity of Washington ground squirrels on the site, but the habitat is not irreplaceable. The habitat does not provide connectivity to other burrows, and most of the area is of a habitat type different than that of the adjacent burrow complex and the closest burrows off-site.	The identified habitat transitions from sage steppe to grasslands within its extent. Use by other species includes that described for category 2 SS-S and category 4 GL	Pending agreement on categories and subtypes
Curlew	CUR	3	Habitat with high densities of nesting long-billed curlew. In some years, curlew nesting may approach the maximum density the space can support. The underlying habitat type is category 3 grassland. Characteristics of the area include frequent basalt outcrops at or above the soil surface. Grass species include Sandberg's bluegrass as the predominant native species, but also includes needle and thread grass and six-weeks fescue. Cheatgrass is more widespread than the native grasses. Scattered sage, rabbitbrush and broom snakeweed are present, but not in clusters large enough to define as separate shrub habitats. Individual junipers were separately classified in the RN subtypes.	The extent of this subtype and category is defined by observations of large numbers of curlews exhibiting courting and nest protecting behaviors. The south boundary generally follows changes in soil types, with fewer rock outcroppings south of the area of highest curlew use. This habitat is essential for the curlews but not limited.	Use of this category and subtype by other species is as described for category 3 GL.	Pending agreement on categories and subtypes
Grassland	GL	3	Grasslands with significant grass stands, little disturbed soil and lower grazing pressure than that evidenced in category 4 grasslands. Although cheatgrass still predominates, cheatgrass stands are tall and healthy, and native grasses in reasonable condition are also significant. The native grass is largely Sandberg's bluegrass, although bluebunch wheatgrass and six-weeks fescue are also present.	This subtype and category is defined by the health of grasses, presence of native species, and the extent of grazing disturbance. Grasslands in this condition are essential not limited within the project boundaries and vicinity.	Grasshopper sparrows use this type of habitat, as well as white-tailed jackrabbits. Common grassland ground nesting avian species are also expected to be present, as well as badgers, rodents and some reptiles including the Western rattlesnake. Provides forage for deer.	Pending agreement on categories and subtypes
	GL	4	Grasslands with sparse or poor grass stands and some stunting of growth. Native grasses are less frequent, and cheatgrass dominates. Contributing to the condition of these grasslands is poor or shallow soils, heavy grazing, fire, soil disturbance by livestock or vehicles, and herbicide overspray at field edges or in the course of noxious weed control.	This subtype and category is defined by the health of grasses, presence of native species and noxious weeds, and the extent of disturbance by grazing or herbicide applications. Grasslands in this condition are important, but not essential or limited within the project boundaries and in the vicinity.	Some common ground nesting grassland avian species may be present. Badgers, rodents and some reptiles may also use these areas.	Pending agreement on categories and subtypes

Habitat type	Symbol	Cat.	Subtype description	Criteria/rationale	Potential uses	Acres
Rock and sand	RS	4	Bare sand or soil, usually in hillsides and often capped by basalt or containing basalt outcrops. Vegetation is sparse or absent.	This subtype is defined by bare ground with little or no vegetation, and is naturally occuring except for road cuts. It does not include basalt escarpments or areas where vehicles or livestock have caused a loss of vegetation. The habitat is not essential, but is important to some species and not limited in the area.	Some areas may be appropriate for bank swallows or burrowing owls. Many contain large numbers of small mammal burrows, in sizes that could accommodate badgers, rabbits, gophers and mice, and are likely to provide prey for raptors.	Pending agreement on categories and subtypes
Dryland wheat	DW	5	Dryland wheat fields, either planted to wheat or fallow.	This subtype and category is defined by current use for growth of dryland wheat, or fallow fields recently used for dryland wheat planting. The habitat is not essential or important. The Applicant has assigned category 5 status to these fields not because they have high restoration potential, but because they provide a significant source of raptor prey, particularly for large numbers of Swainson's hawks in the fall.	Source of raptor prey and used by other birds and small mammals.	Pending agreement on categories and subtypes
Previously cultivated	PC	4	Previously cultivated fields, either in CRP or at field edges and not currently cultivated. This category has been seeded with native bunchgrasses or has been in CRP long enough to recover somewhat from cultivation and the weeds that immediately follow termination of cultivation.	This category is defined by the species of plants present. Native bunchgrasses and cheatgrass make up the predominant vegetation. This habitat is not essential or limited, but it is important.	This category and subtype may be used by white-tailed jackrabbits, burrowing owls and grasshopper sparrows.	Pending agreement on categories and subtypes
	PC	5	Previously cultivated fields, either in CRP or at field edges and not currently cultivated. This category has not been seeded, but contains some cheatgrass and native grasses as well as tumblemustard or tumbleweed.	This category is defined by the species of plants present. Tumblemustard is more frequent than tumbleweed, and although these make up the majority of the vegetation, some native and alien grass species are also present. The habitat is not essential or important, but has the potential for restoration.	This category and subtype may be used by white-tailed jackrabbits and burrowing owls, and perhaps by grasshopper sparrows.	Pending agreement on categories and subtypes
	PC	6	Previously cultivated fields, either in CRP or at field edges and not currently cultivated. This category has not been seeded, and is dominated by tumblemustard and tumbleweed.	This category is defined by the species of plants present. Tumbleweed and tumblemustard make up the predominant vegetation. This habitat is not essential or important, and without major intervantion has very low restoration potential.	This category and habitat type has limited value to any wildlife species.	Pending agreement on categories and subtypes
Animal Facilities	AF	6	Areas used for housing, transporting, feeding, or watering livestock. These areas tend to be bare soil or extremely short-cropped vegetation.	Disturbed areas known to be used for tending livestock. These areas are not essential or important, and restoration potential is low.	This category and habitat type has limited value to any wildlife species.	Pending agreement on categories and subtypes
Structures	ST	6	Houses, barns, shops, equipment storage, junk piles and farmyards.	This habitat type is defined as structures and surrounding yards and appurtenances. These areas are not essential or important, and restoration potential is low.	This category and habitat type has limited value to any wildlife species, except for trees with the potential to provide nesting habitat. Trees with active or inactive raptor nests have been separately categorized as 1 RN.	Pending agreement on categories and subtypes
Roads & Parking	RP	6	Dirt, graveled and paved roads, and graveled or paved pullout areas.	This habitat type includes roads, graveled road verges and off-road vehicle trails. These areas are not essential or important, and restoration potential is low.	This category and habitat type has limited value to any species.	Pending agreement on categories and subtypes

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Friday, August 31, 2007 11:33 AM
To: 'John White'
Cc: 'jflarson@PacificEnergySystems.com'; 'carol@pilzandco.com'
Subject: RE: Habitat Mitigation Plan

HRPamendment.doc

Here are the changes necessary to accommodate the revised construction schedule.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Thursday, August 30, 2007 4:17 PM
To: pat@pilzandco.com
Cc: jflarson@PacificEnergySystems.com; carol@pilzandco.com
Subject: Habitat Mitigation Plan

Pat,
I am starting on the "reformatting" of the plans beginning with the Habitat Mitigation Plan (HMP). I note that at page 3 you say that the facility would take a minimum of 3 years to build. This contradicts your followup response to B16 in which you state that the facility would be completed in 2 years. What difference, if any, do you think this will make in the implementation schedule of the HMP?

John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

B: Current condition, habitat and use of the mitigation area

The 220-acre area under consideration within this parcel contains a typical distribution of habitats:

Habitat	Acres
1 RN	0.23
2 WL-W	16
4 GL	104
6 PC	99
6 RP	0.68

D: Habitats temporarily impacted

Construction of the SFWF is expected to take a minimum of two years. Some of the habitat temporarily disturbed during the first year will have recovered from the impact by the end of construction. Habitat in category 4 grasslands, dryland wheat, and previously cultivated fields are expected to recover in 2 years or fewer with intervention. An analysis of the impact of construction duration and habitat category was performed using the following recovery periods.

Habitat	Recovery	Habitat	Recovery
3 CUR	2 years	3 GL	4 years
3 SS-R	3 years	3 SS-S	10 – 20 years
4 GL	2 years	4 PC	2 years
4 RS	0 years	4 SS-S	10 – 20 years
5 DW	0.5 years	5 PC	0.5 years
5 SS-B	2 years		

A recovery period of 2 years was used for 3 CUR and reflects the nature of the grassland the curlew uses. The habitat category was determined by wildlife use, not by the quality of the vegetation. In the 3 CUR habitat, basalt protrusions and the shallow soil do not support luxuriant growth. The curlew area is heavily grazed by sheep, and these factors all keep grass short and sparse. Evaluating by vegetation quality alone, portions of the 3 CUR grasslands would be category 3 GL, and others 4 GL, and there is no noticible discrimination by the curlews in their use between categories. Disturbed 3 CUR habitat will achieve functionality for curlew well before it reaches 3 GL vegetation diversity.

A HRP of 220 acres provides for ‘no net loss’ of category 3 and 4 habitats from temporary and permanent impacts under the typical or worst-case layout, and for replacement of category 5 habitat lost to the facility footprint (Tables RAI#2 P6 2a and 2b). At the end of the first year of construction, total disturbance would equal 154 and 142 acres in the worst-case and typical layout, respectively. This is 66 to 78 acres less than the HRP area, in effect providing replacement credit for later impacts. This credit is used up in year 2, when the sum of permanent and temporary impacts substantially exceeds 220 acres. By year 4, most habitat has recovered from temporary impact, and total acres falls below 220. Long-term temporary impact after year 5 is between 7 and 17 acres. Applicant proposes to mitigate for these by improving 17 acres within the HRP to category 3 or higher.

The number of acres needed to mitigate for permanent and temporary impacts through the fifth year after initiation of construction is 205 acres for the typical layout and 220 for the worst-case layout. After the fifth year, the HRP is 32 and 41 acres larger than necessary to mitigate for permanent and long-term temporary impacts from the worst-case and typical layout, respectively. 'Net benefit' for category 5 disturbance will be ensured by retaining the 32 to 41-acre 'excess' within the HRP. Other than that needed for the planned roadway and cattle feed/water station, it will be developed to category 5 or higher habitat.

G: Enhancement action success criteria

Maximum rate of habitat development within the HRP

Subtype	Year 0 (acres)	Year 1 (acres)	Year 2 (acres)	Year 3 (acres)	Year 4 (acres)	Year 8 (acres)	Year 11 (acres)	Year 14 (acres)
1 RN	0.23	0.23	0.35	0.35	0.46	0.58	0.69	0.69
2 RN		0.58	0.46	1.6	1.5	1.4	1.3	1.3
2 WL-W	16	16	16	16	16	16	16	16
3 GL				52	52	78	114	137
4 GL/4 PC	90	90	90	45	45	69	57	46
5 PC		93	93	93	93	46	23	12
6 PC	99							
6 AF		5.0	5.0	5.0	5.0	5.0	5.0	5.0
6 RP	0.68	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Totals	**220**	**220**	**220**	**220**	**220**	**220**	**220**	**220**

Table 2a: Worst-case layout disturbance impacts

Category & subtype	Impacted acres Year 1			Impacted acres Year 2			Impacted acres Year 3			Impacted acres Year 4			Impacted acres Year 5		
	perm	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**
3 CUR	46	44	90	92	88	180	92	44	136	92	0	92	92	0	92
3 GL	11	7.8	19	22	16	37	22	16	37	22	16	37	22	8	27
3 SS-R	2.1	1.8	3.9	4.1	3.6	7.8	4.1	3.6	7.8	4.1	1.8	5.9	4.1	1	5.3
3 SS-S	3.6	4.3	7.9	7.2	8.6	16	7.2	8.6	16	7.2	8.6	16	7.2	8.6	16
4 GL	11	9.5	21	23	19	42	23	9.5	32	23	0	23	23	0	23
4 PC	1.4	0.83	2.3	2.9	1.7	4.6	2.9	0.83	3.7	2.9	0	2.9	2.9	0	2.9
4 RS	0.14	0	0.14	0.29	0	0.29	0.29	0	0.29	0.29	0	0.29	0.29	0	0.29
4 SS-S	0.01	0.18	0.19	0.01	0.36	0.38	0.01	0.36	0.38	0.01	0.36	0.38	0.01	0.36	0.38
5 DW	9.2		9.2	18		18	18		18	18		18	18		18
5 PC	0.68		0.68	1.4		1.4	1.4		1.4	1.4		1.4	1.4		1.4
5 SS-B	0		0	0		0	0		0	0		0	0		0
Total	**85**	**68**	**154**	**171**	**137**	**307**	**171**	**82**	**253**	**171**	**26**	**197**	**171**	**17**	**187**

Table 2b: Typical layout disturbance impacts

Category & subtype	Impacted acres Year 1			Impacted acres Year 2			Impacted acres Year 3			Impacted acres Year 4			Impacted acres Year 5		
	perm	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**	**perm**	**temp**	**Total**
3 CUR	19	21	40	37	43	80	37	21	59	37	0	37	37	0	37
3 GL	2.7	2.5	5.2	5.3	5.1	10	5.3	5.1	10	5.3	5.1	10	5.3	2.5	7.9
3 SS-R	0.73	0.73	1.5	1.5	1.5	2.9	1.5	1.5	2.9	1.5	0.73	2.2	1.5	0	1.5
3 SS-S	2.1	2.2	4.3	4.1	4.4	8.5	4.1	4.4	8.5	4.1	4.4	8.5	4.1	4.4	8.5
4 GL	27	28	55	54	56	110	54	28	82	54	0	54	54	0	54
4 PC	1.5	1.2	2.8	3.1	2.5	5.6	3.1	1.2	4.3	3.1	0	3.1	3.1	0	3.1
4 RS	0.17	0	0.17	0.33	0	0.33	0.33	0	0.33	0.33	0	0.33	0.33	0	0.33
4 SS-S	0.01	0.15	0.15	0.01	0.29	0.30	0.01	0.29	0.30	0.01	0.29	0.30	0.01	0.29	0.30
5 DW	27		27	54		54	54		54	54		54	54		54
5 PC	4.8		4.8	9.5		9.5	9.5		9.5	9.5		9.5	9.5		9.5
5 SS-B	1.2		1.2	2.5		2.5	2.5		2.5	2.5		2.5	2.5		2.5
Total	**86**	**56**	**142**	**171**	**113**	**284**	**171**	**62**	**233**	**171**	**10**	**182**	**171**	**7.2**	**178**

No temporary disturbance impact is shown for category 5 habitat as there is no requirement for avoidance of net loss.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Tuesday, September 04, 2007 12:45 PM
To: 'John White'; 'jflarson@PacificEnergySystems.com'
Subject: Clarifying information

Hi again,

Here is some clarifying information on that confusing revegetation language. In the course of clarification, we caught the typo we noted.

The logic we are trying to quantify goes:

Healthy bunchgrass areas have bare soils (as opposed to cheatgrass covering everything). So we can be successful even in the event there is some bare soil.

Revegitation

Applicant has proposed (Exhibit P page 48) that, for each disturbed site, "Revegetation will be considered successful when 1) vegetation cover of native species at disturbed sites is greater than or equal to that at reference sites, and 2) bare soil in disturbed sites does not exceed the sum of reference site bare soil plus three times [this is a typo, the text should read two times] the percentage that native species cover on disturbed sites exceeds native species cover on reference sites."

Applicant prefers success criteria that are quantitative rather than qualitative, recognizes the second success criterion is convoluted, and provides the following equation and table in explanation.

Reference area average native species cover (%) = A

Reference area average bare soil (%) = B

Disturbed area native species cover (%) = X

Disturbed area bare soil = Y

Maximum allowed bare soil in disturbed area = B + [2 × (X – A)]

Assessed area	**Native species cover**	**Bare ground**	**Maximum bare ground**	**Successful**
Reference area A	10%	0%		
Disturbed area A1	30%	20%	40%	Yes
Disturbed area A2	10%	15%	0%	No
Reference area B	60%	15%		
Disturbed area B1	70%	20%	35%	Yes
Disturbed area B2	50%	5%	n/a	No (native cover fails)

Draft Habitat Replacement Plan

For simplification of the plan, Applicant recommends that the analysis of temporary disturbance impacts, including Tables 2a and b, be replaced with:

For mitigation of temporary impacts, Applicant proposes one replacement acre for each acre of Category 3 and 4 sage shrub steppe, and 0.29 replacement acres for each acre of all other Category 3 through 5 habitat. For temporary disturbance from the worst-case layout, this adds 49 acres to the 171 acres needed to replace permanently disturbed Category 3 through 5 habitat, resulting in a replacement parcel of 220 acres.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Friday, September 07, 2007 3:55 PM
To: 'John White'
Cc: dgrant@caithnessenergy.com; jflarson@PacificEnergySystems.com; carol@pilzandco.com
Subject: RE: Status of responses to RAI #3

John email.doc

Hi. The attached Word file addresses your comments on the P items (well, we are hoping it addresses them).

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Wednesday, September 05, 2007 4:02 PM
To: pat@pilzandco.com
Cc: dgrant@caithnessenergy.com; jflarson@PacificEnergySystems.com; carol@pilzandco.com
Subject: Status of responses to RAI #3

Pat,
I thought it might be useful to list the outstanding RAI as of today and give a couple of comments on the information that you have recently sent. I will go down the RAI list by exhibit, listing those RAI for which we have not received a response and making comments where
appropriate:

Exh C
Waiting for response to C2.
This is critical, as we have not yet accepted your calculation of temporary impact acreage with respect to the potential construction impact at the base of each tower. This, in turn, affects your habitat area calculations in Exhibit P.

Exh H
Waiting for responses to H1, H3, H4, H5 and H6.

Exh K
As part of your response to the K1 follow-up you submitted a revised response to K1. Could you help us see what the changes are? The only change that I noticed was your response to "Section 3.020(D)" on page 8. Did you make other changes?

Exh L
Waiting for response to L3.

Exh M
Waiting for response to M1.

Exh O
Waiting for response to O2.

Exh P
Waiting for response to P12.
In your response to P13, you use 7,650 sq ft as the area of temporary disturbance at the base of each tower during construction. This conflicts with the temporary disturbance table you submitted in the revised Exhibit C (March 23 version), which shows 8,837 sq ft of disturbance for each tower. In our follow-up to C2, we asked for more detail and a diagram. Recognizing that some impact might be "light" (no vehicle impact, for example), we suggested showing both the area "scraped and leveled" and the area of "light impact." You discussed this question with us at our meeting a few weeks ago, but I am not yet

persuaded to accept your estimate of the area of temporary impact. I am concerned that if we make the estimated construction area too small, your construction contractor employees might find it necessary to "step outside" the construction boundary and it will not be possible for us to monitor whether additional impact has occured. I am, of course, open to further discussion and additional information on this point.

The additional detail that you have provided in response to P14 helps quite a bit to explain your analysis of temporary construction disturbance. Your discussion, however, raises more questions in my mind:
(1) Assuming your calculation of 29.26 acres per turbine is correct, then there are only 220 turbines possible within 6,444 acres of 3 CUR habitat (6,444/29.26), so how did you figure 226 turbines in this area?
(2) You calculated the 88 acres of total temporary disturbance based on the data in Table P-6a, but if table P-6a is based on the temporary impact table in Exhibit C, then that calculation will have to be redone if we eventually reach agreement on a different area of temporary disturbance at each tower, based on a discussion of C2 (see above). (3) I think we need to revisit how you determined the "worst-case" habitat impacts. This is not simply a matter of geometry and math; that is, it is not just figuring out how many turbines would fit within a particular habitat polygon, but rather what would be a buildable worst-case layout given other constraints, such as terrain. Once this layout is created, the actual impact areas can be determined by GIS analysis, which eliminates the overlap that can result from a computation based on unit acreages alone. (4) Much of your discussion in response to P14 is addressing "loss of habitat category" in the surrounding undisturbed area. I am not sure that this is an important consideration compared to the impact on the areas that are directly affected either by permanent facility components or by construction disturbance. For permanent areas there is a loss of habitat quantity that must be mitigated by providing an equal quantity of habitat in the same category as the area permanently affected. For temporary impacts, we want the affected area to be restored to a quality equal to or better than pre-construction condition. In addition, we are sensitive to the temporal loss of habitat quality while those "temporarily" disturbed areas are being restored and we look for additional mitigation area to address this temporal loss. The question whether an impact would cause the surrounding area to be "reclassified" as a lower category of habitat is not a question that we have asked before; however, it seems to me that the temporal impact on areas that must be restored, as well as the indirect habitat effects of an operating wind facility do affect the quality of the surrounding habitat, whether or not a "reclassification" might be justified.

Exh R
Waiting for response to R2.

Exh S
Waiting for response to S1, S4 and S5.

Exh U
Waiting for response to U3.

Exh X
Waiting for response to X2, X3, X4, X5, X6, X7, X8, X9 and X10.

Exh AA
Waiting for response to AA1(a)

Exh BB
Waiting for response to BB1.

In addition, we have received your written response to ODFW's August 24 comment letter. You have indicated that you will be sending this response directly to Rose and Steve. I am sure that ODFW will have further questions, but my intention is to try to get at least one iteration of the plans (Revegetation, Wildlife Monitoring and Mitigation, and Habitat Mitigation) before we declare completeness. The onus is on me at the moment to produce discussion drafts. I want to circulate and get comments back and produce a revised draft (that is what I am calling one "iteration"). We will probably have additional wildlife-related questions to address after the date of completeness. It is not practical to hold up completenes until every conceivable question has been answered.

You have not proposed a deadline for responding to the remaining RAI, and so I will propose a deadline of 30 days from today (October 5) as a working deadline. Let me know if you think you will need more time.

Regards,

John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

In your response to P13, you use 7,650 sq ft as the area of temporary disturbance at the base of each tower during construction. This conflicts with the temporary disturbance table you submitted in the revised Exhibit C (March 23 version), which shows 8,837 sq ft of disturbance for each tower.

Please see our response to RAI#3, C2.

In our follow-up to C2, we asked for more detail and a diagram. Recognizing that some impact might be "light" (no vehicle impact, for example), we suggested showing both the area "scraped and leveled" and the area of "light impact." You discussed this question with us at our meeting a few weeks ago, but I am not yet persuaded to accept your estimate of the area of temporary impact. I am concerned that if we make the estimated construction area too small, your construction contractor employees might find it necessary to "step outside" the construction boundary and it will not be possible for us to monitor whether additional impact has occurred. I am, of course, open to further discussion and additional information on this point.

Please see RAI#3 C2 for temporary disturbance calculation methodology. Minor disruption (a hay bale on the ground) and ground scraping were equally considered disturbance. We are also willing to propose monitoring of the actual disturbance at each turbine. Since we do not want to seed inappropriate areas (like sand dunes or areas of light disturbance) we probably will need someone like one of our field biologists to determine the area that needs seeding. Determining the actual disturbance area at the same time would be simple.

The additional detail that you have provided in response to P14 helps quite a bit to explain your analysis of temporary construction disturbance. Your discussion, however, raises more questions in my mind:

(1) Assuming your calculation of 29.26 acres per turbine is correct, then there are only 220 turbines possible within 6,444 acres of 3 CUR habitat (6,444/29.26), so how did you figure 226 turbines in this area?

The number of turbines able to be sited within the 3 CUR area was counted from the worst-case layout. Many roads, several animal facilities and a few bare sand areas lie within the 3 CUR area and the worst-case layout avoided them. This ‘concentrates’ turbines within the 3 CUR area. When a 50-foot wide animal facility lies between two turbines sited in the 3 CUR area, the turbines are still 750 feet apart but the distance within the 3 CUR habit is only 700 feet. Maximum turbine density was calculated both ways (from the minimum spacing and from the 3 CUR actual density). The final estimate used was slightly higher than either.

(2) You calculated the 88 acres of total temporary disturbance based on the data in Table P-6a, but if table P-6a is based on the temporary impact table in Exhibit C, then that calculation will have to be redone if we eventually reach agreement on a different area of temporary disturbance at each tower, based on a discussion of C2 (see above).

Agreed.

(3) I think we need to revisit how you determined the "worst-case" habitat impacts. This is not simply a matter of geometry and math; that is, it is not just figuring out how many turbines would fit within a particular habitat polygon, but rather what would be a buildable worst-case layout given other constraints, such as terrain. Once this layout is created, the actual impact areas can be determined by GIS analysis, which eliminates the overlap that can result from a computation based on unit acreages alone.

The worst-case layout is a buildable one (no turbines are placed on cliff faces or similar untenable locations, and no roads go down steep ravine sides). The worst-case layout would be poor in terms of electricity generation. The typical layout is optimized for power production; therefore, any worst-case layout will suffer in that respect. Given all possible permutations for siting 303 turbines within the boundary, the only practical worst-case approach was to place turbines within the best quality habitats at a buildable density (the closest spacing used in the typical layout with similar setbacks from the boundary and public roads). The permanent and temporary impacts, by habitat category and subtype, were determined using GIS analysis (using actual road placement, transmission and communication line locations and sites of other facility components) for both the typical and worst-case layout. Unit acreage was not used to calculate these impacts.

It is unlikely that the facility that actually gets built will be identical to the typical layout. Therefore, in discussing potential impacts from the eventual facility as built, a more general discussion of impacts (based on unit acreage) was included. This is in addition to the GIS-calculated typical and worst-case impacts, not in replacement of either.

(4) Much of your discussion in response to P14 is addressing "loss of habitat category" in the surrounding undisturbed area. I am not sure that this is an important consideration compared to the impact on the areas that are directly affected either by permanent facility components or by construction disturbance. For permanent areas there is a loss of habitat quantity that must be mitigated by providing an equal quantity of habitat in the same category as the area permanently affected. For temporary impacts, we want the affected area to be restored to a quality equal to or better than pre-construction condition. In addition, we are sensitive to the temporal loss of habitat quality while those "temporarily" disturbed areas are being restored and we look for additional mitigation area to address this temporal loss. The question whether an impact would cause the surrounding area to be "reclassified" as a lower category of habitat is not a question that we have asked before; however, it seems to me that the temporal impact on areas that must be restored, as well as the indirect habitat effects of an operating wind facility do affect the quality of the surrounding habitat, whether or not a "reclassification" might be justified.

We addressed loss of habit category in three phases: permanent disturbance of habitat, temporary disturbance of habitat, and construction impact on undisturbed habitat. The proposed mitigation differed for each. The proposal to avoid disturbance of Category 2 habitat, the permanent footprint-reduction measures described in Exhibit P, and 173 acres of the HRP, were to mitigate for permanent impacts. The proposals to minimize temporary disturbance area and disturbance severity described in Exhibit P and RAI responses for Exhibit C, as well as 47 acres of the HRP, were to mitigate for temporary impacts. The proposal to avoid disturbance of specific areas of sage or purshia shrub steppe, and to avoid siting of substations or workshops in Category 3 habitats, arose from analysis of impacts to undisturbed habitat.

We are quite willing to entirely dispense with the discussion of impacts to undisturbed habit, as long as the proposed restrictions on specific habitat patch disturbances and on large-component siting remain.

We agree that the presence of areas temporarily disturbed has an adverse affect on surrounding habitat quality, and stated so in Exhibit P and in RAI#3 P14. The indirect impact of an operating facility is difficult to assess quantitatively. The impact from facility presence on the quality of the surrounding undisturbed habitat is not primarily to the vegetation but to its use by wildlife. Wind facilities are quite spread out and do not pose the same type of habitat fragmentation that an intervening agricultural field or housing development would. Unfortunately, there are few studies of wildlife use of wind facility sites (as compared to the abundance of carcass count studies).

A dry wash runs through the HRP, including the portion that we classified as Category 6 due to its extremely degraded nature. We suspect the Category 6 vegetation in that portion of Fourmile Canyon is a substantial barrier to wildlife movement between the more native areas to the north and south. We believe restoring the value of the wash as a functional wildlife corridor mitigates for the remaining habitat quality impacts.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Sunday, September 09, 2007 2:03 PM
To: 'John White'
Cc: 'jflarson@PacificEnergySystems.com'; 'carol@pilzandco.com'
Subject: RE: Mitigation Plan

John email2.doc

Hi, here is the answer to this one. Hope it helps.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Thursday, September 06, 2007 3:47 PM
To: pat@pilzandco.com
Cc: jflarson@PacificEnergySystems.com; carol@pilzandco.com
Subject: Mitigation Plan

Pat and Carol,

One of the "new concepts" (see my comment to RAI P6) that you present in the proposed habitat mitigation plan is the idea that the size of the mitigation requirement fluctuates over time based on how much of the project has been built (Year 1 to Year 2) and how much of the "temporary" impact is fully restored (Years 3 onward). I have taken a close look at this concept as you have presented it in the revisions included with your 8/31 e-mail.

The real issue, I think, is how the temporal impacts of construction are mitigated. Although there might be some adjustments to be made in the precise acres of footprint impacts, it appears that your plan includes acre-for-acre mitigation for Category 3 and 4 footprint impacts. It also appears that you are proposing acre-for-acre mitigation for Category 5 footprint impacts, although the ODFW goal requires simply "net benefit."

In addressing mitigation for "temporary" impacts, however, your proposed plan gets murky. Your discussion mixes both temporary and permanent impacts, which makes it very difficult to follow. We need to keep these two types of impact separate.

For purposes of discussion, I will use only the "worst-case" numbers. In broad strokes, what I think you are proposing is this:

Year 1: The impacts both permanent and temporary total 154 acres according to Table 2a. Your mitigation area of 220 acres has an extra 66 acres, which you call a "replacement credit for later impacts." [I note that you use 220 acres in the 8/31 discussion, but in Exhibit P, page 50, and in the first paragraph of original plan says that the applicant proposes a mitigation area of 205 acres.]

Year 2: The impacts both permanent and temporary total 307 acres according to Table 2a. The mitigation area of 220 acres covers the permanent impacts (171 acres), but does not provide acre-for-acre mitigation for the temporary impacts. This apparent shortfall seems inconsistent with your statement in the plan that "the number of acres needed to mitigate for permanent and temporary impacts through the fifth year after initiation of construction is...220 for the worst-case layout."

Year 3: The impacts both permanent and temporary total 253, based on the assumption that some of the temporary impact area has been fully restored by Year 2 (for example 44 acres of CUR habitat).

Year 4 and beyond: As the areas that have been affected by construction recover over time, the total area of permanent and temporary impacts declines, so that by Year 5 there is a residual of recovering temporary area equal to 8 acres of 3GL, 1 acre of SS-R, 8.6 acres of 3SS-S and 0.36 acres of 4SS-S.

Let me begin by saying that I do not agree with the underlying premise that you must mitigate for temporary impacts in the same way that you mitigate for permanent impacts. It appears that your intention is to replace temporary habitat impacts acre-for-acre with mitigation area acres but only for the duration of recovery. The amount of mitigation acres required declines over time, under your plan, ending up with a residual of 32 acres -- presumably after the SS-S habitat is fully restored -- which you then assign to "net benefit" mitigation for Category 5. Aside from the fundamental issue of whether this is an appropriate way to mitigate for temporary impacts, your proposal relies on several very big assumptions that I have trouble with. First, you assume that half the impact of the total facility will occur in Year 1. You have provided no basis for this assumption because you have not explained what "phase 1" of the project will include. It very well might be that more than half of the impacts occur in Year 1, and it seems unlikely to me that exactly half of the impacts in each habitat category will occur in Year 1. Second, you assume that habitat will recover precisely on the schedule you have set out in your list of "recovery periods." This is too much spreadsheet and too little biology. We must monitor the progress of recovery to determine whether or not the success criteria for recovery have been met on the ground in any particular year. Third, it appears that you are assuming that an acre of mitigation area, by itself, provides mitigation for an acre of temporary (or permanent) impact, when, in fact, it will take several years to create an acre of Category 3 habitat (for example) on a parcel that consists of mostly Category 4 and 6 habitat when you begin.

I have other questions about the specific numbers shown on Tables 2a and 2b, which seem inconsistent with Table P-6a, but I will not take time to address those now because of the more fundamental problems with your proposal that I have discussed above.

It has been the Council's practice to require a mitigation area that is sufficiently large to meet (after enhancement) the ODFW standards for mitigation for the footprint impacts of an energy facility. Generally, this means acre-for-acre mitigation for Category 3 and 4 habitat and a larger ratio for Category 2 impacts (for example 2 acres of mitigation for every 1 acre of impact). The Council has required this full area to be acquired (usually by easement) before facility construction begins and has required enhancement measures for the full area to begin at about the same time that construction begins.

For temporary impacts, the Revegetation Plan will address restoration of the area affected. Beyond that, we have become sensitive to the issue of the "temporal impact" of construction. That is, because some habitat types (for example, grassland-sagebrush) could take many years to recover even with active restoration efforts, there is a loss of habitat quality for a period of years. Rather than using a mathematical approach to what is really a biological problem, I suggest you "repackage" your plan. Focus on the most important habitat affected and provide some additional acres and enhancement effort in the Habitat Mitigation Area (beyond what is needed for the footprint impacts). It will be much easier for the Council to understand a set number of acres that will be set aside and enhanced from Day 1, rather than a proposal in which the size of the area that is "assigned" to different types of impact grows and shrinks from Year 1 to Year 5 and beyond.

I have not addressed the specific proposed enhancement measures, success criteria and monitoring in this e-mail. I will review those sections of the proposed plan and let you know if I have more questions.

Regards,
John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

One of the "new concepts" (see my comment to RAI P6) that you present in the proposed habitat mitigation plan is the idea that the size of the mitigation requirement fluctuates over time based on how much of the project has been built (Year 1 to Year 2) and how much of the "temporary" impact is fully restored (Years 3 onward). I have taken a lose look at this concept as you have presented it in the revisions included with your 8/31 e-mail.

The real issue, I think, is how the temporal impacts of construction are mitigated. Although there might be some adjustments to be made in the precise acres of footprint impacts, it appears that your plan includes acre-for-acre mitigation for Category 3 and 4 footprint impacts. It also appears that you are proposing acre-for-acre mitigation for Category 5 footprint impacts, although the ODFW goal requires simply "net benefit."

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For purposes of discussion, I will use only the "worst-case" numbers. In broad strokes, what I think you are proposing is this:

Year 1: The impacts both permanent and temporary total 154 acres according to Table 2a. Your mitigation area of 220 acres has an extra 6 acres, which you call a "replacement credit for later impacts." [I note that you use 220 acres in the 8/31 discussion, but in Exhibit P, page 50, and in the first paragraph of original plan says that the applicant proposes a mitigation area of 205 acres.]

Additional acreage was added to the HRP when the anticipated construction schedule changed from three years to two.

Year 2: The impacts both permanent and temporary total 307 acres according to Table 2a. The mitigation area of 220 acres covers the permanent impacts (171 acres), but does not provide acre-for-acre mitigation for the temporary impacts. This apparent shortfall seems inconsistent with your statement in the plan that "the number of acres needed to mitigate for permanent and temporary impacts through the fifth year after initiation of construction is...220 for the worst-case layout."

Year 3: The impacts both permanent and temporary total 253, based on the assumption that some of the temporary impact area has been fully restored by Year 2 (for example 44 acres of CUR habitat).

Year 4 and beyond: As the areas that have been affected by construction recover over time, the total area of permanent and temporary impacts declines, so that by Year 5 there is a residual of recovering temporary area equal to 8 acres of 3GL, 1 acre of SS-R, 8.6 acres of 3SS-S and 0.36 acres of 4SS-S.

Let me begin by saying that I do not agree with the underlying premise that you must mitigate for temporary impacts in the same way that you mitigate for permanent impacts. It appears that your intention is to replace temporary habitat impacts acre-for-acre with mitigation area acres but only for the duration of recovery. The amount of mitigation acres required declines over time, under your plan, ending up with a residual of 32 acres -- presumably after the SS-S habitat is fully restored -- which you then assign to "net benefit" mitigation for Category 5.

We assumed that the SS-S habitat (and any other habitat that has not recovered by year 5) is in effect permanently lost and was replaced 1:1.

Aside from the fundamental issue of whether this is an appropriate way to mitigate for temporary impacts, your proposal relies on several very big assumptions that I have trouble with. First, you assume that half the impact of the total facility will occur in Year 1. You have provided no basis for this assumption because you have not explained what "phase 1" of the project will include. It very well might be that more than half of the impacts occur in Year 1, and it seems unlikely to me that exactly half of the impacts in each habitat category will occur in Year 1. Second, you assume that habitat will recover precisely on the schedule you have set out in your list of "recovery periods." This is too much spreadsheet and too little biology. We must monitor the progress of recovery to determine whether or not the success criteria for recovery have been met on the ground in any particular year. Third, it appears that you are assuming that an acre of mitigation area, by itself, provides mitigation for an acre of temporary (or permanent) impact, when, in fact, it will take several years to create an acre of Category 3 habitat (for example) on a parcel that consists of mostly Category 4 and 6 habitat when you begin.

The habitat recovery rate was described as the maximum that could occur, and we understand that recovery will not follow a precise schedule. We assumed that it would take a minimum of four years to improve any Category 4 habitat to Category 3, and that this period was only adequate for half of it. We assumed that a quarter of the Category 4 habitat would take 8 years to improve to Category 3, and the remainder would take even longer. We assumed improving Category 5 habitat to Category 4 would take a minimum of 8 years, and be successful for only half. Improving the remainder was estimated to take 16 years or longer. The recovery rates were biologically-based; the spreadsheet was used to predict maximum progress at these rates. Without some idea of what might be possible, there is no good response to the statement that “I don’t think these replacement goals can be met.” We wanted to show WHY we thought replacement goals could be met.

Our estimated recovery rates are not inconsistent with the statement in the JLF Project Order that “It could take as long as seven years to restore mature stature of perennial bunchgrass areas”. Since all of the LJF perennial bunchgrass was classified as Category 2, restoration of disturbed LJF ground to Category 2 quality is expected to take a maximum of 7 years. The goal to improve half of the SFWF HRP Category 4 grassland to Category 3 in four years and half of the Category 6 land to Category 4 in eight years does not seem unreasonable.

We agree monitoring needs to occur. In the original plan, we proposed annual qualitative assessment of vegetation. We also proposed quantitative assessment of vegetation on a regular schedule commencing in year 4, the first point at which measurable habitat quality change would be apparent.

I have other questions about the specific numbers shown on Tables 2a and 2b, which seem inconsistent with Table P-6a, but I will not take time to address those now because of the more fundamental problems with your proposal that I have discussed above.

It has been the Council's practice to require a mitigation area that is sufficiently large to meet (after enhancement) the ODFW standards for mitigation for the footprint impacts of an energy facility. Generally, this means acre-for-acre mitigation for Category 3 and 4 habitat and a larger ratio for Category 2 impacts (for example 2 acres of mitigation for every 1 acre of impact). The Council has required this full area to be acquired (usually by easement) before facility construction begins and has required enhancement measures for the full area to begin at about the same time that construction begins.

For temporary impacts, the Revegetation Plan will address restoration of the area affected. Beyond that, we have become sensitive to the issue of the "temporal impact" of construction. That is, because some habitat types (for example, grassland-sagebrush) could take many years to recover even with active restoration efforts, there is a loss of habitat quality for a period of years. Rather than using a mathematical approach to what is really a biological problem, I suggest you "repackage" your plan. Focus on the most important habitat affected and provide some additional acres and enhancement effort in the Habitat Mitigation Area (beyond what is needed for the footprint impacts). It will be much easier for the Council to understand a set number of acres that will be set aside and enhanced from Day 1, rather than a proposal in which the size of the area that is "assigned" to different types of impact grows and shrinks from Year 1 to Year 5 and beyond.

I have not addressed the specific proposed enhancement measures, success criteria and monitoring in this e-mail. I will review those sections of the proposed plan and let you know if I have more questions.

We agree that progress towards application completion would be simpler if the SFWF HRP size was recast in the same terms as that for LJF (Proposed Order Attachment C), and we have done so (below) with minor alterations.

Applicant proposes the following for mitigation of habit loss, based on the worst-case layout (Exhibit P Tables P-6a and b):

<u>Category 2</u>
Applicant has proposed to avoid any disturbance of Category 2 habitat

Category 3
Footprint impacts: 125 acres
Temporal impacts to SS-S and SS-P: 8.6 acres
Mitigation area: 125 acres + (8.6 acres × 0.5) = 129.3 acres

Category 4
Footprint impacts: 26 acres
Temporal impacts to SS-S and SS-P: 0.36 acres
Mitigation area: 26 acres + (0.36 acres × 0.5) = 26.2 acres

Category 5
Footprint impacts: 20 acres
Mitigation area: 20 acres

Minimum mitigation area: 175.5 acres

Applicant proposes to conserve and develop a habitat replacement parcel of 175.5 acres, and to conserve and develop an additional 44.5 acres to meet Applicants own mitigation standards. This brings the total HRP size to 220 acres. In the original plan, Applicant proposed to lease the entire HRP acreage and begin habitat improvement activities immediately upon issuance of the Site Certificate. Applicant does not propose to change this timing or improvement schedule.

The current HRP is assessed as having (Attachment P-7 and amended to increase the HRP to 220 acres) 0.23 acres of habitat Category 1, 16 acres of habitat Category 2, 104 acres of habitat Category 4 and 99.7 acres of habitat Category 6. Applicant has proposed to add burrowing owl nest boxes (which do not rely on vegetation enhancement schedules) to achieve 1.8 new acres of Category 2 habitat by the end of Year 4 (assumes there is no occupation by owls (would be Category 1 if occupied)). Plowing and weed control during the first year will bring the weedy Category 6 area to a condition Applicant has assigned to Category 5 habitat (i.e. fallow wheat fields).

The habitat categories in the HRP at the end of year 5, assuming no improvement of vegetation quality, is: 18 acres of Category 3 or higher habitat, 104 acres of Category 4 habitat, 97 acres of Category 5 habitat, and 1 acre of Category 6 habitat.

Adequacy of habitat replacement

If SFWF construction begins immediately upon issuance of the Site Certificate and is completed within one year, and if the habitat impacts are those of the worst-case layout, the category deficit at the end of year 5 without additional vegetation intervention is 111.3 acres of Category 3 habitat. The remaining question is if Applicant’s proposed program is sufficient to advance, within a reasonable period, 104 acres of Category 4 habitat and 7.3 acres of Category 5 habitat to Category 3 quality, and 26.2 acres of Category 5 habitat to Category 4 quality.

To address potential shortfall in category replacement, Applicant proposes to reassess HRP habitat category goals in the fourth year after initiation of SFWF construction. The replacement goals for the as-built layout impacts, and for the worst-case impact from any portion of the facility remaining to be built, will be compared to the current status of HRP habitat. Should it appear that replacement goals will not be met within a reasonable period, Applicant will locate and lease additional HRP acreage. This acreage will contain existing habitat of the same or better quality than the categories in which the shortfalls will occur.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Monday, October 01, 2007 2:56 PM
To: 'John White'; 'jflarson@PacificEnergySystems.com'
Cc: 'Carol Pilz Weisskopf'
Subject: RE: Shepherds Flat discussion drafts (WMMP)

We have an oops (sorry). We don't like helicopter surveys for raptor nests, so as we work this through with ODFW, perhaps we can change that? In general, we do not like them because they are very disruptive to wildlife. But in the instant case, there are so few potential nesting structures (all short), that it makes more sense to survey on foot. It's a Leaning Juniper item that we overlooked.

Again, sorry for the trouble.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Monday, October 01, 2007 2:25 PM
To: Rose M Owens
Cc: jflarson@PacificEnergySystems.com; carol@pilzandco.com; pat@pilzandco.com; Steve P Cherry
Subject: Shepherds Flat discussion drafts (WMMP)

Rose,
Attached is a discussion draft of the Wildlife Monitoring and Mitigation Plan for Shepherds Flat. This is based on the applicant's proposal in Attachment P-8 and on further dialog with the applicant. The applicant has agreed to add raptor monitoring and also a program of ongoing monitoring for incidental finds. Please discuss this draft plan with Steve and send me your comments as soon as you can.

I am tentatively planning to be in Arlington by the afternoon of October 17. Do you and Steve still have that time available for a visit of the grassland area and mitigation area at Shepherds Flat? When do you think you will finish your tours of the Leaning Juniper Projects and Pebble Springs?

John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

Patricia Pilz

From: Carol Pilz Weisskopf [carol@pilzandco.com]
Sent: Thursday, October 04, 2007 3:38 PM
To: John White; pat@pilzandco.com
Cc: jflarson@PacificEnergySystems.com
Subject: RE: rare plant question

First, little mousetail and Robinson's onion are listed in Table P-2 on page 18 and discussed on page 24 (revised Ex P). According to the current Oregon Natural Heritage Program database, Northern wormwood is known only in Multnomah, Sherman, Umatilla and Wasco Counties.

The primrose and hepatic monkeyflower are listed in the database as known in Gilliam County and are Oregon candidates for listing:

http://www.oregon.gov/ODA/PLANT/CONSERVATION/statelist.shtml#Candidate_plant_species

Don't worry about me feeling ignored, I still have lots of weeds left to keep me busy.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Thursday, October 04, 2007 1:47 PM
To: pat@pilzandco.com
Cc: jflarson@PacificEnergySystems.com; carol@pilzandco.com
Subject: rare plant question

Hi Pat,
Here's a Carol question, so she doesn't feel left out.

Can you reconcile why your survey of literature and databases for rare plants did not include three species identified by CH2M Hill for the LJ2 project? The species are little mousetail, Robinson's onion and Northern wormwood (which is State-endangered). I also note that you included dwarf evening primrose and hepatic monkeyflower, which were not on CH2's list.

John

John G. White
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Salem, Oregon 97301-3742
john.white@state.or.us

Patricia Pilz

From: Carol Pilz Weisskopf [carol@pilzandco.com]
Sent: Thursday, October 25, 2007 1:14 PM
To: John White
Cc: John Larson; Pat Pilz
Subject: RE: Raptor nest surveys

The 2007 survey did not revisit all known raptor nest sites (if we had looked for WGS 2 miles from the boundary we would still be out there). It is a mixed bag for calculating it, one hazard of reporting incidental sightings and then treating them as part of a formal survey. There are two options for the calculation:

Since 122 sq mi was the area of the formal search, if the new nests are considered to have been missed in the formal search this is the proper calculation. 0.11 All raptors combined 0.057 red-tailed hawk 0.0082 ferruginous hawk 0.016 great-horned owl 0.016 golden eagle 0.0082 Swainson's hawk

If the 2007 survey is considered to be a separate nest search (which it was not), the search area would be 122 sq mi for the nests found in 2003 and 25.8 sq mi for the new nests found in 2007. 0.20 All raptors combined 0.088 red-tailed hawk 0.0082 ferruginous hawk 0.016 great-horned owl 0.047 golden eagle 0.039 Swainson's hawk

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Thursday, October 25, 2007 12:14 PM
To: Carol Pilz Weisskopf
Cc: John Larson; Pat Pilz
Subject: RE: Raptor nest surveys

Carol,
You have a good point that "raptor nest density" should be the active nests in a given year. If I am reading the November 2006 baseline study correctly, it appears that the data of ten active and five inactive nests were based on ground and vehicle surveys in 2003. Further, it appears that there was no re-survey of all known nests done in 2007, but rather three previously unrecorded raptor nests were discovered incidental to the WGS and burrowing owl surveys. Because these nests were unknown in 2003, we have no way of knowing whether they were active in that year. The fact that a redtail nest and a golden eagle nest were active in 2003 but not in 2007 suggests that the pairs moved their nesting site, but we cannot be sure. It seems to me that the conservative assumption would be to include the newly discovered raptor nests in calculating the raptor nest densities for all raptors and for individual species, but we can footnote the calculation to indicate that there could be an overcount due to the fact that we do not have a complete survey of known nest sites for any one year.

John

John G. White
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625 Marion St., NE
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>>> "Carol Pilz Weisskopf" <carol@pilzandco.com> 10/24/07 11:07 AM >>>
I can recompute the raptor nest density, but I don't think it would be appropriate for the red-tailed hawk or the golden eagle. I believe the statistic should be occupied nest density in a given year, rather than a running total of all nests (occupied or not) during a multi-year period.

We did find new raptor nests during the 2007 study, but the wildlife biologists also noticed that some nests found during the 2003 - 2004 surveys were unoccupied in 2007. Unoccupied nests during 2007 included at least two red-tailed hawk nests and the golden eagle nest shown in Figure P-4 of revised Exhibit P (the red-tailed hawk nest in the middle of the southern site, the red-tailed hawk nest within the northern site, and the golden eagle nest to the east of the north project site were the known unoccupied nests). Some of the raptor nests were not within the area searched during the 2007 surveys, so their status is unknown.

Wednesday the 17th, when discussing the ferruginous hawk nest, ODFW agreed that raptors often maintain several nests and switch nesting locations from one year to the next. This was probably the case for the golden eagle and red-tailed hawk nests.

Calculating Swainson's hawk nest density is reasonable, since there were no nests found in 2003 - 2004. The Swainson's hawk nest density (with one nest found in 25.8 sq mi) is 0.038 nests/sq mi. Adding this to the other raptor nests would bring the all raptors combined estimated site density to 0.12 nests/sq mi. Let me know if you still want me to recalculate the golden eagle and red-tailed hawk nest numbers.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Tuesday, October 23, 2007 11:46 AM
To: Carol Pilz Weisskopf
Cc: John Larson; Pat Pilz
Subject: RE: Raptor nest surveys

Carol,
In my previous message below, I asked you to calculate raptor nest density based on the November 2006 wildlife assessment report (which found 10 active and 5 inactive nests). I did not realize that your 2007 surveys found three additional raptor nests (WGS and Burrowing Owl Surveys, May 2007, page 5). Would you please recompute the densities that you show in your response below, adding in these three nest sites?

Thanks,
John

>>> "Carol Pilz Weisskopf" <carol@pilzandco.com> 10/16/07 5:06 PM >>>
The information is not staring you in the face because it is not there (we didn't know it would be useful).

The surveyed area for SFWF was approximately 122 square miles, giving an active nest density of 0.082 nests/mi2. Since Table 13 in LJF attachment P-2 gives the nest density for Pacific Northwest facilities by species, we assume the "All Raptors Combined" was for active nests; otherwise the species would not have been known.

By species, nest density was red-tailed hawk at 0.049 nests/mi2, ferruginous hawk and golden eagle each at 0.0082 nests/mi2, and great-horned owl at 0.016 nests/mi2.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Tuesday, October 16, 2007 3:54 PM
To: Carol Weisskopf
Cc: John Larson; Pat Pilz
Subject: Raptor nest surveys

Carol,
Perhaps it is staring me in the face, but I have not been able to find either an analysis of raptor nest density or the data to calculate it. In the November 2006 wildlife assessment report, page 4, it says that foot an vehicle surveys were conducted on the project site and a two-mile buffer. I cannot find where the total square miles of this search area has been given. The report says that 10 active and 5 inactive nests were found.

I assume that raptor nest densities reported for other wind projects in the region have included bothe active and inactive nests, but I am not certain. If you can find something that verifies this one way or the other, please let me know. Otherwise, can you calculate a raptor nest density per square mile using the total of 15 nests?

Thanks,

John

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625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

□

Patricia Pilz

From: Carol Pilz Weisskopf [carol@pilzandco.com]
Sent: Thursday, October 25, 2007 5:20 PM
To: John White; John Larson
Cc: Pat
Subject: Ex P & Q conditions

SFWF conditions.doc

Habitat exclusions.doc

I have looked through Exhibits P and Q, associated RAIs, and email correspondence dealing with these exhibits. Everything I found that might be appropriate as a condition is included as an attachment to this email. I also attached the locations of the habitat patches proposed for exclusion from disturbance.

Carol

SFWF conditions

ExP p 39:
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.

ExP p 40:
Applicant proposes to disturb no category 1 or 2 habitats, which are rare in the area.

ExP p 41:
Applicant proposes to cause no temporary or permanent disturbance to any raptor nesting structures containing occupied nests. Applicant proposes to avoid construction within 0.5 miles of occupied nests during raptor nesting season. Applicant also proposes spring surveys during the period raptor nests are being constructed (approximately mid-March through early April) in all areas within 0.5 miles of construction scheduled to take place during nesting season (approximately early April through June).

Applicant proposes to cause no temporary or permanent disturbance to category 1 Washington ground squirrel habitat. Applicant proposes to avoid construction within 1,300 to 1,700 feet from identified burrows during the period in which Washington ground squirrels are active (approximately mid-March through May).

Applicant proposes to avoid removal of any trees greater than 3 feet in height that may be suitable to use for raptor nest construction.

Applicant proposes to avoid construction or disturbance of all areas of category 2 sage shrub steppe.

Applicant proposes to avoid construction or disturbance of all areas of category 2 Washington ground squirrel habitat. Applicant proposes to avoid construction within 1,000 feet of category 2 Washington ground squirrel habitat during the period in which the squirrels are active.

ExP p 42:
Applicant proposes to avoid construction or disturbance of all category 2 wetlands dry wash.

Applicant proposes to avoid placement of any transmission line supports within the washes.

Applicant proposes to prevent disturbance to nesting curlew by avoiding construction activity within 0.5 miles of identified curlew nesting habitat during nesting season, approximately March 8 through mid-June.

ExP p43:
When [Category 3 sage or purshia] shrubs cannot be avoided, Applicant proposes to prune rather than break interfering limbs, and to shorten rather than remove plants.

There is one small (less than 5-acre) mapped category 3 purshia sage steppe habitat. Applicant proposes to avoid any disturbance of this habitat.

Of the 21 mapped category 3 sage shrub steppe habitat areas, 12 are smaller than 5 acres. Applicant proposes to avoid category 3 sage shrub steppe mapped at 5 acres or smaller.

Applicant proposes to crush rather than remove [rabbitbrush] shrubs when possible to minimize shrub loss.

ExP p 44:
The smallest mapped area of category 3 rabbitbrush shrub steppe is less than 3 acres, and Applicant proposes to avoid it.

ExP p 45:
Existing damaged [Category 4] sage plants will be avoided when practical, and every effort made to avoid healthy plants.

When [Category 4] sage cannot be avoided, Applicant proposes to prune rather than break interfering limbs, and to shorten rather remove plants.

ExP p 51:
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, to reduce the potential for avian electrocutions.

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.

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.

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 exterior lighting of the facility site will be installed.

ExP p 52:
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.

ExP p 53:
Applicant proposes to avoid siting of turbines on slopes greater than 20%.

Applicant proposes to avoid siting a turbine string along the north site boundary, and to avoid siting turbines within 250 feet of the bluff edge.

Applicant proposes the same 250-foot turbine setback from the east site boundary above the Willow Creek Valley.

Although not identified as high-use corridors, ridge saddles and gaps between hilltops could have some preferential use by avian species. During final turbine siting, these areas will be reviewed by the project's wildlife biologists, and turbine locations adjusted accordingly.

ExP p 54:
Overhead transmission crossing narrow saddles, ravines and gaps will be avoided where possible. There are cases where overhead line crossings may be preferred over underground lines to minimize habitat impacts. Where crossings cannot be avoided, avian line markers such as PVC spirals will be installed. These line markers significantly reduce avian mortality from wire strikes.

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.

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.

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). Stormwater pollution prevention and erosion control plans will be established for facility construction and operation.

ExP p 55:
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.

Email of 09/07/2007:
We are also willing to propose monitoring of the actual disturbance at each turbine. Since we do not want to seed inappropriate areas (like sand dunes or areas of light disturbance) we probably will need someone like one of our field biologists to determine the area that needs seeding. Determining the actual disturbance area at the same time would be simple.

RAI#3, P15
Applicant proposes to ensure all facility-owned electrical poles are constructed to be APLIC compliant.

[F]acility-owned electrical poles or lines directly implicated in raptor fatalities will have perch guards, line markers or other protective measures installed to prevent recurrence.

Post-construction searches may detect raptor carcasses near turbines in close proximity to power poles. The perching opportunity provided by the pole may increase raptor use near turbines and add to collision risk. Applicant proposes to install perch prevention devices on facility-owned power poles within 0.5 miles of turbines at which raptor carcasses are found.

RAI#3 p14:
Applicant additionally proposes to restrict construction of field workshops and substations (components with large contiguous permanent footprints) to habitat categories 4 through 6.

Most limitations in ExQ are the same as in ExP. The two that differ are listed, below.

ExQ p 15
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. 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.

ExQ, p 16
Of [the listed, proposed or candidate plant species], 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.

Locations of habitat exclusions

The maps showing the locations of habitat exclusions are Figures P-8a and b. These suffer to some extent by the small scale of the exclusion areas compared to the terrain covered by the maps. These maps also have errors, where three patches of Category 3 shrub steppe-sage larger than 5 acres were shown as exclusion areas and three patches smaller than 5 acres were omitted. In summary, all habitats were mapped correctly, but exclusion area designations were not. The locations of the one patch each of Category 3 shrub steppe-purshia and rabbitbrush, the 12 patches of Category 3 shrub steppe-sage, and the Category 1 and 2 exclusion areas are described, below, in reference to the ODFW-2 maps. We did not include a description of the location nests and trees appear (Category 1 and 2 RN), although all 59 habitat patches are shown on these maps. There are several patches of Category 3 shrub steppe-sage shown at the site boundary that are not marked as exclusion areas. These are part of large off-site sage steppe patches and therefore larger than 5 acres in size.

ODFW-2 Figure 3: Category 3 SS rabbitbrush, near the west boundary below the transmission lines. Turquoise, separated from a larger 3 SS-R area by white Category 4 rock and sand.

ODFW-2 Figure 4: Category 3 SS purshia, lavender, southwest of the brown Category 5 habitat on the east edge. Category 3 shrub steppe-sage, light blue, southwest of the purshia, surrounded by white rock and sand, and between two larger light blue sage steppe habitats.

ODFW-2 Figure 5: Category 2 shrub steppe-sage, pink, along the east edge.

ODFW-2 Figure 6: Category 2 shrub steppe-sage, the pink habitat to the west of the canyon. Category 3 shrub steppe-sage, the two light blue patches towards the south end on the west side of the canyon.

ODFW-2 Figure 8: Category 1 and 2 Washington ground squirrel habitat (orange and purple) slightly below the middle of the map. Category 3 shrub steppe-sage, two light blue patches, one below the WGS habitat and the other to the southwest.

ODFW-2 Figure 9: Category 2 shrub steppe-sage, the pink habitat at the west end of the map. Category 3 shrub steppe-sage, the light blue habitat in the middle of the turquoise and darker blue habitat just west of the map center. There are four patches of light blue Category 3 shrub steppe sage on the east side of Fourmile Canyon Road at or north of the intersection with Cecil Road.

ODFW-2 Figure 10: One patch of Category 3 shrub steppe sage on the east side of Fourmile Canyon Road near the southwest corner of the map. One patch of Category 3 shrub steppe-sage, light blue and running diagonally just west of the middle of the map. Two patches of Category 2 shrub steppe-sage, pink, to the east-northeast of the substation.

ODFW-2 Figure 12: Category 2 shrub steppe-sage, pink, in the north just east of map center.

Q1

You state that "the facility site includes appropriate habitat types" for Laurence's milkvetch but the species was not observed during the 2002 vegetation survey. Did the nine survey points described in Attachment P-4 include all areas of appropriate habitat for this species within the site boundary? If not, how do we know whether this species is at risk from construction of the proposed SFWF? On page 17, you state that there would be permanent loss of habitat for this species. Has that habitat been surveyed during the appropriate season to determine whether Laurence's milkvetch is present?

LAURENCE'S MILK-VETCH

Laurences milk-vetch is associated with basaltic grassland, sagebrush desert and dry slopes. This habitat is abundant within the site boundary, particularly in the north project area. In Oregon, the species is found at elevations above 1970 feet, well above the highest elevation (approximately 1050 feet) within the Shepherds Flat Wind Farm (SFWF) site boundary.

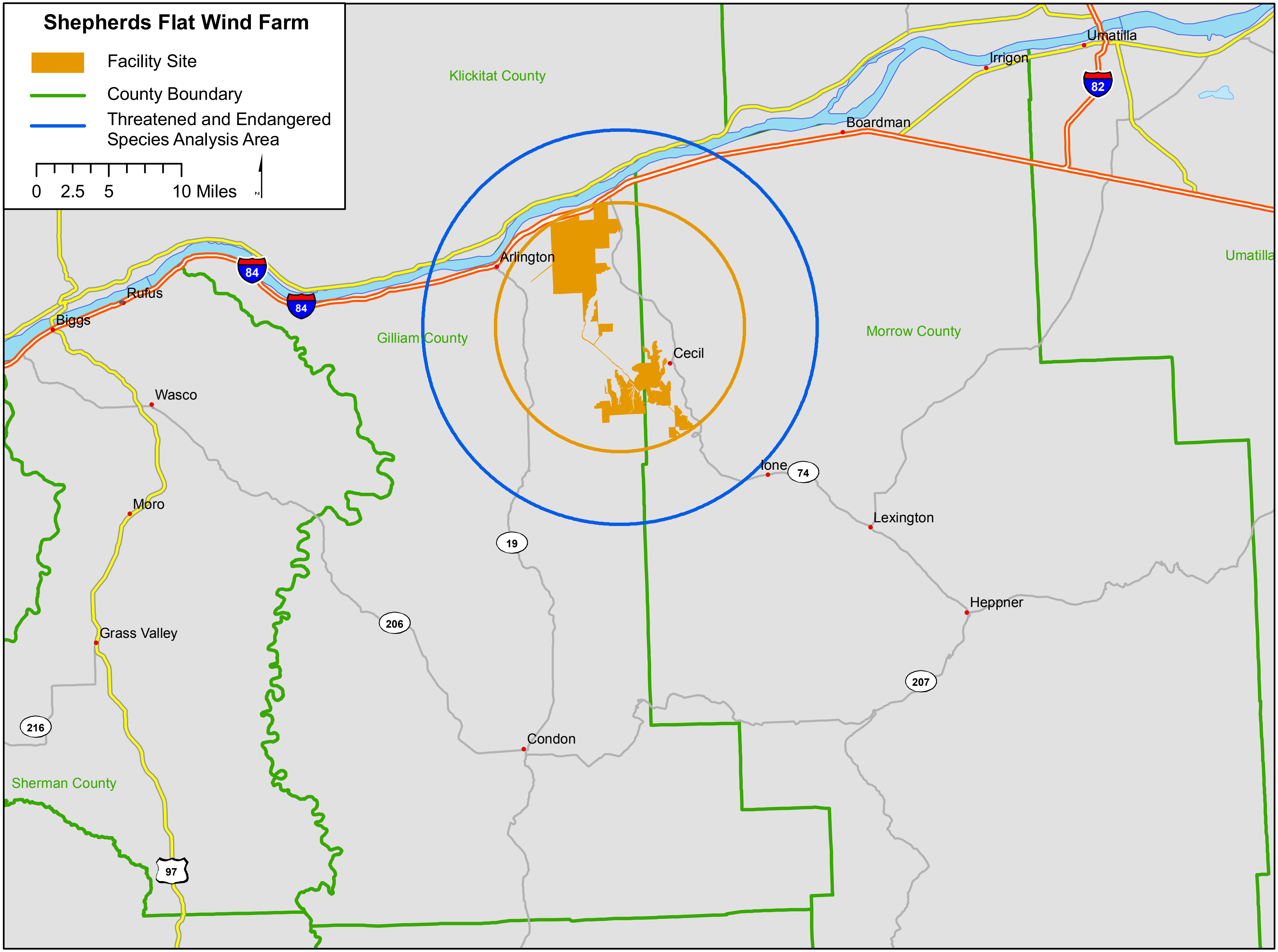
Applicant is not aware of any habitat suitable for use by Laurence's milk-vetch at elevations occupied by this species within the site boundary, and no loss of individuals of the species from facility construction are anticipated to occur. Suitable habitat, albeit at an elevation that eliminates current use of the habitat by Laurence's milk-vetch, will be lost to the permanent facility footprint.

Assessment of the effect permanent loss of suitable habitat will have on Laurence's milk-vetch must address potential impacts to the species in the future. Exhibit Q (E) requires '*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'*

Although Laurence's milk-vetch does not currently inhabit the elevation range the site encompasses, species recovery requires consideration of conditions that may occur 40 years in the future. In most regions, including eastern Oregon, climate change is not typically expected to result in occupation of a lower elevation range by plant or animal species, but that possibility cannot be ruled out. For an accurate assessment of potential future impacts to Laurence's milk-vetch recovery, the loss of habitat that might be appropriate for use by the species in the future must be addressed.

The habitat replacement parcel (RAI#2 P6) includes sufficient acreage of basalt, sagebrush desert and dry slopes to ensure no significant reduction in habitat available for use by Laurence's milk-vetch. The SFWF facility will cause no significant reduction in the likelihood of recovery of Laurence's milk-vetch.

Figure RAI #2 Q-1



Q2

Provide a detailed description of the "two years of focused searches for Washington ground squirrels" that have been performed. Describe the survey protocols, locations surveyed and analysis of results.

EARLY WASHINGTON GROUND SQUIRREL SURVEYS

In the periods March through mid-June in 2003 and March through mid-May in 2004, surveys for Washington ground squirrels and burrowing owls were performed by Energy Northwest field biologists. A brief description of this work is included in Attachment P-1, page 28. The regions surveyed were in the south project area, where proposed turbines or roads were sited on undisturbed land. The layout and site boundary used to determine search locations were those proposed in the SFWF NOI.

In appropriate habitat (non-disturbed), an area 500 to 1000 feet from road centerlines and around turbines was surveyed for burrows, animals or other evidence of ground squirrels and burrowing owls. Transect spacing was between 100 and 200 feet depending on terrain.

Nearly all of the roads and turbines in the south project area, as proposed in the NOI, are sited in dryland wheat fields. The areas where siting is in or near native landscapes, and in which surveys took place, were unplowed hillsides along Fairview Lane from where it approaches turbine locations above Cecil until it leaves the site above Fourmile Canyon, turbine locations directly above Cecil to the west, and unplowed hillsides along Cecil Lane from where it approaches turbines southwest of Cecil until it reaches Fourmile Canyon. The area around the two westernmost turbines in the south area was not searched; it was originally thought planted to wheat.

No burrowing owl or Washington ground squirrel burrows were located during any of the 2003 – 2004 searches. The one area of Washington ground squirrel burrows found in 2007 is approximately 500 feet from the nearest road or turbine. All burrow locations are within a 10-foot circle, and this may be a recent extension of the larger burrow complex off-site to the west. None of the burrowing owl burrows found in the south project area during the 2007 survey is within the area searched in 2003 and 2004; they are well over 1,000 feet from the nearest turbine or road proposed in the NOI. The burrowing owl burrow found in the north project area in 2007 was not present in 2003 or 2004. It is easily seen from the road, and would have been tabulated as an incidental observation during avian surveys.

Q3

Please provide a more complete description of the proposed surveys for Washington ground squirrels (WGS). Please consult with ODFW regarding the protocol for these surveys (specifically, is it appropriate to survey only those areas with soil depth of 0.6 meters or more, as you suggest?). It would be informative to determine this spring (2007) whether WGS are present within the site boundary, so that we can decide what WGS mitigation or monitoring should be required in the site certificate.

WASHINGTON GROUND SQUIRREL SURVEYS

Systematic surveys for Washington ground squirrels were conducted in the spring of 2007:

- The facility site, plus a surrounding 1,000 foot buffer, was mapped and evaluated.
- Those portions of the site under cultivation were eliminated.
- Areas at the base of basalt cliffs outside the facility site, but within the 1,000 foot buffer were included at the request of the Oregon Department of Fish & Wildlife (ODFW).
- Applicant's list of likely soils was submitted to ODFW for review. Applicant surveyed additional soils at the request of ODFW.
- Surveys began on March 15, after establishing (through inspection of a reference colony) that the squirrels were active.
- A two to four person search team traversed parallel transects approximately 200 feet apart, looking for and listening for signs of squirrel activity (burrows, animals, warning barks, etc).
- Vertical slopes impossible to access on foot (canyon walls, some road cuts, etc.) were carefully examined from above and/or below for burrows or squirrels using binoculars.
- Occupied burrows were marked.

Because the northern project area contains tracts of very shallow soil (two to three inches deep) Applicant originally proposed that surveys be limited to soils with sufficient depth to support ground squirrel burrows. A soil depth of 0.6 meters was suggested. ODFW rejected Applicant's proposal, and all soils on the ODFW-approved list were searched, regardless of depth.

Applicant anticipates that the report of survey results will be completed by June 15, 2007.

Patricia Pilz

From: Carol Pilz Weisskopf [carol@pilzandco.com]
Sent: Monday, October 22, 2007 11:50 AM
To: John White
Cc: John Larson; Pat Pilz
Subject: RE: WGS survey area

Q2 addressed the extent of the 2003 and 2004 WGS surveys. During those surveys the area around those turbines was not searched. It was, however, searched (including the 1,000 ft search buffer beyond the site) during the 2007 WGS survey and no WGS were found.

The habitat is category 2 sage steppe (SS-S). It's very nice sage. The part off the site is what we first thought of for the new mitigation plan but it isn't big enough.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Monday, October 22, 2007 11:06 AM
To: Carol Weisskopf
Cc: John Larson; Pat Pilz
Subject: WGS survey area

Carol,
Would you please clarify a statement in the response to RAI Q2 that "the area around the two westernmost turbines in the south area was not searched; it was origiallny thought planted to wheat." The two westermost turbines appear to be those shown on ODFW-2, Figure 11. There is a lavender-colored Category 2 area shown on the figure, but I cannot discern the color difference between "2 SS-S" and "2 WGS." Which is it? If the area is suitable habitat for WGS, it should be surveyed for the species; however the WGS activity period for this year has passed. I understand that the project will avoid all constuction disturbance in Category 2 habitat, but if WGS are present, then there should be a construction buffer. What are your thoughts?

John

John G. White
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625 Marion St., NE
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R1

You state that one-third of the analysis area is within the state of Washington, "which is not considered in this Exhibit." Please provide the information described in OAR 345-021-0010(1)(r) for the areas within the State of Washington.

STATE OF WASHINGTON SCENIC AND AESTHETIC VALUES

Applicant's responses to RAI#2 R2 and R3 include areas within the State of Washington.

R2

Please describe the visual analysis you performed to determine whether any part of the proposed SFWF would be visible from the areas discussed on page 2 and whether any visual impact would be significant.

VISUAL ANALYSIS

Applicant commissioned a new "worst-case" computer-generated visual analysis which may be found at RAI#2 Attachment R. The worst case assumes that the turbine layout covers the whole of the facility site and uses the tallest of the turbines under consideration. The analysis shows:

John Day River and Canyon

The facility will not be visible from the John Day River, nor from the Canyon floor. The facility will be theoretically visible from elevations above the Canyon. However, the facility is some 17 miles to the east of the Canyon, and several wind energy facilities are sited directly between the Canyon and the Shepherds Flat Wind Farm (SFWF). Applicant believes that there will be no significant visual impact.

Oregon Trail

The Oregon Trail Historic Sites at Fourmile Canyon are on the west side of Fourmile Road. When viewing the extant wagon ruts (the Site's important feature), the facility will be behind the visitor and not visible. While large portions of the facility will be visible to the east side of Fourmile Road, Applicant believes that the visual impact to the ruts themselves will not be significant.

Sherman County

The SFWF is theoretically visible from the higher elevations of Sherman County. However, from Sherman County, several other wind facilities lie between the county line and the SFWF. Applicant therefore believes that there will be no significant visual impact.

Gilliam County

The facility will visible from the higher elevations of western Gilliam County, but, again, other wind facilities (particularly the Leaning Juniper complex) will be "in front" of the SFWF. That portion of northeast Gilliam County not included in the SFWF, where visual impact might be expected to be significant, hosts existing and planned wind facilities. Therefore, the visual impact of the SFWF is not expected to be significant within Gilliam County.

Morrow County

The facility will be visible from most of the northern half of Morrow County, and the visual impact is expected to be significant.

City of Boardman

Wind turbines are expected to be visible on the far western horizon from the City of Boardman. Because they will be in the distance, with rows of high-voltage transmission towers in front, Applicant expects no significant visual impact in the City of Boardman.

Klickitat County, Washington

Klickitat County values its undisturbed landforms and rock outcrops, as well rolling terraces developed as irrigated farmland, agricultural fields and orchards. These are offset by highways and transmission lines. The SFWF will be prominently visible from the north side of the Columbia River in eastern Klickitat County. Because Klickitat County has sited at least two wind energy facilities on the bluffs along the Columbia in this area, and these facilities will be in front of the SFWF from other higher elevations in the rest of Klickitat County, Applicant does not believe that this visual impact is significant.

Yakima County, Washington

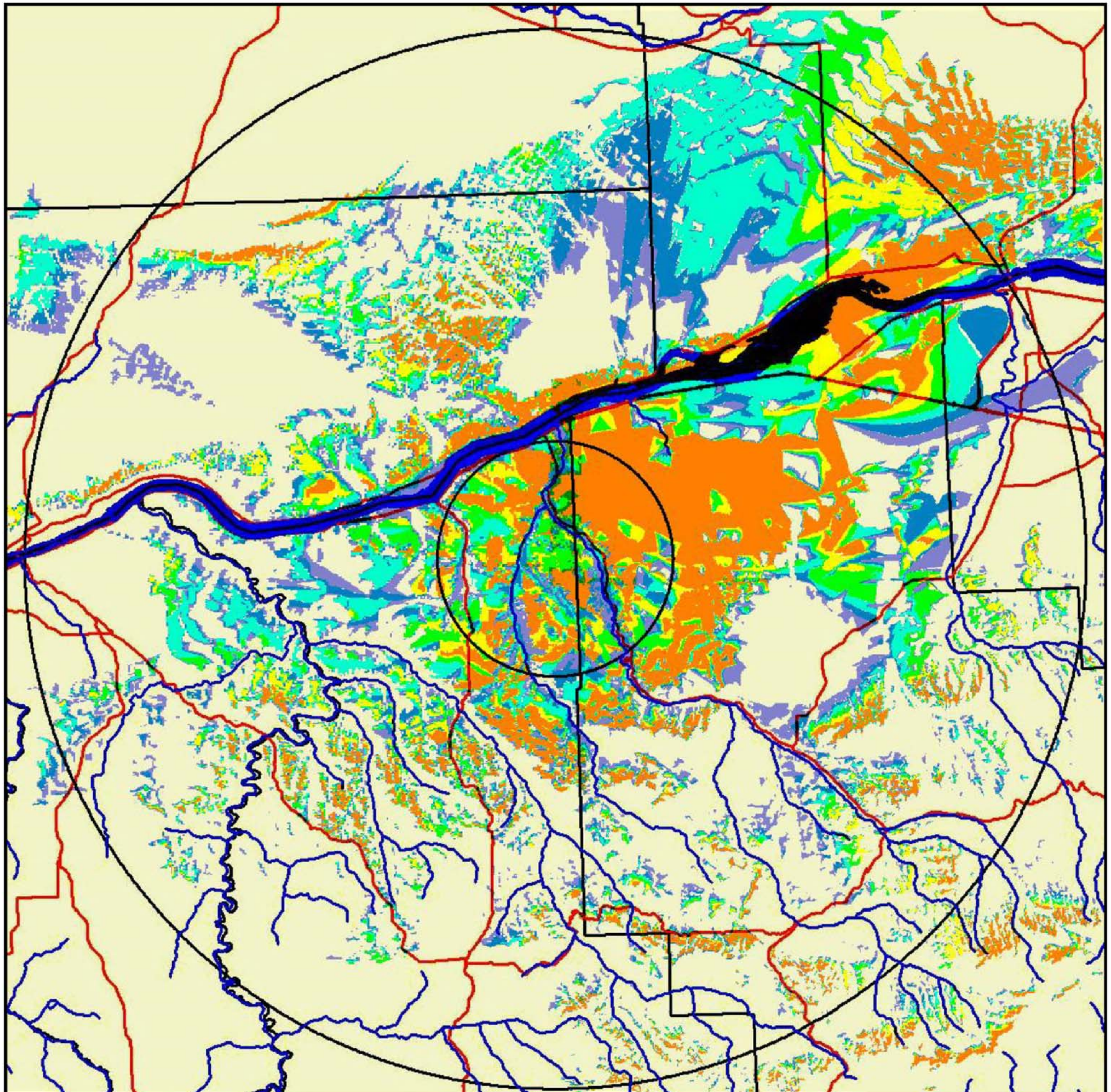
The southeastern portion of Yakima County lies within the analysis area. Yakima County policies seek to protect the natural, historic, and visual quality of remote areas and use programs that would enable open lands to remain in a natural state to maintain scenic beauty. While portions of the SFWF are theoretically visible from the southeastern corner of the County, the Klickitat County wind facilities are, again, in-front. Applicant does not believe that the potential for significant visual impact exists.

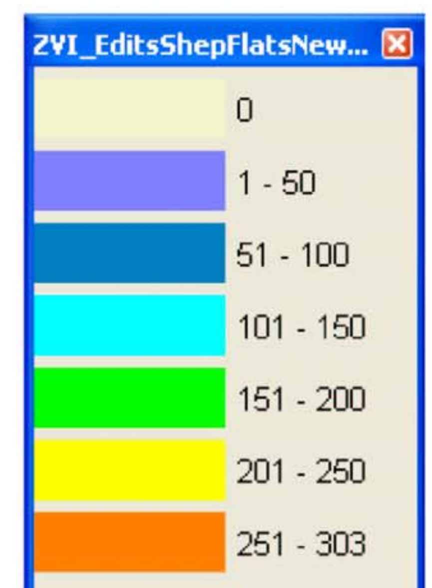
Benton County, Washington

Benton County is home to the Nine Canyon wind facility, and that facility is not in front of the SFWF. Benton County's Comprehensive Plan contains no specific scenic and aesthetic values. The SFWF will be visible from southeastern Benton County, but at some distance. Because this area includes transmission lines and other power generation facilities, Applicant does not believe that the visual impact will be significant.

Umatilla County

The Umatilla County Comprehensive plan values its outstanding scenic views and pleasant vistas. A corner of northwestern Umatilla County is within the analysis area and computer modeling shows that turbines will be visible from this area. However, due to distance from the facility, Applicant does not believe that the visual impact will be significant.





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Shepherds Flat
Zone of Visual Influence

Client
Caithness Shepherds Flat, LLC

Project Description

CITY Arlington

STATE Oregon

Issue Dates

MARK	DESCRIPTION	DATE
		6/12/07

PROJECT NO: 20072840

DRAWN BY:

CHECKED BY:

Drawing Title

Shepherds Flat ZVI

RAI#3, R2: SCENIC RESOURCES

(Follow-Up) Please provide a discussion of the methods and assumptions used to generate the ZVI analysis.

ZONE OF VISUAL INFLUENCE

Applicant's ZVI analysis was generated using the WindPRO ZVI Calculation Model, which calculates and documents the visibility of wind turbine generators (WTGs) from any angle in the landscape, along with the size of areas of different number of visible WTGs.

The calculation was generated using Applicant's "worst-case" (largest) turbine, the Vestas V-90 3 MW, with a hub height of 105 meters and rotor diameter of 90 meters.

Topographical information (height contour lines) was imported from topographical maps.

In order to produce a worst-case analysis, no consideration was given to "area objects" such as forests, shrubbery, urban areas, etc. which might block visibility from some angles. For the same reason, no consideration was given to obstacles to visibility (buildings and other man-made structures, including the existing arrays of WTGs within the analysis area).

R3

Please provide citations of the federal land management plans and county comprehensive plans that identify significant important scenic resources as described on page 2. Provide copies of the relevant text.

CITATIONS

Area	Applicable Plan	Citation
John Day River	Wild and Scenic Rivers Act	(P.L. 90-542, as amended) (16 U.S.C. 1271-1287)
Oregon Trail	Two Rivers Resource Management Plan June, 1986	N/A
Sherman County	Sherman County Comprehensive Land Use Plan, 2000, revised June 2003	Finding XI; Goal X; Section XVIII
Gilliam County	Gilliam County Comprehensive Land Use Plan, October 25, 2000	Finding 2 Part 5
Morrow County	Morrow County Comprehensive Plan, January 1986	Goal 5
City of Boardman	City of Boardman Comprehensive Plan, April 2003	Chapter V, Natural Resources Scenic Views and Sites
Klickitat County	Klickitat County Energy Overlay Final environmental Impact Statement September 2004	Visual Resources and Aesthetics 3.8
Yakima County	Plan 2015 Policy Plan May 1997; amended December 1998	NS 6.1
Benton County	Benton County Comprehensive Land Use Plan, January 2005	Chapter 3 Goals, Policies, and Actions Goal 50 G
Umatilla County	Umatilla County Comprehensive Plan 1983, Amended 1987	Chapter 5 Open Space, Scenic, and Historical Areas, and Natural Resources 20

Copies of the sections cited may be found at Figure RAI#2 R3.

Wild and Scenic Rivers Act

(P.L. 90-542, as amended)
(16 U.S.C. 1271-1287)

[1]An Act
To provide for a National Wild and Scenic Rivers System, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that,

(a) this Act may be cited as the "Wild and Scenic Rivers Act."

Congressional declaration of policy.

(b) It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.

Congressional declaration of purpose.

(c) The purpose of this Act is to implement this policy by instituting a national wild and scenic rivers system, by designating the initial components of that system, and by prescribing the methods by which and standards according to which additional components may be added to the system from time to time.

Composition of system; requirements for State-administered components.

SECTION 2. (a) The national wild and scenic rivers system shall comprise rivers (i) that are authorized for inclusion therein by Act of Congress, or (ii) that are designated as wild, scenic or recreational rivers by or pursuant to an act of the legislature of the State or States through which they flow, that are to be permanently administered as wild, scenic or recreational rivers by an agency or political subdivision of the State or States concerned, that are found by the Secretary of the Interior, upon application of the Governor of the State or the Governors of the States concerned, or a person or persons thereunto duly appointed by him or them, to meet the criteria established in this Act and such criteria supplementary thereto as he may prescribe, and that are approved by him for inclusion in the system, including, upon application of the Governor of the State concerned, the Allagash Wilderness Waterway, Maine; that segment of the Wolf River, Wisconsin, which flows through Langlade County; and that segment of the New River in North Carolina extending from its confluence with Dog Creek downstream approximately 26.5 miles to the Virginia State line. Upon receipt of an application under clause (ii) of this subsection, the Secretary shall notify the Federal Energy Regulatory Commission and publish such application in the *Federal Register*. Each river designated under clause (ii) shall be administered by the State or political subdivision thereof without expense to the United States other than for administration and management of federally owned lands. For purposes of the preceding sentence, amounts made available to any State or political subdivision under the Land and Water Conservation [Fund] Act of 1965 or any other provision of law shall not be treated as an expense to the United States. Nothing in this subsection shall be construed to provide for the transfer to, or administration by, a State or local authority of any federally owned lands which are within the boundaries of any river included within the system under clause (ii).

Classification.

(b) A wild, scenic or recreational river area eligible to be included in the system is a free-flowing stream and

(D) the 1.5-mile segment from Little Eagle Creek to the Wallowa-Whitman National Forest boundary as a recreational river.

(76) **ELK, OREGON.** — The 19-mile segment to be administered by the Secretary of Agriculture in the following classes:

(A) The 17-mile segment from the confluence of the North and South Forks of the Elk to Anvil Creek as a recreational river; and

(B) the 2-mile segment of the North Fork Elk from the falls to its confluence with the South Fork as a wild river.

(77) **GRANDE RONDE, OREGON.** — The 43.8-mile segment from its confluence with the Wallowa River to the Oregon-Washington State line in the following classes:

(A) The 1.5-mile segment from its confluence with the Wallowa River to the Umatilla National Forest boundary in section 11, township 3 north, range 40 east, as a recreational river; to be administered by the Secretary of Agriculture;

(B) the 17.4-mile segment from the Umatilla National Forest boundary in section 11, township 3 north, range 40 east, to the Wallowa-Whitman National Forest boundary approximately one-half mile east of Grossman Creek as a wild river; to be administered by the Secretary of Agriculture;

(C) the 9-mile segment from the Wallowa-Whitman National Forest boundary approximately one-half mile east of Grossman Creek to Wildcat Creek as a wild river; to be administered by the Secretary of the Interior; and

(D) the 15.9-mile segment from Wildcat Creek to the Oregon-Washington State line as a recreational river; to be administered by the Secretary of the Interior.

(78) **IMNAHA, OREGON.** — Those segments, including the South Fork Imnaha; to be administered by the Secretary of Agriculture in the following classes:

(A) The 6-mile segment from its confluence with the North and South Forks of the Imnaha River to Indian Crossing as a wild river;

(B) the 58-mile segment from Indian Crossing to Cow Creek as a recreational river;

(C) the 4-mile segment from Cow Creek to its mouth as a scenic river; and

(D) the 9-mile segment of the South Fork Imnaha from its headwaters to its confluence with the Imnaha River as a wild river.

(79) **JOHN DAY, OREGON.** — The 147.5-mile segment from Service Creek to Tumwater Falls as a recreational river; to be administered through a cooperative management agreement between the State of Oregon an the Secretary of the Interior as provided in section 10(e) of this Act.

(80) **JOSEPH CREEK, OREGON.** — The 8.6-mile segment from Joseph Creek Ranch, one mile downstream from Cougar Creek, to the Wallowa-Whitman National Forest boundary as a wild river; to be administered by the Secretary of Agriculture.

(81) **LITTLE DESCHUTES, OREGON.** — The 12-mile segment from its source in the northwest quarter o section 15, township 26 south, range 6 1/2 east to the north section line of section 12, township 26 south, range 7 east, as a recreational river; to be administered by the Secretary of Agriculture.

(82) **LOSTINE, OREGON.** — The 16-mile segment from its headwaters to the Wallowa-Whitman National Forest boundary; to be administered by the Secretary of Agriculture in the following classes:

(A) The 5-mile segment from its headwaters to the Eagle Cap Wilderness boundary as a wild river; and

(B) the 11-mile segment from the Eagle Cap Wilderness boundary to the Wallowa-Whitman National Forest boundary at Silver Creek as a recreational river.

(83) **MALHEUR, OREGON.** — The 13.7-mile segment from Bosonberg Creek to the Malheur National Forest boundary; to be administered by the Secretary of Agriculture in the following classes:

(A) The 7-mile segment from Bosonberg Creek to Malheur Ford as a scenic river; and (B) the 6.7-mile segment from Malheur Ford to the Malheur National Forest boundary as a wild river.

(84) **MCKENZIE, OREGON.** — The 12.7-mile segment from Clear Lake to Scott Creek; to be administered by the Secretary of Agriculture in the following classes:

(A) The 1.8-mile segment from Clear Lake to the head of maximum pool at Carmen Reservoir as a recreational river;

(B) the 4.3-mile segment from a point 100 feet downstream from Carmen Dam to the maximum pool at Trail Bridge Reservoir as a recreational river; and

(C) the 6.6-mile segment from the developments at the base of the Trail Bridge Reservoir Dam to Scott Creek as a recreational river.

(85) **METOLIUS, OREGON.** — The 28.6-mile segment from the south Deschutes National Forest boundary to Lake Billy Chinook in the following classes:

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management

Prineville District Office

June 1986

Two Rivers Resource Management Plan

Record of Decision

Rangeland Program Summary (RPS)

John Day River State Wildlife Refuge, Horn Butte Curlew Area and White River Wildlife Areas

Incompatible uses will be excluded. The areas will be managed to meet forage and habitat needs for big game and non game species as recommended by the Oregon Department of Fish and Wildlife, The Horn Butte Curlew Area which totals 6,000 acres will be designated as an Area of Critical Environmental Concern, The designation and management of this area will be designed to protect and preserve the important nesting habitat for the long billed curlew. Specific management actions to be taken include limiting vehicle travel on public lands to existing roads and trails and by managing livestock grazing in the area to enhance habitat for the long billed curlew.

The Dalles Watershed

The management agreement with the City of The Dalles will be continued. Surface disturbing activities will be excluded from this 410 acre area if they would have an adverse effect on the watershed.

The Governor Tom McCall Preserve at Rowena and the Botanical/Scenic Areas within the Columbia Gorge.

The 12.5 acres of public land within The Governor Tom McCall Preserve will be designated as an Area of Critical Environmental Concern; Outstanding Natural Area to preserve the outstanding botanic values of this area. The important botanic/zoologic and scenic qualities of 76 additional acres (in two parcels) outside this preserve, but within the Columbia Gorge, will also be preserved with a designation as an Area of Critical Environmental Concern; Outstanding Natural Area. Specific management actions to be taken include closing the areas to off road vehicle use, continuing to not lease the areas for fluid mineral exploration and development, to not sell mineral material (rock, sand or gravel), to continue to exclude livestock grazing from the areas, preclude the use of mechanized equipment in fire suppression and prohibit the collection of rocks, plants! plant parts or animals.

Historic Spanish Gulch Mining District

The 335 acre Spanish Gulch Mining District has been determined to be eligible for the National Register of Historic Places. It will be designated as an Area of Critical Environmental Concern to protect and maintain significant historical values, The designation will recognize valid existing mineral rights,

This mining district is an important historic gold mining area dating back to the mid 1800s. Remnants of early mining activities include an old stamp mill, mineshafts and several old cabins. Specific management actions to be taken include limiting vehicle travel to existing roads and trails and requiring plans of operation from mining claimants before beginning any mining operations in the area.

The Oregon Trail Historic Sites at Fourmile Canyon and McDonald and the Macks Canyon Archaeological Site.

The unusual qualities of these sites will he maintained and protected. Intensive management plans. as well as public information and interpretive plans will be developed for these areas.

Implementation

Five of the special management areas are hereby designated as areas of critical environmental concern with three areas being managed as either a research natural area, or an outstanding natural area. This action is completed with the publication of this record of decision and filing of the designation order in the Federal Register. Additional survey work will be initiated on Sutton Mountain and on the Sherars Bridge Road to determine if the areas meet the criteria for one of the above designations. Any areas which are nominated and found to meet the criteria for classification as an Area of Critical Environmental Concern in the future will receive interim protective management until formal designation occurs.

COMPREHENSIVE LAND USE PLAN

SHERMAN COUNTY OREGON

1994

Finding VIII. There are lands managed by the Bureau of Land Management within Sherman County, which may meet the review wilderness procedures and thus qualify for wilderness designation.

Finding VIX. Natural hazards are primarily limited to those areas with cross-slopes greater than 40% and along waterways. The County is currently participating in the National Flood Insurance Program. The U.S. Department of Housing and Urban Development has identified specific flood zones within the County. However, there is danger of "flash flooding in all stream beds and gullies.

Finding X. An adequate number of aggregate extraction sites exist within the County to satisfy future demands through the year 2000. A haul distance of greater than five miles for a major construction project is not practical.

Finding XI. Rock outcroppings, trees, the John Day River Canyon and the Deschutes River Canyon are all-important features of the County's landscape. In addition, the Oregon State Department -of Transportation has designated certain segments of I80N, U.S. 97, ORE 206 and ORE 216 as scenic highways.

Listed below are the segments so designated.

Route #	**Hwy #**	Milepost to Milepost	
I80N	2	99.85 (Sherman/Wasco)	106.46
		110.10	114.23 (Sherman/Gilliam)
OR 216	290	8.30 (Sherman/Wasco)	11.00
OR 206	300	5.00	14.91 (Sherman/Gilliam)
US 97	42	0.50	5.00
		10.00	16.00
		22.00	27.00
		30.00	48.81 (Sherman/Wasco)

Finding XII. A diversity of fish and wildlife habitat types are available within the County and are utilized by an even greater number of fish and wildlife species. Grain production and cattle grazing when properly managed are consistent with

Goal VIII. To provide a detailed investigation of the County's groundwater resources.

Policy I. The County shall support and assist reasonable efforts to investigate the groundwater resources. When such information becomes available it shall be incorporated into the Resource Document. If appropriate, goals and policies will be developed, adopted and integrated into the Comprehensive plan.

Goal IX. To maintain the multiple use management concept on Bureau of Land Management Lands within Sherman County.

Policy I. Encourage the Bureau of Land Management District Manager to not recommend lands within Sherman County for wilderness preservation.

Goal X. Preserve the integrity of the Sherman County Landscape.

Policy I. Trees should be considered an important feature of the landscape and therefore the County Court shall encourage the retention of this resource when practical.

Goal XI. To maintain all species of fish and wildlife at optimum levels and prevent the serious depletion of any indigenous species.

Policy I. Fish and wildlife management policies should be implemented to enhance the public enjoyment of wildlife and fish in a manner that is compatible with the primary uses of the lands and waters

Policy II. Range management programs and conservation plans shall consider wildlife as an important resource. Fencing of springs and seeps with provisions for stock watering, fencing of river areas with stock waterways, construction of stock dams, the drilling of wells and cross fencing should all be given consideration in the development of range management plans and programs.

LAND USE DESIGNATIONS - Section XVIII

Open Space

Open space lands are those which are physically limited to low density activities. Lands so designated will assure the preservation of aesthetic as well as other natural features of the area.

Residential

Existing and future demands for residential uses can be supplied and are planned for within each of the incorporated cities. Adequate public facilities and services are available and can accommodate future anticipated growth.

The unincorporated city of Kent is currently attempting to develop adequate domestic water storage facilities and a distribution system. Due to this fact it is anticipated that limited high-density residential uses in the Kent area are feasible. This is the only area within the unincorporated area of Sherman County designated for residential use.

Rangeland

Rangeland is one of two agricultural designations of the plan map. The rangelands are agricultural lands which due to their location, soil type, size, shape and/or other physical constraints, are not utilized for crop production. These lands shall be retained for agricultural use but other selected uses may be undertaken. These uses shall be limited and will under no circumstances conflict with agricultural uses. Examples would be large lot residential uses, commercial utility facilities, surface mines and other similar uses.

GILLIAM COUNTY

COMPREHENSIVE LAND USE PLAN

AND

ZONING ORDINANCES

As Amended

October 25, 2000

by order of the

Gilliam County Court

PART 5. PARKS, RECREATION AND OPEN SPACE LAND USES

PREFACE TO PART FIVE

The policies adopted in Part Five of this Comprehensive Plan focus on issues related to the conservation of open space and natural and scenic resources, and to the provision and development of adequate recreational opportunities and facilities. They are intended to comply with statewide planning goals and guidelines concerning Open Spaces, Scenic and Historic Areas, and Natural Resources (Goal 5) and Recreation Needs (Goal 8)

FINDINGS

1. Open space is characteristic of Gilliam County, and no effort exclusively directed toward acquisition of additional open space is necessary. As provided in Part Two of this comprehensive plan, stream beds, drainage ways and proven landslide areas generally will be maintained in an open state as a matter of prudent development practice.

2. The rock outcroppings marking the rim and walls of steep canyon slopes are an important characteristic of the county's landscape.

3. All active aggregate sources in the County have been inventoried, and are identified by site location in the inventory set forth as an Attachment hereto. A comparison of the estimated total volume of aggregate from these sources to the estimated needs of committed or projected construction projects requiring such material, clearly indicates that sufficient quantities are available to meet such needs.

4. The entire Columbia River waterfront, including related fish and wildlife habitat, is within the jurisdiction of the United States Army Corps of Engineers; the Corps has prepared and adopted a plan for the development of the river shore land, which plan encompasses preservation of fish and wildlife habitat and the development of water-oriented park and recreation facilities. (Appendix C. Exhibit V-5)

5. The Oregon Department of Fish and Wildlife has recommended development of a number of access sites on the John Day River and the development of two reservoirs in the county. The commission also has established two wildlife areas; one at the mouth of Willow Creek and the other consisting of that portion of the John Day River from the mouth of Thirty-Mile Creek to the Columbia River. Appendix C Exhibit V-2

6. The State Highway Division maintains one state park and two state waysides within the county:

A) The J. S. Burres State Park is a 13.2 acre tract located along the John Day River at Cottonwood Bridge (Oregon Route 206);

B) Dyer Wayside is a 0.6 acre parcel at Ramsey Canyon on State Route 19, south of

MORROW COUNTY

PLANNING DEPARTMENT

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June 11, 2007

Patricia Pilz
Pilz & Co, LLC
Shepherd's Flat Wind Project
656 San Miguel Way
Sacramento, CA 95819

Dear Ms. Pilz:

This letter is in response to a recent request for information concerning the Morrow County Comprehensive Plan specifically in relation to scenic or aesthetic values. Rather than just share the appropriate citations I wanted to share some additional thoughts to clarify what the Comprehensive Plans says and lacks.

You will find reference to scenic and aesthetic values in the Goal 5 Analysis portion of the Comprehensive Plan with some specific policies on page 133. None of the policy statements have been specifically codified into ordinance language. However the County has applied those policy statements in reference to the Blue Mountain Scenic Byway which does travel along the border of the proposed Shepherd's Flat wind farm and sections of the Historic Oregon Trail.

Morrow County adopted the Comprehensive Plan is 1980 and it was acknowledged by the Land Conservation and Development Commission in 1986. Since that time no significant work has taken place to update or modernize this planning document. There is a recognition locally that the Comprehensive Plan does not provide adequate guidance in most circumstances and can be construed to be opposed to development based on the policy statements. It is not the opinion of Planning staff that the policy statements regarding 'natural and scenic values' were intended to restrict the development of wind farms. The same Goal 5 Analysis section speaks to natural resources and wind specifically encouraging the development of alternative energy sources. As the Planning Commission has evaluated various applications and Goal 5 has been reviewed from both perspectives a balance has been sought supporting development which trying to preserve those things that are special and unique to Morrow County.

As always I wish you luck with your continuing process and if you or others should have any questions concerning this letter or the Morrow County Comprehensive Plan do not hesitate to call me at the number above.

Cordially,

Carla McLane

Carla McLane
Planning Director

TABLE OF CONTENTS

Natural Resource Policies

1. General Policies

A. All sites designated 2A in the Goal 5 inventory (no conflicting uses) shall be protected and managed so as to preserve their original character and/or public benefit.

B. Where conflicting uses are identified; economic, energy, environmental and social consequences shall be evaluated in determination of use designation.

C. Agriculture, forest, open space, and recreational uses shall be considered consistent with natural and scenic values dependent on resource carrying capacities.

D. Outdoor advertising signs as described in ORS 377.710 (23) shall only be permitted within commercial and industrial zones.

E. Designated natural, scenic or buffer areas shall serve a valid public purpose and property owners should be duly compensated for the right of public use if deemed justifiable. Compensation can be in various forms including tax differentials, development densities transfer, market value reimbursements, public-private exchanges, etc.

F. It shall be the policy of the County to conserve open space and protect natural and scenic resources.

G. It shall be the policy of the County to maintain and improve the quality of the air, water, and land resources of Morrow County.

H. It shall be the policy of the County to consider the carrying capacities of all affected natural resources in development proposals and to not permit any development which exceeds said capacities.

I. The County shall continue in its efforts to identify open spaces, scenic and historical areas, and natural resources which should be preserved from urban or other development.

City of Boardman

"On the River, On the Way"

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- Utility
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- Community Liaison

home

Comprehensive Plan

The following are a listing of our Comprehensive Plan in pdf format:

generation facilities. These turbines produce 550 mega-watts of electricity and the steam by-product is used as a resource by the Port of Morrow industrial tenants. Within the Urban Growth Boundary, an additional natural gas fired turbine produces an additional 32 mega-watts of electricity. These resources are addressed and protected through other elements of the Comprehensive Plan.

Cultural Resources

Through the review of different cultural resource studies, conducted as part of construction or development, there has been only two identified sites containing Native American resources. One is located within the Urban Growth Boundary and one identified site within the City limits. These studies, conducted by the Confederated Tribes of the Umatilla Indian Reservation Cultural Resources Preservation Program identified sites 35MW13 which is located within the Urban Growth Boundary on land owned by the Port of Morrow and JDRS 79(1) which is an abandoned portion of the old US Highway 730.

Historic Resources

After discussions with the State Parks Division of the Oregon Department of Transportation and a review conducted by the City, it has been determined that no historic areas or sites, structures or objects exist within the City and/or its UGB, as the City was relocated in the mid 1960's and the old city is inundated by the Columbia River.

Open Space

OAR 660-023-0220 defines open space as parks, forests, wildlife preserves, natural reservations or sanctuaries and public or private golf courses. The City's most desirable area for open space preservation is the Corps of Engineers waterfront property. The area extends for a distance of more than a mile along the Columbia River with an average property depth of 1,000 feet. Preservation in its natural state would severely restrict its full potential. Preserving the area for open space and recreational activities would be a more fitting land use. A multi-million dollar marina and park site is situated on 74 acres on the west end of the property. The park site is equipped with campsites, windbreaks, utilities, restrooms, picnic facilities with shelters, petroglyph display, landscaping, parking, boat launch and dock, and a swimming area. The facility presently serves both tourist and Boardman area residents alike. Further development of the remainder of the property, about 75 acres, into recreational uses such as playfields, beaches, campsites and swimming, is encouraged. The City's horizontal collector wells, for its domestic water are placed adjacent the Columbia River at two locations within the area defined above. Due to the rural nature of Morrow County, the City has not designated any open space lands other than what is noted for the Bonneville Power Administration easement and other public ownership, including US Army Corps of Engineers property adjacent to the Columbia River, which is administered by several federal agencies including the US Fish and Wildlife Service, Bureau of Indian Affairs, the US Army Corps of Engineers and one local agency, the Boardman Parks and Recreation District.

Scenic Views and Sites

Due to the City's topography, vegetation, and existing infrastructure development, the City believes there are limited scenic views, none of which could be considered outstanding.

September 2004

Klickitat County Energy Overlay

Final Environmental Impact Statement

3.7.5 Impacts of No Action Alternative

Under the No Action Alternative, energy development would likely continue to be permitted on a conditional use basis, which would include requirements for surveying and mitigating cultural impacts.

3.7.6 Cumulative Impacts

As assumed throughout this analysis, up to seven 250 MW or five 350 MW thermal energy plants, two biomass plants, and four wind farms totaling 1,000 MW (covering approximately 335 acres) could potentially be developed in Klickitat County. This represents an increase in the amount of development that would likely be developed in the absence of development of an Overlay and ordinance.

The cumulative impacts to the cultural resources associated with the energy Overlay are predominantly associated with construction activities and permanent land use change through development. Because the developments are likely to be dispersed throughout the Overlay area, the impacts are not likely to be concentrated, leaving un-impacted areas so loss of cultural artifacts from an entire cultural source is unlikely.

Assuming a foot print of about 15 acres per thermal power plant (based on the Goldendale Energy Foot Print), 10 acres per biomass plant (based on the Klickitat Cogeneration Project), and one-half acre per turbine (extrapolated from the Stateline and Maiden wind projects), the total land area potentially directly affected by development would come to a total of 460 acres. Additional impacts from associated pipe lines, transmission lines, and roads cannot be accurately gauged, but based on the energy projects described above, are estimated to amount to an additional 83 acres. The total area potentially impacted is approximately 543 acres, or less than 0.07 percent of the total area of the 769,345-acre proposed Overlay and about 0.04 percent of the 1,218,796 acres in the entire county. Since this potentially impacted area represents a very small fraction of the total area in the county, the cumulative impacts to cultural resources directly associated with energy development are likely to be insignificant.

3.8 Visual Resources and Aesthetics

This section includes impacts to scenic areas, views and production of light pollution and glare. Klickitat County is primarily rural with unique and distinctive visual elements and is home to a wide variety of natural features. It is considered by some to be the gateway to the Columbia River Gorge, the Cascade Mountains, the Gifford-Pinchot National Forest, the Conboy Lake National Wildlife Refuge, and the Mt. Adams Recreation area. Landforms, rock outcrops and other patterns are largely undisturbed.

Human features are also not unusual within the region and include a mixture of crop and forested areas. County elements also include rolling terraces developed as irrigated farmland, agricultural fields, and orchards. The dominant visual characteristic of many areas is the large-scale crop circle pattern typical of center-pivot irrigation systems.

Several human features other than those characteristic of farming practices have modified the physical setting in the County. Highway 14 (SR 14) is a major east-west arterial and runs parallel to the Columbia River. State Route 141 runs north-south at the west side of the county from SR 14 to Trout Lake. State Route 142 and U.S. Highway 97 run north-south from SR 14 to the city of Goldendale. Several transmission lines (BPA and KPUD) and high-pressure gas lines run through the County. Areas around Dallesport, White Salmon, and Goldendale are zoned urban or industrial.

Scenic areas within the County include the Columbia River Gorge National Scenic area and state designated scenic byways.

3.8.1 Study Methodology

Although a detailed visual impact analysis was not completed as part of this EIS, a general qualitative evaluation identifying the sensitivity of viewers who would see the project sites was completed. Figure 3-7, Visual Impact Analysis, illustrates a line-of-site evaluation along Highway 97, Highway 14, Highway 141, Highway 142, and Interstate 84 in Oregon. The GIS-based visual analysis used a topographic digital elevation model of the terrain and assumed an elevation of 100 feet for towers. Shaded areas on the figure represent areas visible from each of the identified highways; however, it does not mean that the entire shaded area is visible from every point on the highway. Several conditional use permits for energy projects within the County were reviewed. Common mitigation measures implemented for these projects have been incorporated in the following sections.

3.8.2 Affected Environment

Potential visual impacts of any energy generation project would include temporary visual changes introduced by construction of the project and permanent visual changes resulting from the operations and maintenance of the project. Activities and facilities for the energy types discussed in this EIS would be visible to residents, recreationists, motorists, and workers.

3.8.3 Regulatory Framework

Development within in the Columbia River Gorge National Scenic area is regulated by the Columbia River Gorge Commission (CRGC). The CRGC has developed a body of rules governing development in the National Scenic Areas. The rules can be found in OAR 350, Division 20, and in the Management Plan for the Columbia River Gorge National Scenic Area, which can be found on the Internet at:

http://www.co.multnomah.or.us/dscd/landuse/CRGNSAPlan/Home/NSAMP_Home.html.

These rules do not apply to existing Urban Areas located within the Scenic Area.

Scenic Byways are regulated by Washington State Department of Transportation (WDOT) Rules regarding scenic byways are found in Chapter 47.39 RCW implementing the Scenic and Recreational Highway Act of 1967. The code principally regulates billboards and development directly adjacent to the highways.

The current Klickitat County zoning ordinance has an Illumination Control area incorporating all of Townships 3, 4, and 5 within Ranges 15, 16, and 17. Township 3, Range 16 and 17 are limited to those areas north of the crest of the Columbia Hills.

PLAN 2015

A BLUEPRINT FOR
YAKIMA COUNTY
PROGRESS

Adopted May 20, 1997
Amended December 28, 1998

VOLUME 1

POLICY PLAN

Yakima County Planning Department
Room 417, County Courthouse
128 N. 2nd Street
Yakima, WA 98901

(509) 574-2230 / FAX: (509) 574-2231
1-800-572-7354

NS 5.4 Evaluate specific projects for their effects on noise-sensitive uses, such as residences, schools, churches, libraries, and health care facilities, and establish mitigating conditions.

VISUAL

PURPOSE STATEMENT NS 6

Perhaps the most popular "postcard" image of Yakima County is a bountiful orchard stretching westward with Mount Adams looming in the background, or the image of the nearby ridge lines and valley bottoms. Intermixed with the ridges and valleys are other places that hold people, roads, buildings and lights. For most of us, these urban images dominate our daily visual perspective. They seem more dynamic and fluid than ridges orchards and valleys. Changes in our urban setting are seen more readily than anywhere else because that is where most of us live. But in Yakima County, many feel that what once looked rural and open has become increasingly filled up and more urban in appearance. The following goal and policies address the importance of our urban and rural visual surroundings.

GOAL NS 6: Protect property values by improving the appearance of the Yakima Valley.

POLICIES:

NS 6.1 Protect the natural, historic, and visual quality of remote areas.

NS 6.2 Utilize programs that would enable open lands to remain in a natural state to maintain scenic beauty and aesthetic qualities.

NS 6.3 Develop standards for light and glare appropriate to each land use designation to minimize incompatibilities.

NS 6.4 Continue to enforce nuisance laws requiring clean-up of yards (garbage, clutter, junk cars, etc.).

NS 6.5 Encourage new telecommunications towers to be located and designed to minimize visual and land use impacts.

NS 6.6 Establish siting standards for mobile/manufactured homes outside approved mobile/manufactured home parks or subdivisions.

NS 6.7 Assure that lot coverage, height and setback regulations are appropriate to the purpose and intent of the zoning district.

NS 6.8 Include landscaping, signage and other aesthetic standards in the commercial and industrial site plan review process.

NS 6.9 Encourage private efforts to improve the appearance of the Yakima Valley.

NS 6.10 Provide incentives for the reconfiguration of parcels to enhance open space character.

SHORELINES

PURPOSE STATEMENT NS 7

The goals and policies of the Shoreline Master Program are directed towards land and water uses and their impact on the environment. As the population continues to increase, the pressures upon our shorelines will also increase. The goal of the Shoreline Master Program is to protect the shorelines of the state.

GOAL NS 7: Maintain, restore and where necessary improve terrestrial and aquatic ecosystems so that they maintain viable, reproducing populations of plants and animals.

Shorelines: Economic Development

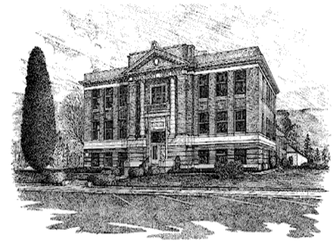
POLICIES:

NS 7.1 Encourage shoreline-dependent economic activities along County shorelines that will enhance the quality of life for residents while mitigating significant adverse environmental impacts.

Benton County

Planning/Building Department

TERRY A. MARDEN, DIRECTOR



BENTON COUNTY
COMPREHENSIVE LAND USE PLAN

BOARD OF COUNTY COMMISSIONERS

Chairman Max Benitz Jr.
Leo Bowman
Claude Oliver

BENTON COUNTY PLANNING COMMISSION

Mark Reis, Chairman
Charles Isley
Jon Lindeman
Martin Sheeran
Steve LePage

BENTON COUNTY PLANNING STAFF

Terry A. Marden, Director
Phil J. Mees, Senior Planner
Susan M. Walker, Associate Planner

The Benton County Planning Staff would like to extend their thanks and appreciation to the Residents of Benton County for their contribution and countless hours of dedication they provided throughout the development of this plan. Special thanks to members of the five Rural Planning Advisory Committees: Finley-Kennewick, Prosser-Whitstran, Benton City- Kiona, Paterson-Plymouth and Richland-West Richland. The Rural Planning Advisory Committee Members are referenced by name in the

appendices of this plan.

APPENDICESs

Revised by Resolution January 2005

which influence a sustainable use of the natural resources base.

GOAL 47
To facilitate economic growth and prosperity while preserving the existing rural quality of life and character, as it is defined by rural residents.

GOAL 48
To promote and protect tourism related to viticulture and other agricultural activities.

GOAL 49
To provide adequate, accessible commercial areas while minimizing impact on surrounding uses.

GOAL 50
Expand employment opportunities.

POLICIES:
A. That economic growth and diversification in the County shall be planned for and encouraged.

B. That the agricultural economic base of Benton County shall be maintained and protected.

C. That locations for commercial retail and service activities serving urban and regional markets shall be made exclusively within Urban Growth Areas. Commercial development serving rural communities is appropriate on commercially designated lands within or adjacent to the communities of Finley, Plymouth, Paterson, Whitstran, and Kiona. Highway commercial development is appropriate for areas designated for such at highway interchanges. Master planned resorts and tourist oriented visitor destinations are appropriate county-wide.

D. That commercial activities develop in "nodes" or clusters as opposed to striptype configurations.

E. That where practical, commercial development utilize a frontage road or a circulation system that will prevent the occurrence of numerous driveways opening onto arterial roadways.

F. That uses locating within areas designated "Interchange Commercial" be those which serve interstate freeway traffic.

G. That commercial developments be planned, constructed and landscaped so as to be visually and physically compatible with surrounding areas and uses.

UMATILLA COUNTY

COMPREHENSIVE PLAN

1983, Amended

Umatilla County Planning Department
Pendleton, Oregon

(limited grazing) and will notify the County if changes in use or ownership are contemplated.

15. "Albee Area" may be a significant natural area by ONHP (see Technical Report).

15. Umatilla County shall study this area to determine what special protective land use measures are necessary, if any, to protect and preserve "Albee Area."

16. "Stage Gulch Rangeland" may be a significant natural area (see Technical Report).

16. Umatilla County shall study this area to determine what special protective land use measures are necessary, if any, to protect and preserve "Stage Gulch Rangeland."

17. The County and BLM have prepared a management plan for Harris County Park and the adjacent BLM land (South Fork Walla Walla River, UM-20) (see Technical Report) .

17. Umatilla County should work towards implementation of the recommendations of the Management Plan prepared for this property.

18. "Kamela Area" may be a significant natural area (see Technical Report).

18. Umatilla County shall study this area to determine what special protective land use measures are necessary, if any, to protect and preserve "Kamela Area."

19. An area near Rieth (described in the Technical Report) has been determined to be an area of occurrence of a rare or endangered species fmimulus <u>iunqermannioides</u>) .

19. Special protective land use measures shall be enacted if necessary to protect the species.

20. Umatilla County has a number of outstanding scenic views and pleasant vistas.

20. (a) Developments of potentially high visual impacts shall address and mitigate adverse

[Note: Additional scenic findings and policies are located in the Multiple Use Plan Map Section].

visual effects in their permit application, as outlined in the Development Ordinance standards, (b) It is the position of the County that the Comprehensive Plan designations and zoning already limit scenic and aesthetic conflicts by limiting land uses or by mitigating conflicts through ordinance criteria. However, to address any specific, potential conflicts, the County shall insure special consideration of the following when reviewing a proposed change of land use:

1. Maintaining natural vegetation whenever possible.

2. Landscaping areas where vegetation is removed and erosion might result.

3. Screening unsightly land uses, preferably with natural vegetation or landscaping.

4. Limiting rights-of-way widths and numbers of roads intersecting scenic roadways to the minimum needed to safely and adeguately serve the uses to which they connect.

5. Limiting signs in size and design so as not to distract from the attractiveness of the area.

6. Siting developments to be compatible with surrounding area development, and recognizing the natural characteristics of the location.

7. Limiting excavation and filling only to those areas where alteration of the natural terrain is necessary, and revegetating such areas as soon as possible.

8. Protection vistas and other views which are important to be recognized because of their limited number and importance to the visual attractiveness of the area.

9. Concentrating commercial developments in areas where adequate parking and public services are available and discouraging strip commercial development.

(c) Publicly owned lands which provide outstanding scenic views shall be developed where appropriate.

(d) The "Elephant Rock" site shall be studied to determine if there is any scenic significance.

(e) The Wallula Gap has been recognized as a significant scenic (as well as historic and wildlife) area. The county shall enact special land use measures; i.e., overlay zone to protect and preserve this area (see Technical Report).

21. Currently there are no designated state or federal scenic waterways in Umatilla County.	21. (a) Umatilla County will cooperate with any future designation of a state or federal scenic waterway, (b) Proposals for development within any future designated recreational or scenic river areas will be coordinated with the administrative staff of the Scenic Waterways Program.
22. Important archeological, historic, cultural, and scientific sites need protection.	22. The County shall cooperate with state agencies and other historical organizations to preserve historic buildings and sites, cultural areas, and archeological sites and artifacts.
23. Many historical and archeological sites in Umatilla County have not been recognized or cataloged.	23. (a) Umatilla County shall encourage and cooperate in developing a detailed county-wide historic site inventory. (b) Over time, as money and assistance are available, the

resource uses will now be more effectively controlled over a wider area.

Again, the primary objective of the county is to acknowledge existing mountain residential development and attempt to efficiently and equitably plan for these committed lands. Only those areas with significant amounts of mountain residential development have been identified for similar uses in the future.

Found below are policies and programs to fit the particular needs of multiple-use lands. Some differences in programs and policies are largely the result of several citizen committee and public meeting comments and suggestions gathered from the different vacation home areas in the county. Dealt with first are land use policies applicable to all multiple use designated lands. Second, policies particularly drafted for a specific multiple-use area are then discussed and listed. MULTIPLE USE PLAN MAP SECTION

The primary purpose of this section is to guide growth and development in the mountain multiple use areas of Umatilla County. This chapter is meant to bring together the various issues which deal with mountain residential and other recreational use development and measures to protect adjacent resource lands.

It is very evident from the Exception Statement that Umatilla County has had significant mountain residential development in the past. Current state planning laws and land use goals largely discourage non-resource development and greatly favor resource protection. However, the above existing non-resource development is a reality. It is a long-established and recognized lifestyle, in Umatilla County.

The county recognizes that some trade-offs would be likely due to the inevitable resource vs. non-resource recreational state goal interpretation conflicts. The county's effort, as is mentioned throughout the Comprehensive Plan, has been aimed at recognizing existing areas of mountain residential development and those lands committed to this use. This would mean reclassification of thousands of acres back into resource use from the original 1972 Comprehensive Plan. General planning goals have been established to guide and control the location and design of recognized non-resource activities, to minimize their impacts upon adjacent resource activities and to minimize costs to the public for demanded facilities and services. Numerous goals and policies are found throughout the plan which reflect the county's commitment to protect adjacent resource lands.

Interestingly and fortunately, many vacation home property owners in most all established mountain residential areas have expressed the above same concerns and goals. Many have stated that higher levels of development in their locales without some controls would likely be incompatible with the existing rural nature of the area. A good many agree that there is a need for limited and controlled growth, but that the rural character of their area must be maintained.

To guide multiple use development into appropriate patterns and locations, the following goals have been prepared.

GOALS

1. To guide the location and design of further multiple use development (mountain residential and related recreational use) in a manner so as to minimize the public costs of facilities and services, to avoid unnecessary expansion of these areas, and to preserve and enhance the safety and viability of developed multiple use areas.
2. To recognize existing uses in multiple use areas as benefiting the physical and mental well-being of county citizens by providing near year-round recreational opportunities as well as places for solitude.
3. To preserve and enhance the rural character, scenic values and natural resources within existing seasonal home and recreational area.

During the development of this part of the plan, many land use issues were raised by a variety of interested persons. Policies needed to accomplish the identified goals and land use issues were largely developed by several citizen's committees and from citizen/property owner comments at public meetings and hearings. It was obvious that some additional policies would be needed to pull the various resource, environmental and public facilities concerns together and to fill in some gaps so that a more complete plan was possible.

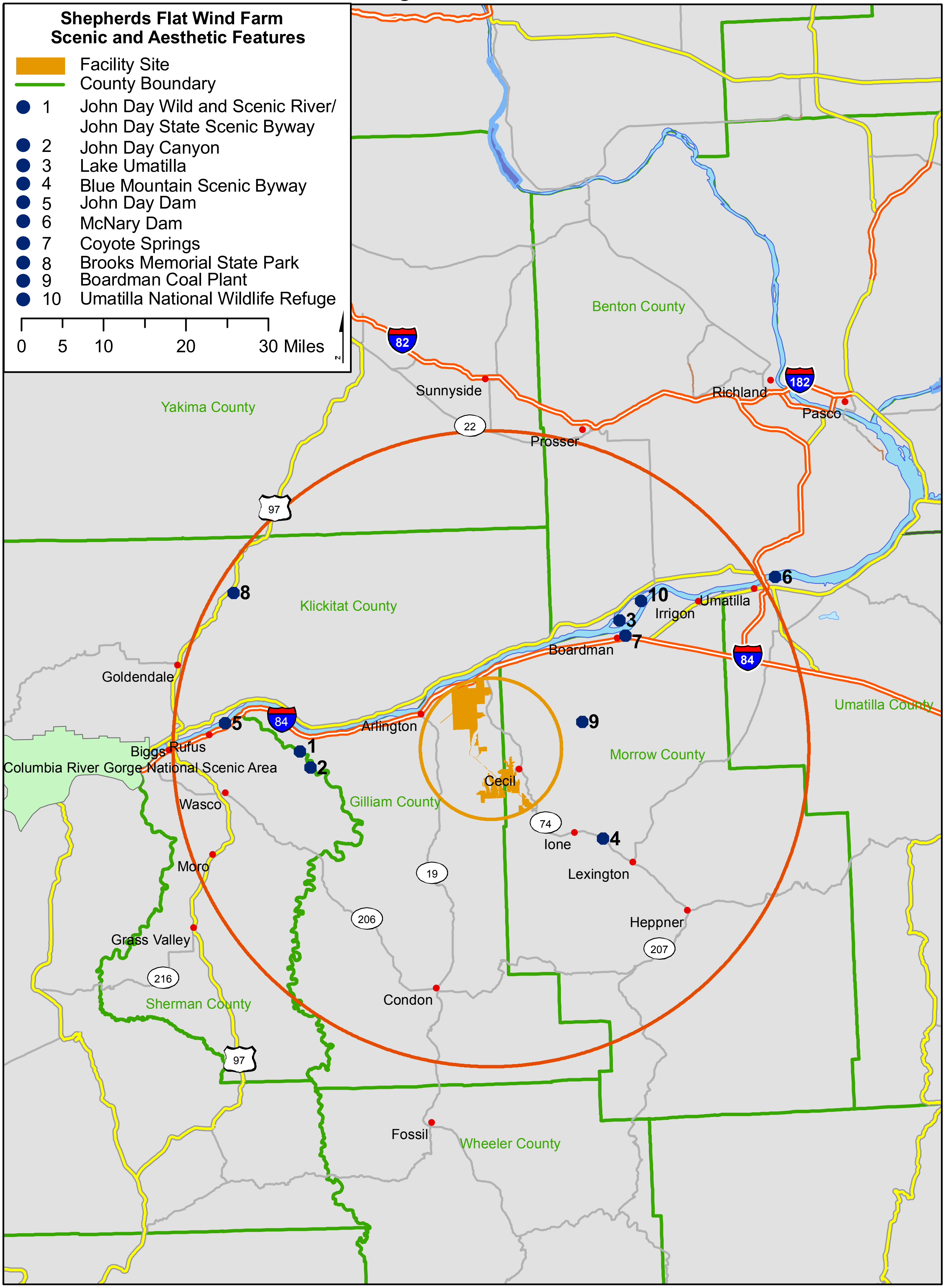
Because there were so many land use issues and comments, a different format will be used. Instead of the paragraph format used in the resource chapters (Agriculture and Mountain/Highlands), a number, outline system should be better aid the user of this document to more easily locate land use policies and programs relating to Multiple Use areas. A. General Review Policies

State resource planning goals purpose is to preserve and protect resource lands up to the latest possible moment of conversion. Since some parcels within multiple use areas are still used for resource uses, and lands surrounding multiple use areas are being preserved for resource uses, and that some owners/citizens in multiple use areas wish, for the present time, to continue incidental resource operations, several general review policies have been adopted to protect these lands and adjacent resource lands from premature conversion. (See Policies 1,2,3, and 4).

Policy 1- Future multiple use development will be reviewed to ensure compatibility with existing similar uses and with adjacent resource lands.

Policy 2- New major development (those involving four or more lots for vacation home structures or related uses) that creates significant impacts upon existing facilities, services or requiring additions to or new facilities or services shall be carefully examined. Examination shall include land use compatibility questions, and issues regarding adequate services are provided and are readily available.

Figure RAI #2 R-1



S1

You state that "systematic ground surveys" are "pending." When do you anticipate that a report on these surveys will be available?

GROUND SURVEYS

Applicant's site boundary, the area in which exhaustive ground surveys take place, extends to some 22,390 acres. This area has been surveyed for waters, wetlands, habitats, and species of special concern. However, ground surveys for historic, cultural and archaeological resources are traditionally more tightly focused.

This traditional "tight focus" assumes that there is no reason why the Applicant cannot submit a facility layout that will survive changes in assumptions brought about by improved technology, by constraints caused by equipment availability, and adaptation to the results of other environmental surveys.

Applicant notes that if a traditional cultural resources survey, performed using 900 foot corridors around Applicant's "typical" facility layout, had been completed, the results of this survey would be worthless, as subsequent information with respect to wind power development in the property immediately downwind of the facility renders Applicant's "typical" layout economically impossible.

Rather than continually contract for new corridor assessments as the "ground truth" changes, as has been the case with previous facilities, Applicant proposes the following:

- That the entire purported route of the Oregon Trail, as it crosses the facility site, be surveyed. Please see Applicant's response to RAI#2 S3;
- That areas described as having high-to-moderate potential for archaeological resources, in Attachment S of the Application, be ground truthed. Applicant believes that some of these areas, which stand out in relief on topographical maps, will be found to be eroded or farmed;
- That the results of these initial surveys inform a continuing plan of action with respect to cultural resources surveys; and
- That tight focus surveys take place only when facility component siting of each project phase is determined.

Because all other (waters, wetlands, habitats, and species of special concern) survey results are known, Applicant will have flexibility to avoid any areas of newly discovered cultural resources of concern. Applicant proposes that the avoidance of these areas becomes a condition of development.

RAI#3, S1: HISTORIC, CULTURAL AND ARCHAEOLOGICAL RESOURCES

(Follow-Up) Please provide the results of ground surveys addressing the proposed facility layout, including proposed turbine string corridors, roads, and all other related or supporting facilities, together with a discussion of the potential impacts of construction, operation and retirement of the proposed facility on any identified resources and a plan for protection of those resources as required by OAR 345-021-0010(1)(s).

[Comment: In your response to RAI S1, you suggest that you cannot provide a "tightly focused" survey for cultural resources because there might be changes to the facility layout due to "changes in assumptions." You also suggest that a cultural resource survey of your proposed "typical" layout would be "worthless" if subsequent information regarding other wind development renders the "typical" layout economically impossible. We assume that in developing any proposed layout, the applicant has already taken into consideration any off-site wind energy development that might occur in the future. Part of the planning for siting wind turbines should include designing the proposed layout with sufficient buffer area to avoid potential loss of wind resource to a neighboring project. The purpose of completing a cultural resource survey on the proposed layout before issuance of a Draft Proposed Order is to demonstrate that there is at least one possible configuration of the proposed facility that could be built in compliance with the siting standards. This does not preclude micrositing after issuance of a site certificate but before construction, although additional on-site cultural resource investigation might then be necessary in areas outside of the previously-surveyed area.]

GROUND SURVEYS

Applicant has engaged Archaeological Investigations Northwest, Inc. (AINW) to complete archaeological and historical resource surveys of the site of the Shepherds Flat Wind Farm. The scope of these surveys is presented below:

Task 1: Coordination with Tribes and Agencies: AINW will coordinate with the cultural resource staffs of the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of the Warm Springs Reservation of Oregon. This coordination will include notification of plans to conduct the survey, an invitation to comment on the plans and visit the project area during the fieldwork, and an inquiry into possible Tribal participation in the fieldwork. The Tribes will also be provided copies of the survey reports. Coordination with the SHPO staff will include review of the survey documentation and recommendations regarding evaluation, avoidance, protection, or treatment of identified cultural resources.

Task 2: Records Review and Background Research: This work has already been completed and documented in AINW Report No. 1651, entitled *A Cultural Resources Overview of the Proposed Shepherds Flat Wind Farm Project, Gilliam and Morrow Counties, Oregon*, dated March 17, 2006. This report will be provided to project reviewers as part of the documentation package.

Task 3: Field Survey: AINW will employ two strategies for identification of cultural resources. The first strategy is primarily oriented toward identification of archaeological resources and involves pedestrian survey of corridors containing the proposed facilities. Pedestrian transects spaced at 20-meter (66-foot) intervals will be used for all of the survey corridors. The survey corridor for turbine strings and parallel facilities is 100 meters (330 feet) wide to accommodate the construction footprint of the turbines, access roads along the turbines strings, and underground collector system cables. The total combined length of the turbine string corridors (including individual turbines) is approximately 52 miles and encompasses 1,975 acres. Other linear facilities (access roads, collector systems, and transmission lines) that are outside of the turbine string corridors have a total length of approximately 75 miles and will be surveyed using narrower 40-meter (132-foot) wide corridors (1,193 acres). The non-linear facilities (meteorological towers, substations, and operations and maintenance yards) total approximately 7 acres in size and will be surveyed using parallel transects spaced 20 meters (66 feet) apart. Because the project area is sparsely vegetated, especially in the fall season when the survey will occur, the ground surface visibility is expected to be good and shovel testing is not anticipated. If areas of poor ground surface visibility are encountered, shovel testing may be recommended for those areas or for areas where subsurface archaeological deposits are suspected but cannot be identified from surface exposures.

The second strategy for resource identification is primarily oriented toward identification of historic-period buildings and structures. This strategy involves a reconnaissance of the project area by specialists in identification and evaluation of historic-period buildings and structures. The reconnaissance will be done by driving the main roads in the project area and immediately surrounding areas within one mile to identify resources that could be directly or indirectly affected by the proposed project.

Approximately 15 archaeological or historical resources are expected based on the density of resources identified for other similar projects in the area. Cultural resources in the area are expected to consist primarily of archaeological sites including stacked rock features, scatters of artifacts, and isolated artifacts. There may be up to five resources with historic-period buildings or structures. Linear historic-period resources including historic-period trails, roads, or telegraph lines may also be present. The historic-period Oregon Trail routes through the project area have already been field-surveyed and the results of these surveys may be found at Attachment S-2.

Task 4: Documentation: AINW will prepare a technical report. The report will include descriptions of the survey methods and results, along with appropriate maps, photographs, tables, and resource forms. The report will also provide a preliminary assessment of the significance of identified resources and recommendations for avoidance, protection, evaluation, or treatment of those resources. The technical report is intended for limited distribution to specific project reviewers and included archaeological site location information that cannot be provided to the public and is exempt from Freedom of Information Act requests.

AINW will also prepare a summary report of the survey. This report will not contain sensitive archaeological site location information and will be included in this Application as Attachment S-3.

S2

With what tribes have you consulted?

TRIBAL CONSULTATION

Applicant has consulted with the Confederated Tribes of Umatilla and the Confederated Tribes of Warm Springs. Although the site boundary no longer includes lands currently associated with the Confederated Tribes of Umatilla, Applicant will continue this consultation.

Both Tribes were informed of development plans and provided with maps of the project area in 2004. Neither Tribe responded. Subsequent telephone conversation established that both Tribes wished to receive copies of any cultural resource surveys of the facility site.

Both Tribes received multiple copies of Applicant's Notice of Intent to Apply for a Site Certificate, and both Tribes received multiple copies of Applicant's Application.

Applicant intends to invite Tribal representatives to take part in its cultural resources ground surveys (please see Applicant's response to RAI#2 S1).

S3

Please provide a map showing the alignment of the Oregon Trail within the site boundary in relation to the location of facility components (based on preliminary layouts). Describe the proposed fence. Where would it be located? What are the estimated perimeter dimensions? What materials would be used in its construction? Describe in more detail how you would monitor the condition of the proposed Oregon Trail fence.

OREGON TRAIL

Alignment of the Oregon Trail

The conjectural route of the Oregon Trail crosses the southern project area for a distance of approximately 1.4 miles, and further to the west crosses Fourmile Canyon, the facility's proposed transmission corridor (see Figure RAI#2 S-1).

Two routes are shown:

- The GLO route is taken from 1867-1870 General Land Office maps; and
- The Franzwa route is taken from *Maps of the Oregon Trail* (Franzwa, Gregory M., The Patrice Press, St. Louis, Missouri, 1990).

These routes differ in their conjectural entrance to the facility site from the east. Because the GLO route assumes a straight-line entrance that ascends and immediately descends an intervening hill, rather than skirting this obstacle as does the Franzwa route, this portion of the GLO route is not considered (Applicant notes, however, that this portion of the GLO route traverses only cultivated land within the facility site). Both routes are considered as they exit the property. Neither route includes the visible Oregon Trail wagon ruts discussed below.

The conjectural route of the Oregon Trail cuts "cross-country" for 0.5 miles after it enters the facility site from the east. Applicant's preliminary layout places one turbine string, perpendicular to the conjectural route, within this 0.5 miles. All possible points of turbine string intersection occur on cultivated land. The balance of the conjectural route of the Oregon Trail (0.9 miles) is covered by Fairview Lane (a two-lane county road that is paved in some portions and graveled in others). Fields are generally cultivated to the edge of the roadway making it unlikely that there are remaining visible ruts in this area. The following photographs were taken on Fairview Lane:

Applicant proposes no alterations to Fairview Lane.

Fencing the Wagon Ruts

Tradition places approximately 300 feet of visible Oregon Trail wagon ruts directly north of Immigrant Lane to the east of Highway 74. This area was once within the facility site, and Applicant proposed protecting and enhancing the area by installing a split-rail fence.

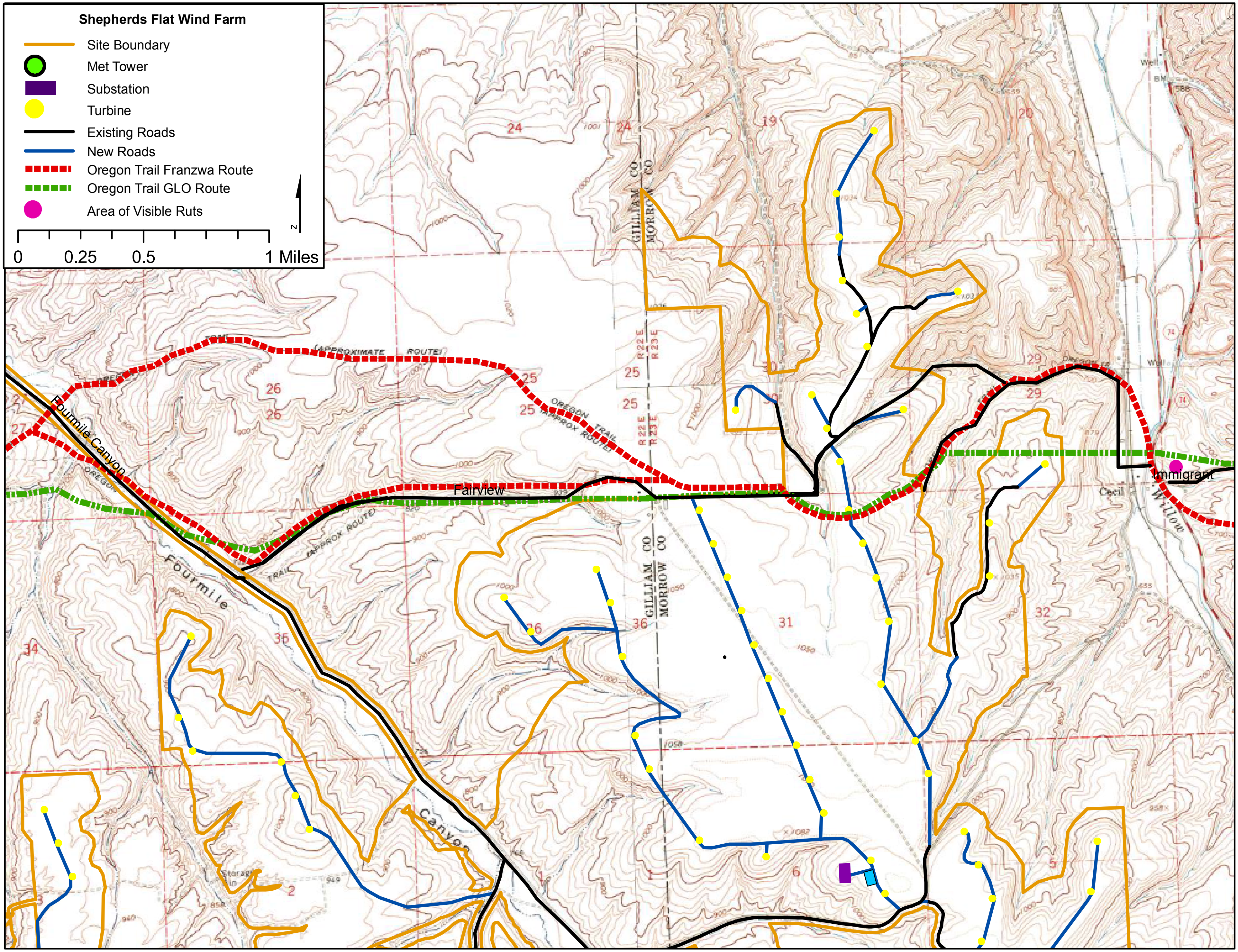
Because the traditional ruts are now approximately 0.5 miles across the Willow Creek Valley and Highway 74 from the site boundary, on private land no longer under the control of the Applicant, Applicant withdraws its fencing plan.

Informational Posting

Fairview Lane does not include any pull-outs that would support an informational kiosk. A sign with detail text would present a traffic hazard as Fairview Lane has few shoulders. However, a simple sign, noting the route of the Trail, is proposed.

Applicant will consult with the County road department and with the Oregon Historic Trails Advisory Council with respect to the design and placement of the proposed sign on Fairview Lane. Project roads which connect with Fairview Lane generally will use existing farm road access points, and it is anticipated that the sign can be erected at one of these access points.

Figure RAI #2 S-1



RAI#3, S4: HISTORIC, CULTURAL AND ARCHAEOLOGICAL RESOURCES

Please provide the results of surveys of the Oregon Trail as it crosses the facility site, together with a discussion of the potential impacts of construction, operation and retirement of the proposed facility on any identified resources and a plan for protection of those resources as required by OAR 345-021-0010(1)(s).

OREGON TRAIL

Applicant commissioned a study of the Oregon Trail, including research and a field reconnaissance, to determine whether the proposed Shepherds Flat Wind Farm (SFWF) might impact the Oregon Trail. The study, in its entirety, may be found at Attachment S-2.

Page 8 of the study provides specific recommendations for protecting the Oregon Trail. Applicant has considered these recommendations and proposes that:

- No project facilities, access roads, or work areas be sited on the identified rutted remnants of the Oregon Trail;
- No project facilities, access roads, or work areas be sited on undeveloped portions of the trail alignment where it is marked by Oregon-California Trail Association markers;
- The transmission line in the Fourmile Canyon section of the project be located to the northeast side of Fourmile Canyon road; and
- During the design phase of the Fourmile Canyon transmission line, Applicant will prepare alternative configurations (one underground, the other overhead) in the immediate vicinity of the BLM Four Mile Historic Site interpretive center. Underground line placement may or may not be feasible depending on geological features. Underground line placement may be more disruptive to important vegetation and habitat than overhead construction. Underground line placement will certainly be more costly. For these reasons, Applicant proposes to review its alternative configurations with the Oregon Department of Energy, and mitigate for any adverse impacts as appropriate.

Applicant notes that the general area of the Willow Creek Campground site is commemorated by a newly-installed marker on Highway 74. Applicant expects that several SFWF turbines will be visible from this commemorative marker. Applicant also notes that Willow Creek Winds, a project to the immediate north of the SFWF facility and also opposite the Willow Creek Campground site, has been permitted by Morrow County and is scheduled for construction in 2008.

Because the nature of any indirect visual impact is not yet known, and because any impact may be shared by facilities both within and without the Council's jurisdiction, Applicant proposes that:

- Applicant will work with other wind facility developers, in consultation with the Oregon-California Trails Association, Oregon Historic Trails Advisory Council, and other affected parties to find some suitable and mutual accommodation for mitigation of any indirect visual impact on the general area of the Willow Creek Campground.

RAI#3, S5: HISTORIC, CULTURAL AND ARCHAEOLOGICAL RESOURCES

Please provide the results of surveys of the areas that would be affected by the proposed facility layout and that are described as having high-to-moderate potential for archaeological resources in Attachment S of the application. Describe the potential impacts of construction, operation and retirement of the proposed facility on any identified resources and a plan for protection of those resources as required by OAR 345-021-0010(1)(s).

ARCHAEOLOGICAL RESOURCES

Please see Applicant's response to RAI#3, S1. Areas described as having high-to-moderate potential for archaeological resources have been included in the survey described in that response.

CONFIDENTIAL Report

A CULTURAL RESOURCE SURVEY OF

THE PROPOSED SHEPHERDS FLAT WIND FARM PROJECT

GILLIAM AND MORROW COUNTIES, OREGON:

OREGON TRAIL

Prepared for
Caithness Shepherds Flat, LLC
New York, New York

October 8, 2007

REPORT NO. 2012

Archaeological Investigations Northwest, Inc.

2632 SE 162nd Ave. • Portland, OR • 97236 Phone 503 761-6605 • Fax 503 761-6620

T1

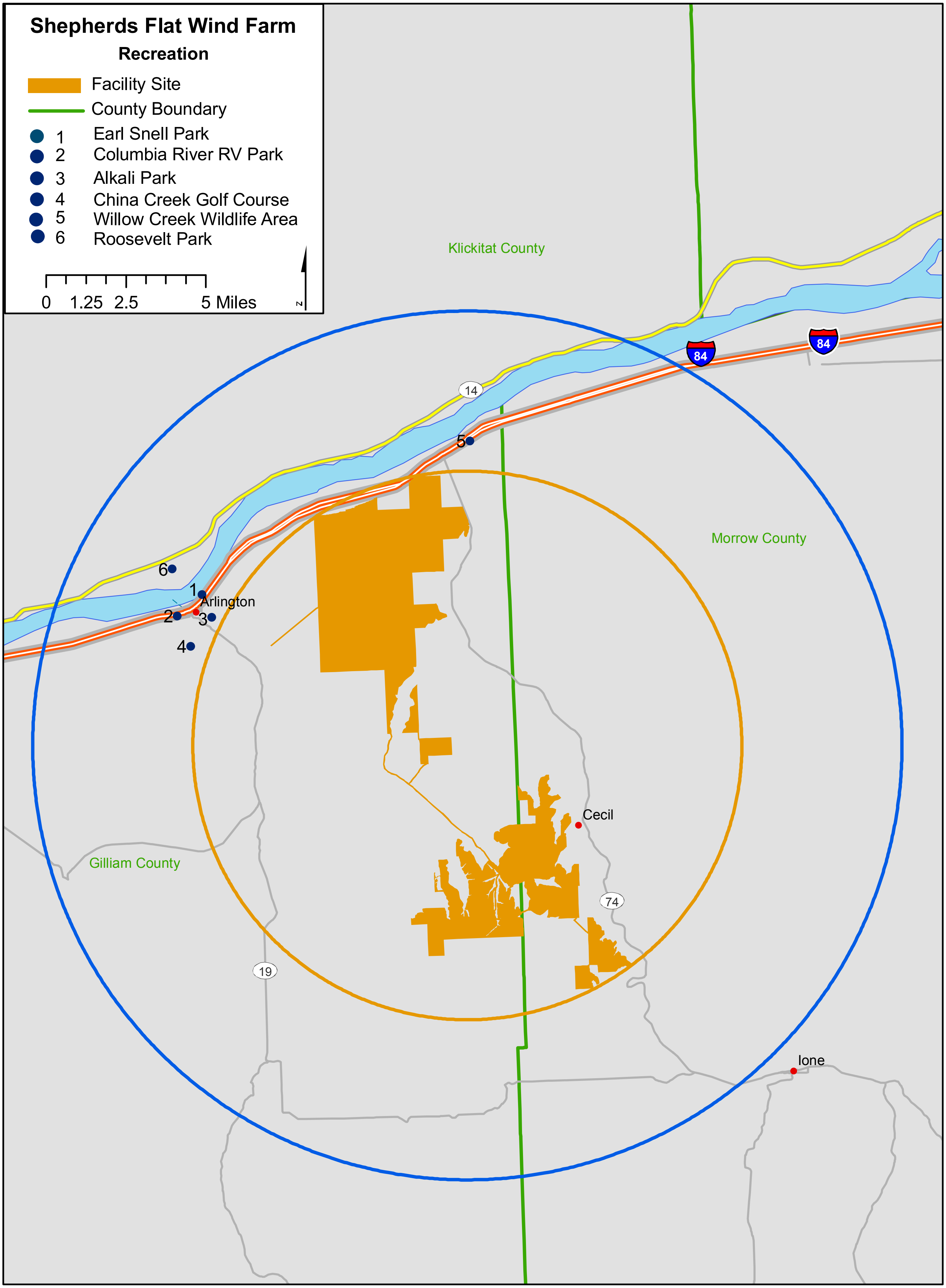
Address recreational opportunities that could be affected in the analysis area within the State of Washington.

STATE OF WASHINGTON RECREATIONAL OPPORTUNITIES

Applicant has identified one site of recreational opportunity—Roosevelt Park (Roosevelt, WA)—in the State of Washington that is located within the five-mile analysis area.

This recreational opportunity does not meet the criteria set out for "importance" by OAR 345-022-0100. These criteria, and their applicability (or lack thereof) to this and other recreational opportunity sites, are discussed in RAI#2 T2.

Figure RAI #2 T-1



T2

Discuss the criteria in OAR 345-022-0100 for each of the recreational facilities you identify within the analysis area as a basis for the conclusion that these recreational opportunities are not important.

IMPORTANCE OF RECREATIONAL OPPORTUNITIES

OAR 345-022-0100 sets the following criteria for the designation of a recreational opportunity as "important":

- (a) Any special designation or management of the location;
- (b) The degree of demand;
- (c) Outstanding or unusual qualities;
- (d) Availability or rareness;
- (e) Irreplaceability or irretrievability of the opportunity.

The applicant has identified six recreational opportunities within a five-mile radius of the Shepherds Flat Wind Farm, five located in the State of Oregon, and one located in the State of Washington.

An assessment of these six sites against the criteria set out for "importance" by OAR 345-022-0100 shows that none of these six recreational opportunities meets the criteria for designation as "important".

On a site-by-site basis, Applicant's assessment is that:

- The *Earl Snell Park* (Arlington, OR), a small park located under a freeway overpass in downtown Arlington, has no special designation or management. While the park contains a playground and public toilets, public use is generally light. The site is well-maintained, but has no outstanding, unusual, or rare qualities. The opportunity to recreate in Earl Snell Park is similar to that offered by multiple other parks and open spaces in the area;
- The *Alkali Park* (Arlington, OR) is a gass-covered square approximately the size of a city block in the north of the town of Arlington. It has no special designation or management, and is little-used. It has no outstanding, unusual, or rare qualities, and offers no irreplaceable or irretrievable opportunities;

- The nine-hole *China Creek Golf Course* (Arlington, OR), located on the outskirts of Arlington, opened as a public golf course in 2003. It is not specially-designated or managed. While it is enjoyed by residents, demand is not remarkable, nor does the course possess qualities that differ significantly from those found at many other local public golf courses;

- The *Columbia River RV Resort* (Arlington, OR) is a private campground offering facilities to overnight campers in recreational vehicles. It is primarily used by transiting campers, as the resort, while pleasant, does not provide rare, unusual or outstanding recreational opportunities. It has no special designation or management, and is similar in design and facilities to other RV campgrounds adjacent to Interstate 84, which collectively meet (if not exceed) public demand;

- The *Willow Creek Wildlife Area* (Morrow County, OR) is a 2,722 acre wildlife area visited by wintering waterfowl, wildlife enthusiasts, hunters and fishers. The Wildlife Area is not specially-designated nor managed, nor does it attract large numbers of visitors. It does not differ significantly in recreational opportunities offered from other sites in the local area also used for wildlife viewing and hunting;

- *Roosevelt Park* (Roosevelt, WA) offer sailors and other visitors access to the Columbia River from Washington State Highway 14. The park is appreciated by water sports enthusiasts, but has neither rare, unusual, nor outstanding qualities, nor offers irretrievable or irreplaceable recreational opportunities in comparison with multiple other points-of-access to the Columbia River used regularly by visitors.

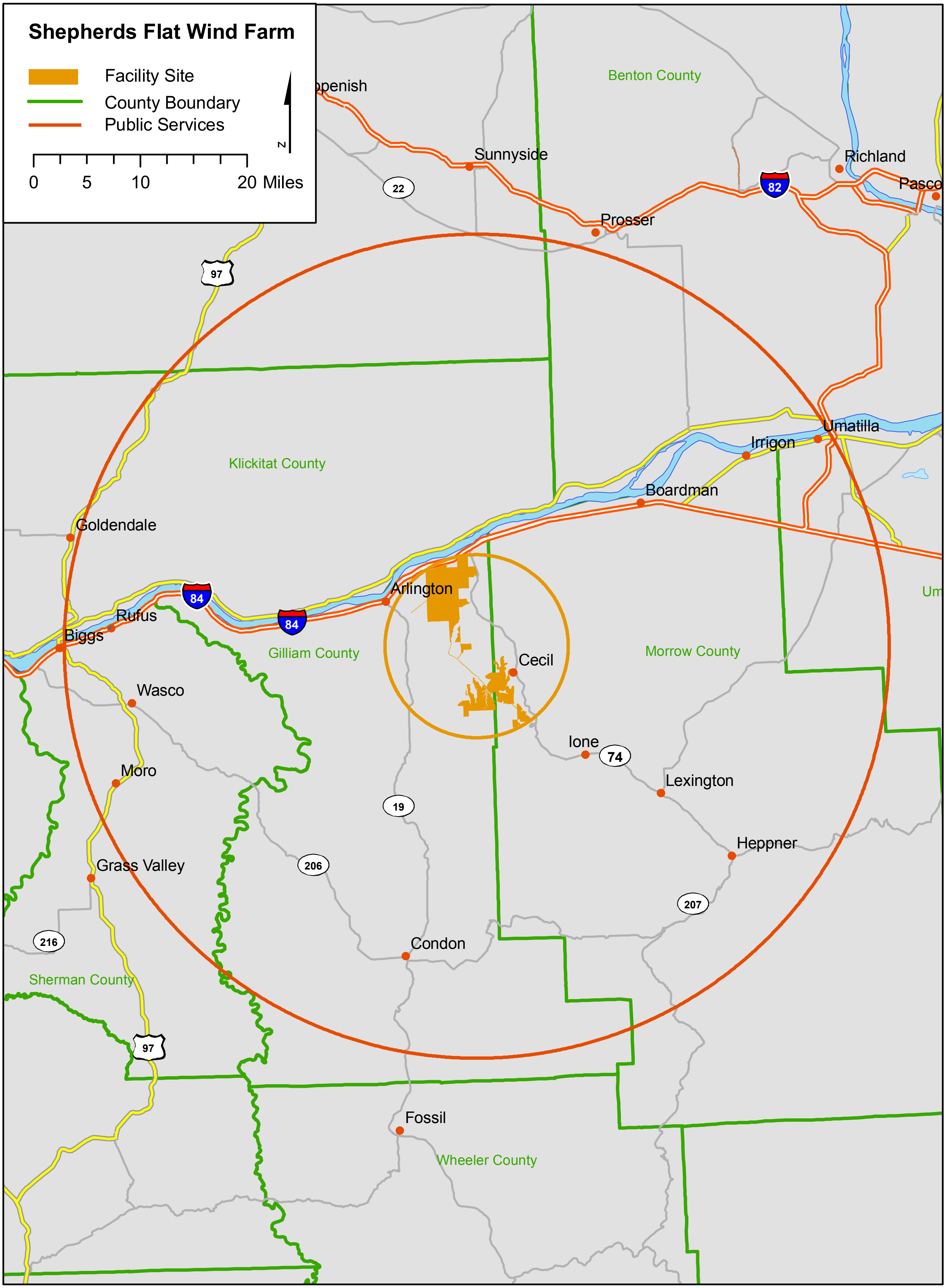
U1

Address public services that may be affected in the analysis area within the State of Washington.

STATE OF WASHINGTON PUBLIC SERVICES

The thirty mile public services analysis area includes unincorporated areas of three counties in the State of Washington: Klickitat County, Yakima County, and Benton County. Please see Applicant's response to RAI#2 U2 for the identity of the public and private providers of public services and Applicant's response to RAI#2 U3 for a discussion of any likely adverse impact to those providers.

Figure RAI #2 U-1



U2

Respond to OAR 345-021-0010(1)(u)(B). Identify the public and private providers of sewers and sewage treatment, water, storm water drainage, solid waste management, housing, traffic safety, police and fire protection, health care, and schools services within the analysis area.

PUBLIC SERVICES PROVIDERS

Sewers and Sewage Treatment Providers

City/County	Provider
City of Arlington, OR	City of Arlington Public Works Department
City of Boardman, OR	City of Boardman Public Works Department
City of Heppner, OR	City of Heppner Public Works Department
City of Condon, OR	City of Condon Public Works Department
City of Umatilla, OR	City of Umatilla Public Works Department

Water

City/County	Provider
City of Arlington, OR	City of Arlington Public Works Department
City of Boardman, OR	City of Boardman Public Works Department
City of Heppner, OR	City of Heppner Public Works Department
City of Condon, OR	City of Condon Public Works Department
City of Umatilla, OR	City of Umatilla Public Works Department

Storm Water Drainage

City/County	Provider
City of Arlington, OR	City of Arlington Public Works Department
City of Boardman, OR	City of Boardman Public Works Department
City of Heppner, OR	City of Heppner Public Works Department
City of Condon, OR	City of Condon Public Works Department
City of Umatilla, OR	City of Umatilla Public Works Department

Solid Waste Management

City/County	Provider
City of Arlington, OR	City of Arlington
City of Boardman, OR	City of Boardman
City of Heppner, OR	Heppner Garbage Disposal
City of Condon, OR	Waste Connections
Umatilla County, OR	Sanitary Disposal Inc.
Sherman County, OR	Sunrise Sanitation
Klickitat County, WA	Tri-County Disposal

Housing

City/County	Units (2000 US Census Bureau)	Vacancy Rate (2000 US Census Bureau)
City of Arlington, OR	278	18.0%
City of Condon, OR	422	15.4%
Gilliam County, OR	1,043	21.5%
City of Boardman, OR	948	9.2%
City Of Ione, OR	139	10.1%
City of Lexington, OR	114	5.3%
Morrow County, OR	4,276	11.7%
City of Rufus, OR	162	21.0%
City of Wasco, OR	199	14.1%
City of Moro, OR	144	8.3%
Sherman County, OR	935	14.8%
City of Umatilla, OR	1,511	9.7%
Umatilla County, OR	27,676	9.0%
Klickitat County, WA	8,633	13.4%
Yakima County, WA	79,174	8.2%
Benton County, WA	55,963	9.3%

Traffic Safety

City/County	Provider
City of Arlington, OR	City of Arlington Road Department
City of Boardman, OR	City of Boardman Road Department
Gilliam County, OR	Gilliam County Road Department
Morrow County, OR	Morrow County Road Department
Umatilla County, OR	Umatilla County Road Department
Sherman County, OR	Sherman County Road Department
Klickitat County, WA	Klickitat County Road Department
Yakima County, WA	Yakima County Road Department
Benton County, WA	Benton County Road Department

Police Protection

City/County	Provider
City of Boardman, OR	City of Boardman Police Department
City of Condon, OR	City of Condon Police Department
City of Umatilla, OR	City of Umatilla Police Department
Gilliam County, OR	Gilliam County Sheriff Department
Morrow County, OR	Morrow County Sheriff Department
Umatilla County, OR	Umatilla County Sheriff Department
Sherman County, OR	Sherman County Sheriff Department
Klickitat County, WA	Klickitat County Sheriff Department
Yakima County, WA	Yakima County Sheriff Department
Benton County, WA	Benton County Sheriff Department

Fire Protection

City/County	Provider
City of Arlington, OR	City of Arlington Fire Department
City of Boardman, OR	City of Boardman Fire Department
City of Condon, OR	City of Condon Fire Department
City of Rufus, OR	Rufus Volunteer Fire Department
City of Wasco, OR	North Sherman County Rural Fire Department
City of Moro, OR	Moro Rural Fire District
City of Umatilla, OR	Umatilla Rural Fire Protection District
Gilliam County, OR	North Gilliam County Rural Fire Protection District
Gilliam County, OR	South Gilliam County Rural Fire Protection District
Morrow County, OR	Morrow County Rural Fire District
Umatilla County, OR	Umatilla Rural Fire Protection District
Sherman County, OR	Sherman County Rural Fire Protection District
Klickitat County, WA	Klickitat County Rural Fire Protection District
Yakima County, WA	Yakima County Rural Fire Protection District
Benton County, WA	Benton County Rural Fire Protection District

Health Care

City/County	Provider
City of Heppner, OR	Pioneer Memorial Hospital
City of Moro, OR	Moro Medical Clinic
City of Umatilla, OR	Umatilla Medical Clinic

School Services

City/County	Provider
City of Arlington, OR	Arlington Elementary School (K-8)
	Arlington High School (9-12)
City of Boardman, OR	Sam Boardman Elementary School (K-4)
	Windy River Elementary School (5-6)
	Riverside Junior & Senior High School (7-12)
City of Ione, OR	Ione Elementary School (K-6)
	Ione High School (7-12)
City of Irrigon, OR	A. C. Houghton Elementary School (K-4)
	Irrigon Elementary School (5-6)
	Irrigon Junior & Senior High School (7-12)
City of Heppner, OR	Heppner Elementary School (K-6)
	Heppner Junior & Senior High School (7-12)
City of Condon, OR	Condon Elementary School (K-7)
	Condon High School (8-12)
City of Wasco, OR	North Sherman Elementary School (K-6)
City of Moro, OR	Sherman Junior & Senior High School (7-12)
City of Umatilla, OR	McNary Heights Elementary School (K-4)
	Clara Brownell Middle School (5-8)
	Umatilla High School (9-12)
Klickitat County, WA	Roosevelt Elementary School (K-6)

U3

Respond to OAR 345-021-0010(1)(u)(C). Describe any likely adverse impact to the providers identified in response to OAR 345-021-0010(1)(u)(B) to provide their public services during construction and operation of the proposed facility.

IMPACT TO PUBLIC SERVICES PROVIDERS

Sewers and Sewage Treatment Providers

The Public Works Departments of the cities of Arlington, Boardman, Heppner, Condon and Umatilla provide sewers and sewage treatment to the establishments and residents of those cities. The Shepherds Flat Wind Farm (SFWF) is not located within any of those cities and the facility will require neither sewers nor sewage treatment services from the Public Works Departments listed in RAI#2 U2.

Applicant believes that the only potential for adverse impacts to providers of sewers and sewage treatment would arise in the case of significant changes in the population of these cities. During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families, and (due to project proximity) most are expected to lodge in the cities of Arlington and Boardman. The two cities contain sufficient temporarily lodging facilities, for which sewers and sewage treatment is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of sewers and sewage treatment during construction of the proposed facility.

During operation, the facility will employ approximately 35 people. Applicant expects that some of these employees already reside in the analysis area. Applicant believes that it is likely that those recruited from outside the area will settle throughout the analysis area, rather than in a single listed city. Applicant also believes that the majority of those settling in any listed city will purchase or rent from existing housing stocks, for which sewers and sewage treatment is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of sewers and sewage treatment providers during operation of the proposed facility.

Water

The Public Works Departments of the cities of Arlington, Boardman, Heppner, Condon and Umatilla provide water to the establishments and residents of those cities. The Shepherds Flat Wind Farm (SFWF) is not located within any of those cities and the facility will not receive water service from the Public Works Departments listed in RAI#2 U2.

Applicant believes that the only potential for adverse impacts to providers of water would arise in the case of significant changes in the population of these cities. During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families, and (due to project proximity) most are expected to lodge in the cities of Arlington and Boardman. The two cities contain sufficient temporarily lodging facilities, for which water is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of water during construction of the proposed facility.

Applicant has had discussions with the City of Arlington with respect to supplying water for water tankers during facility construction. The City has contracted to supply water for similar construction projects in the past, with no apparent adverse impact on its ability to provide water to its residents. Please see Applicant's response to RAI#2 O-2.

During operation, the facility will employ approximately 35 people. Applicant expects that some of these employees already reside in the analysis area. Applicant believes that it is likely that those recruited from outside the area will settle throughout the analysis area, rather than in a single listed city. Applicant also believes that the majority of those settling in any listed city will purchase or rent from existing housing stocks, for which water is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of water during operation of the proposed facility.

Storm Water Drainage

The Public Works Departments of the cities of Arlington, Boardman, Heppner, Condon and Umatilla provide storm water drainage to the establishments and residents of those cities. The Shepherds Flat Wind Farm (SFWF) is not located within any of those cities and the facility will not receive storm water drainage service from the Public Works Departments listed in RAI#2 U2.

Applicant believes that the only potential for adverse impacts to providers of storm water drainage would arise in the case of significant changes in the population of these cities. During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families, and (due to project proximity) most are expected to lodge in the cities of Arlington and Boardman. The two cities contain sufficient temporarily lodging facilities, for which storm water drainage is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of storm water drainage during construction of the proposed facility.

During operation, the facility will employ approximately 35 people. Applicant expects that some of these employees already reside in the analysis area. Applicant believes that it is likely that those recruited from outside the area will settle throughout the analysis area, rather than in a single listed city. Applicant also believes that the majority of those settling in any listed city will purchase or rent from existing housing stocks, for which storm water drainage is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of storm water drainage during operation of the proposed facility.

Solid Waste Management

Solid waste management services are provided for the establishments and residents of the cities of Arlington, Boardman, Heppner, and Condon and Umatilla, Sherman and Klickitat counties. The Shepherds Flat Wind Farm (SFWF) is not located within any of those service areas and the facility will not receive solid waste management services from any of the providers listed in RAI#2 U2.

Applicant believes that the only potential for adverse impacts to providers of solid waste management services would arise in the case of significant changes in population in their service areas. During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families, and (due to project proximity) most are expected to lodge in the cities of Arlington and Boardman. The two cities contain sufficient temporarily lodging facilities, for which solid waste management services are already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of solid waste management services during construction of the proposed facility.

During operation, the facility will employ approximately 35 people. Applicant expects that some of these employees already reside in the analysis area. Applicant believes that it is likely that those recruited from outside the area will settle throughout the analysis area, rather than in a single listed service area. Applicant also believes that the majority of those settling in any listed service area will purchase or rent from existing housing stocks, for which solid waste management services is already provided. Therefore, Applicant believes that it is unlikely that there will be any adverse impact to providers of solid waste management services during operation of the proposed facility.

Housing

Housing stocks (both temporary and permanent) are listed in RAI#2 U2.

During construction, the maximum resident and transient (less than one week) population increase is expected to be 250 people with no attendant families, and (due to project proximity) most are expected to lodge in the cities of Arlington and Boardman. The two cities contain sufficient temporarily lodging facilities, however Applicant believes that there may be a short-term impact on the availability and price of temporary housing (rentals, motels and RV parks).

During operation, the facility will employ approximately 35 people. Applicant expects that some of these employees already reside in the analysis area. Applicant believes that it is likely that those recruited from outside the area will settle throughout the analysis area, and that the majority of those resettling will purchase or rent from existing housing stocks which are sufficient. Therefore, Applicant believes that it is unlikely that there will be any adverse impact on housing stocks.

Traffic Safety

Applicant believes that neither the construction nor operation of the facility will result in any additional traffic in Umatilla County, Sherman County, Klickitat County, Yakima County and

Benton County. Therefore it is unlikely that there will be any adverse impact on the ability of the road departments of those counties to provide for traffic safety during construction or operation of the proposed facility.

Due to its location on Interstate 84, and its proximity to the facility site, Applicant expects that the City of Boardman will experience increased traffic during facility construction. Several service stations and food establishments are located near the Boardman I-84 exit and Applicant expects that both regular and long-load construction and delivery vehicle drivers will make use of these facilities. However, these service establishments have large driveways and parking areas and are separated from smaller city streets and the balance of the commercial area. Applicant therefore believes it is unlikely that there will be any adverse impact on the ability of the City of Boardman Road Department to provide for traffic safety during construction of the proposed facility. Applicant expects no significant increase in traffic in the City of Boardman during facility operation, and therefore believes it is unlikely that there will be any adverse impact on the ability of the City of Boardman Road Department to provide for traffic safety during operation of the proposed facility.

The proposed facility is located in Gilliam and Morrow Counties, and is served by and crossed by roads maintained by the Gilliam and Morrow County Road Departments. Applicant expects that during facility construction, these county roads (Rhea Road/Lane, Fairview Lane, Cecil Lane, Palmateer Lane, His Idea Lane) will be heavily used by construction, delivery and personal vehicles. However, these roads receive very little regular traffic (two or three vehicles per day). Applicant therefore believes it is unlikely that there will be any adverse impact on the ability of the Gilliam and Morrow County Road Departments to provide for traffic safety during construction of the proposed facility. For the same reason, Applicant believes it is unlikely that there will be any adverse impact on the ability of the Gilliam and Morrow County Road Departments to provide for traffic safety during operation of the proposed facility.

Applicant believes that most facility components will be delivered to the project area via Interstate 84, and that most vehicles will exit I-84 at the City of Arlington. Arlington will experience increased traffic throughout the construction period, and will experience traffic disruption during the delivery of heavy equipment, cranes, tower sections, nacelles and blades.

Applicant will mitigate against any adverse impact on the ability of the City of Arlington Road Department to provide for traffic safety during facility construction by:

- Notifying the Road Department and County Sheriff in advance of disruptive deliveries;
- Notifying City residents in advance of disruptive deliveries; and
- Employing flaggers at all affected intersections

Applicant expects no significant increase in traffic in the City of Arlington during facility operation, and therefore believes it is unlikely that there will be any adverse impact on the ability of the City of Arlington Road Department to provide for traffic safety during operation of the proposed facility.

Police Protection

Applicant believes that 1) due to distance from the project and 2) the absence of a likelihood of increased population (discussed above) that neither the construction nor operation of the proposed facility will have an adverse impact on the ability of the City of Condon Police Department, the City of Umatilla Police Department, the Umatilla County Sheriff Department, the Sherman County Sheriff Department, the Klickitat County Sheriff Department, the Yakima County Sheriff Department or the Benton County Sheriff Department to provide police protection within their service areas.

Applicant expects that during facility construction, the City of Boardman will experience a temporary increase in population, but that it is unlikely that this population increase will adversely impact the ability of the City of Boardman Police Department to provide police protection within its service area. No adverse impact is anticipated during facility operation.

The proposed facility lies within the service areas of the Gilliam and Morrow County Sheriff Departments. Impacts to the departments during construction might include:

- An increase in traffic violations
- An increase in after-hours rowdiness
- Thefts and/or vandalism at the construction site

Applicant will mitigate against any adverse impact on the ability of the Gilliam and Morrow County Sheriff Departments to provide for police protection during facility construction by:

- Including good-citizen/no-tolerance language in its contractors and subcontractors agreements; and
- Employing private site-security as appropriate

During operation, the possibility of thefts and or vandalism will persist at the facility site. Applicant will mitigate against any adverse impact on the ability of the Gilliam and Morrow County Sheriff Departments to provide for police protection during facility operation by employing private site-security as appropriate.

Fire Protection

The proposed facility lies within the North Gilliam County Rural Fire Protection District and the Morrow County Rural Fire District. Because none of the other providers of fire protection services listed in RAI#2 U2 provides services to the facility site, and because no significant population increase is expected (discussed above), it is unlikely that any of these other providers of fire protection services will experience an adverse impact on their ability to provide fire protection services during facility construction or operation.

Wildfires, and occasionally arson-induced fires, are a regular occurrence in the facility's northern project area. These fires are controlled by creating bare-ground fire breaks as water supplies are limited. Applicant believes that the during facility construction and operation the abilities of the North Gilliam County Rural Fire Protection District and the Morrow County Rural Fire District to provide fire protection services will be enhanced for the following reasons:

- Establishment of project roads that serve as fire-breaks
- Presence of additional fire-fighting personnel
- Presence of earthmoving equipment
- Presence of water trucks
- Installation of two 20,000 water tanks

No adverse impact during facility construction or operation is anticipated.

Health Care

Pioneer Memorial Hospital in Heppner is a 60 minute drive from Arlington, the Moro Medical Clinic is a 52 minute drive, and the Umatilla Medical Clinic a 51 minute drive. Residents of the project area often receive health care services in Portland (2 hours 14 minutes), The Dalles (55 minutes), and the Washington Tri-Cities (1 hour 21 minutes) which are all outside the analysis area.

Because no significant population increase is predicted during facility construction or operation (discussed above), and because health care services are secured from throughout the larger region, no adverse impact to the three health care services providers listed in RAI#2 U2 is anticipated during facility construction or operation.

School Services

Personnel employed during the construction of facility are not likely to relocate with school-age children. Therefore, no adverse impact to school services providers listed in RAI#2 U2 is anticipated during facility construction.

Applicant believes that those operating personnel recruited from outside the region will settle throughout the analysis area. The children of these employees may be served by the school services providers listed in RAI#2 U2. Because no significant increase in population is expected (discussed above) Applicant does not believe that facility operation will adversely impact the ability of school services providers to provide school services.

RAI#3, U3: PUBLIC SERVICES

(Follow-Up)

A. On page 3 of your response, you state that SFWF would not receive solid waste management services from any of the listed providers. How would these services be provided?

B. On pages 4 and 5, you indicate that you "believe" that the proposed facility would not have adverse impacts on the ability of county road departments to provide for traffic safety, of local law enforcement agencies to provide police protection or on the ability of fire protection services to provide for fire protection and response. Please provide evidence that you have consulted directly with local road, police and fire agencies to discuss the scope of the proposed facility and its potential impacts on these services and that you have addressed any concerns that the agencies have expressed.

WASTE MANAGEMENT SERVICES

The Shepherds Flat Wind Farm is sited in unincorporated areas of Gilliam and Morrow Counties. Waste management services are not provided in these areas—residents and businesses "self-haul." Applicant will self-haul waste materials to the appropriate county landfill.

IMPACTS ON ROAD, POLICE AND FIRE AGENCIES

Attachment U1 contains agency responses to Applicant's discussion of potential impacts. Applicant proposes to:

- Comply with the terms of the Gilliam County road agreement;
- Accept the conditions proposed by Morrow County Public Works;
- Establish good communications between on-site security personnel and local law enforcement;
- Encourage facility employees to become members of local fire departments by providing time off for appropriate firefighting training; and
- Work with other wind facility operators in the area to sponsor high angle rescue and confined space training for firefighters.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Friday, September 21, 2007 9:40 AM
To: 'Susie Anderson'; 'John White'
Cc: 'Dewey Kennedy'; 'jflarson@PacificEnergySystems.com'
Subject: RE: Shepherds Flat Wind Farm

Hi Susie, it's simple...we accept the terms of the agreement and John will write it into our Project Order. I wish it was all this easy (and reasonable).

Thanks,
Pat

-----Original Message-----
From: Susie Anderson [mailto:susie.anderson@co.gilliam.or.us]
Sent: Friday, September 21, 2007 9:14 AM
To: John White
Cc: Dewey Kennedy; Patricia Pilz
Subject: Shepherds Flat Wind Farm

Hi John,
I received from Dewey Kennedy the Gilliam County Roadmaster, a letter from Patricia Pilz regarding the Shepherds Flat Wind Farm. It is important to note that each wind energy company is required to enter into a road agreement with Gilliam County that the contractors are to be held responsible for any and all damage to Gilliam County Roads, resulting from all wind energy operation and as consideration for permission to use county roads to complete Contractor=s operations. (Please see attached agreement). This agreement has come about as our Road Department has a very limited budget and due to the expense of repairing and maintaining county roads extensively damaged due to the construction of the wind projects, this agreement was necessary.
I do not know if there is a way to address this in the application for Site Certification or not, but I would appreciate your input regarding this in matter.

In case you would like to contact Dewey Kennedy, his contact information is as follows:
Dewey Kennedy-Gilliam County Roadmaster
P.O. Box 427
Condon, OR 97823
Phone-(541) 384-5717

Susie Anderson
Gilliam County Planning Director/Enterprise Zone Manager/Wasteshed Coordinator
P.O. Box 427
Condon, OR 97823
Phone: (541) 384-2381
Fax: (541) 384-2166

Agreement

THIS AGREEMENT is entered into this ______, day of________________,2007, between __________________(hereinafter "Contractor@) and Gilliam County (hereinafter ACounty@).

WHEREAS, in the course of hauling materials and traveling to and from wind energy operations, "Contractor" anticipates operating equipment over a portion of ____________________________ Road, (hereinafter "Gilliam County Road"), and;

WHEREAS, the parties desire to agree as to certain terms and conditions for the hauling of materials and for "Contractor" to be held responsible for any and all damage to "Gilliam County Road", resulting from all wind energy operation and as consideration for permission to use county roads to complete "Contractor=s" operations.

NOW THEREFORE, the parties agree as follows:

1. Scope of Work: "Contractor", shall have the right to haul materials over "Gilliam County Road". Loading operations shall take place off County Road Right-of-Way (60 ft.).

2. Traffic Control: "Contractor" shall provide, at his expense, appropriate traffic signs, flaggers, and warning devices on "Gilliam County Road". Sign and warning device location will be determined by Gilliam County Roadmaster. Traffic delays due to wind energy activity shall not exceed ten(10) minutes. Emergency Vehicles shall have immediate access to the road. Maximum speed for loaded and empty trucks shall be held to 25 miles per hour.

3. Dust Suppression: When hauling begins, “Contractor” will water roads in a sufficient amount to eliminate the dust where houses are located along county roads.

4. Road Maintenance: If the road surface (paved or gravel) should deteriorate, “Contractor”, shall make necessary repairs under the direction of Gilliam County Roadmaster to eliminate potholes, washboards and surface deteriorations. Should “Contractor” be unable to maintain the road surface, County will grade the road or make pavement repairs at County rates.

5. Road Repairs: “Contractor” shall repair soft spots by digging out the base material, backfilling with base rock, compacting and re-graveling the surface, or make asphalt repairs under the direction of the Gilliam County Roadmaster. “Contractor” will blade road surface or make asphalt repairs of “Gilliam County Road” upon completion of hauling.

6. Inclement Weather Conditions: The Gilliam County Roadmaster will survey road conditions and instruct “Contractor” to discontinue the hauling operation.

7. Access: “Contractor” agrees to abide by all contractual or applicable governmental regulations concerning access of property owners to their driveways during the course of construction.

8. Successors: This agreement shall be binding upon and inure to the benefit of the respective heirs, successors, and assigns of the parties.

9. Attorney Fees: In the event any suit or action is brought to enforce the term of this Agreement, the prevailing party shall be entitled to recover as part of its cost, its reasonable attorney fees incurred in such suit or action in any trial court of competent jurisdiction or any appellate court upon appeal.

Executed in duplicate on the above date.

GILLIAM COUNTY

____

By______________________________

Its______________________________

By______________________________
Patricia Shaw, Judge

By______________________________
Frank Bettencourt, Commissioner

By______________________________
Michael Weimar, Commissioner

Agreement-Page 3

GILLIAM COUNTY
SHERIFF'S OFFICE

GARY D. BETTENCOURT, SHERIFF

P.O. BOX 685
221 S. OREGON STREET
CONDON, OREGON 97823
TEL: 541-384-2851 – EXT. 146
FAX: 541-384-2878

September 24, 2007

Patricia Pilz
For Caithness Shepherds Flat, LLC
656 San Miguel Way
Sacramento, CA 95819

Dear Ms. Pilz:

I received your letter, dated September 17, 2007, concerning the Shepherds Flat Wind Farm project located in north Gilliam and Morrow Counties.

My Office is capable of handling any potential increase in calls for service without noticeable affect on our local citizen's needs for service.

Our past experience, with windmill projects, is the lack of training of the private security personnel. I would ask that my staff have the opportunity to communicate with on-site security prior to the wind farm projects delivery of the towers. If we are able to accomplish this, we would greatly increase our chances of apprehending any criminal suspects, possibly in the act of a crime.

Sincerely,

Sheriff Gary Bettencourt

SHERIFF

MORROW COUNTY SHERIFF

325 Willow View Drive -:- P.O. Box 159
Heppner, Oregon 97836
Phone: (541) 676-5317
Fax: (541) 676-5577

Kenneth W. Matlack, Sheriff
Steven L. Myren, Undersheriff

September 25, 2007

Patricia Pilz
Caithness Shepherds Flat, LLC
656 San Miguel Way
Sacramento, CA 95819

RE: Shepherds Flat Wind Farm

Dear Patricia:

We would be very interested in knowing that security would be on site. Because this location is at the far end of our patrol area with very little calls for service, this will impact our ability to respond to other calls for service when our staff is called to your facility.

We have very limited resources and a large patrol area. We want our county to grow but we have problems meeting expectations.

Have you considered providing a small amount of resource funding for overtime, or call out issues that may occur at your site? I understand you'll be paying taxes eventually but as a new business of substantial size have you considered partnering with us, perhaps a donation towards unexpected calls for service?

Thank you for asking for our comments.

Respectfully,

Ken Matlack

Ken Matlack, Sheriff
(m.ross)

North Gilliam County

Rural Fire Protection District

PO Box 476, Arlington, OR 97[illegible]

Fax 541-454-0199 Ph 541-454-2900

October 8, 2007

Patricia Pilz
Caithness Shepherds Flat, LLC
565 Fifth Avenue
29th Floor
New York, NY 10017

Dear Patricia:

This is a response to the letter North Gilliam County Rural Fire Protection District recently received from Caithness Shepherds Flat, LLC regarding the construction and operation of Shepherds Flat Wind Farm. Included in the letter were a number of reasons the construction of the wind farm would enhance fire protection services in North Gilliam County. I would agree with all of the comments but would like to add a caveat to the statement that there would be additional fire-fighting personnel available. There may be personnel on the wind farm site that would be available to suppress fires that start on the site but North Gilliam County Rural Fire Protection District requires volunteers to have approved wildland firefighting classes before participating with the fire department. If there are new community members as a result of the operation and construction of the wind farm, North Gilliam County RFPD would welcome their application to become members of the fire department.

Additionally, wind farm companies coming into Gilliam County must recognize the limited funding of fire departments in this area. Because there are limited funds, training in high angle and confined space rescue has not occurred. As a matter of policy, firefighters do not undertake tasks such as these for which they have no training. There are members of fire departments throughout Gilliam County that would welcome the chance to become certified in both high angle rescue and confined space training. If the wind farms would be willing to fund not only the training but the tools needed for high angle and confined space rescue the fire departments would be glad to supply volunteers to participate

Overall, the wind farms are a benefit to the communities of Gilliam County. With the willingness of Caithness Shepherds Flat, LLC to address the preceding concerns, I do not envision any adverse effects from either the construction or the operation of the wind farm

If you have any questions, please contact me at 541-454-2900 or 541-980-3[illegible]

Sincerely,

Shannon K. Coppock

Shannon K. Coppock
Gilliam County Fire Services Coordinator

CAITHNESS SHEPHERDS FLAT, LLC
565 FIFTH AVENUE
29TH FLOOR
NEW YORK, NEW YORK 10017

Mr. Tim Wetherell
Public Works Director
City of Arlington Road Department
500 West First Street
Arlington, OR 97812

Post-it® Fax Note 7671	Date 10.8.07	# of pages ▶ 2
To	From City of Arlington	
Co./Dept.	Co.	
Phone #	Phone # 541-454-2740	
Fax # 916-456-4451	Fax # 541-454-2753	

RE: Shepherds Flat Wind Farm

Dear Director Wetherell,

Background

The Shepherds Flat Wind Farm, up to 303 turbines in size, is proposed for land in northern Gilliam and Morrow Counties (please see the enclosed site map). The facility's Application for a site certificate is under review by the Oregon Department of Energy (ODOE), which acts as staff to Oregon's Energy Facility Siting Council (the Council). Among other things, the Council must find that the facility will not adversely affect your ability to provide for the public safety.

In our Application, we stated the following:

The proposed facility is located in Gilliam and Morrow Counties, and is served by and crossed by roads maintained by the Gilliam and Morrow County Road Departments. Applicant expects that during facility construction, these county roads (Rhea Road/Lane, Fairview Lane, Cecil Lane, Palmateer Lane, His Idea Lane) will be heavily used by construction, delivery and personal vehicles. However, these roads receive very little regular traffic (two or three vehicles per day). Applicant therefore believes it is unlikely that there will be any adverse impact on the ability of the Gilliam and Morrow County Road Departments to provide for traffic safety during construction of the proposed facility. For the same reason, Applicant believes it is unlikely that there will be any adverse impact on the ability of the Gilliam and Morrow County Road Departments to provide for traffic safety during operation of the proposed facility.

Applicant believes that most facility components will be delivered to the project area via Interstate 84, and that most vehicles will exit I-84 at the City of Arlington. Arlington will experience increased traffic throughout the construction period, and will experience traffic disruption during the delivery of heavy equipment, cranes, tower sections, nacelles and blades.

Applicant will mitigate against any adverse impact on the ability of the City of Arlington Road Department to provide for traffic safety during facility construction by:

- *Notifying the Road Department and County Sheriff in advance of disruptive deliveries;*
- *Notifying City residents in advance of disruptive deliveries; and*
- *Employing flaggers at all affected intersections*

Applicant expects no significant increase in traffic in the City of Arlington during facility operation, and therefore believes it is unlikely that there will be any adverse impact on the ability of the City of Arlington Road Department to provide for traffic safety during operation of the proposed facility.

While this is what we anticipate, it is more important to understand any concerns that you may have with respect to impacts on your department. Therefore, we would appreciate (and ODOE has asked for) your comments. These might take the form of a separate letter, or notes at the bottom of this letter.

We have provided a return envelope for your convenience, and we are grateful for your attention.

Regards,

Patricia Pilz
For Caithness Shepherds Flat, LLC
656 San Miguel Way
Sacramento, CA 95819
(916) 456-7651

Comments:

It appears that the route you will be using is Oregon Hwy 19. The City of Arlington has no jurisdiction on this road way.

Thanks
Tim

PUBLIC WORKS DEPARTMENT

365 W. Highway 74 -:- P.O. Box 428
Lexington, Oregon 97839
Phone: (541) 989-9500
FAX No.: (541) 989-8352

Burke O'Brien
Director

Bob Nairns
Asst. Director

Date: October 4, 2007

To: Patricia Pilz
656 San Miguel Way
Sacramento, CA 95819

From: Burke O'Brien
Morrow County
Public Works Director

Re: Letter of September 17, 2007 Shepherds Flat Wind Farm

Dear Patricia

I am replying to you in regard the Shepherds Flat Wind Farm request for comment I received from you on behalf of Caithness Shepherds Flat, LLC.

In your letter you requested input in regard to Gilliam and Morrow Counties Road Departments being able to provide traffic safety during the projects. I find this statement needing some clarification. If it implies that our Road Department would take any extra action or implement any different procedures than we do with any other contractor or project using our road system In fact the burden lies on the Contractor to insure they operate in a safe and legal manner. This can include additional signage for safety purposes and in some cases traffic control, as well as valid overweight and over length permits.

MORROW COUNTY

PUBLIC WORKS DEPARTMENT

365 W. Highway 74 -:- P.O. Box 428
Lexington, Oregon 97839
Phone: (541) 989-9500
FAX No.: (541) 989-8352

Burke O'Brien
Director

Bob Nairns
Asst. Director

I refer to CUP-N-192 that is dated April 23, 2003 and the following conditions.

Condition # 2 makes reference to the need to control dust. Either by the use of a dust inhibitor or by routine use of water, and or re applying gravel to the road surface.

Condition # 5 refers to the obtaining of any access permits required to cross or access County Roads.

Condition # 6 refers to monies to be bonded for the Cecil and for the Immigrant Roads in the amount of $100'000 and $75,000.

Condition # 7 refers to all project roads being built to a rural access II standard.

I would like to think that these conditions cover the majority of the issues we may face during the construction of your project.

Sincerely Yours;

Burke O'Brien

Burke O'Brien
Morrow County Public Works Director

CAITHNESS SHEPHERDS FLAT, LLC
565 FIFTH AVENUE
29TH FLOOR
NEW YORK, NEW YORK 10017

Chief Virgil Morgan
Fire Chief
Ione Rural Fire Protection District
68498 Lloyd Road
Ione, OR 97843

RE: Shepherds Flat Wind Farm

Dear Chief Morgan,

Background

The Shepherds Flat Wind Farm, up to 303 turbines in size, is proposed for land in northern Gilliam and Morrow Counties (please see the enclosed site map). The facility's Application for a site certificate is under review by the Oregon Department of Energy (ODOE), which acts as staff to Oregon's Energy Facility Siting Council (the Council). Among other things, the Council must find that the facility will not adversely affect your ability to provide for the public safety.

In our Application, we stated the following:

Wildfires, and occasionally arson-induced fires, are a regular occurrence in the facility's northern project area. These fires are controlled by creating bare-ground fire breaks as water supplies are limited. Applicant believes that the during facility construction and operation the abilities of the North Gilliam County Rural Fire Protection District and the Morrow County Rural Fire District to provide fire protection services will be enhanced for the following reasons:

- *Establishment of project roads that serve as fire-breaks*
- *Presence of additional fire-fighting personnel*
- *Presence of earthmoving equipment*
- *Presence of water trucks*
- *Installation of two 20,000 water tanks*

No adverse impact during facility construction or operation is anticipated.

While this is what we anticipate, it is more important to understand any concerns that you may have with respect to impacts on your department. Therefore, we would appreciate (and ODOE has asked for) your comments. These might take the form of a separate letter, or notes at the bottom of this letter.

We have provided a return envelope for your convenience, and we are grateful for your attention.

Regards,
Patricia Pilz
For Caithness Shepherds Flat, LLC
656 San Miguel Way
Sacramento, CA 95819
(916) 456-7651

Comments:

U4

Please provide a revised map. The outer radius shown on Fig. U-1 appears to be a larger radius than the 30-mile analysis area, if the scale shown on the figure is accurate.

REVISED MAP

Figure RAI #2 U-1 corrects the mapping error.

V1

Describe the septic systems that would be installed at the field workshops. OAR 345-021-0010(1)(v)(A).

SEPTIC SYSTEMS

Septic systems for the field workshops will be designed and installed in compliance with the Oregon Department of Environmental Quality's (DEQ's) On-site Sewage Treatment and Disposal System program (please see Applicant's response to RAI#2 E1).

DEQ's Site Evaluation Report will specify the approved area, the type and size of the septic system required, and any special requirements. The system will be installed by a DEQ-licensed installer, using DEQ-approved materials and equipment to meet all DEQ standards.

A septic tank that serves a commercial facility must have a liquid capacity of at least two times the projected daily sewage flow, unless otherwise authorized by the DEQ. In all cases the capacity must be at least 1,000 gallons. Applicant believes that the 1,000 gallon minimum will be sufficient for the larger of its two proposed field workshops.

V2

What specific measures would you implement to "meet the requirements of the NPDES water quality criteria regardless of the requirement for a permit?"

WATER QUALITY

The following measures will be implemented at the Shepherds Flat Wind Farm:

Erosion and sediment controls

Temporary stabilization practices

- Clearing, grading, and foundation pours will be scheduled when the chance for precipitation is minimal;
- Clearing and grading areas will be clearly marked prior to activity;
- Dust control measures: To prevent the transport of soil from exposed surfaces, water will be applied to at least 80% of all inactive disturbed surface areas daily. When there is evidence of wind driven fugitive dust, water will be applied to at least 70% of the surface area of all open storage piles at least three times a day.

Permanent stabilization:

- A ten foot crushed rock base will be placed around each turbine;
- Access roads will be finished with gravel or crushed rock;
- Unauthorized traffic will be prohibited; and
- On-site vehicular traffic will not exceed 15 miles per hour.

Other controls

Waste materials

- All trash and construction debris will be stored in securely lidded metal dumpsters, which will be emptied as necessary;
- All personnel will be trained in proper procedures for waste disposal;
- Waste disposal procedures will be posted on-site; and
- On-site supervisors will be responsible for seeing that procedures are followed.

Hazardous waste

Construction and operating personnel will follow all federal, state, and local government regulations 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.

Sanitary waste

- All sanitary waste will be collected from any portable units a minimum of two times each week by a licensed sanitary waste management contractor:

- Portable toilets will be placed on a level surface;
- Portable toilets will be secured to the ground to prevent blowing over and;
- Any spill that should occur during pump-out will be cleaned up immediately.

Vehicle and Equipment Maintenance

- All on-site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage;
- Large equipment maintenance will be conducted within a designated maintenance yard and;
- Drip pans will be placed under vehicle and equipment during minor routine maintenance.

Storage Areas

- All construction material will be delivered and staged in the designated staging area and;
- Any materials being stored that could release pollutants by wind or rain will be properly covered.

Spill Prevention

Good Housekeeping

- Prompt cleanup and removal of any spillage;
- Restriction of vehicle traffic to access roads;
- Regular pickup and disposal of garbage and rubbish; and
- Use of appropriate storage containers.

Hazardous Products

- Products will be kept in original containers (unless not re-sealable);
- Original labels and material safety data will be retained; and
- Appropriate disposal of surplus materials following manufacturers' and state recommended methods.

Concrete Trucks

Concrete trucks will be permitted to wash out or discharge surplus concrete only within the turbine foundation hole.

Spill control practices

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of cleanup procedures and the location of cleanup supplies;
- Materials and equipment necessary for spill cleanup will be kept in the material storage area on-site. Equipment and materials will include brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers dedicated to this purpose;
- Any spill will be cleaned up immediately upon discovery;
- Any spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substances;
- Any spills of toxic or hazardous material will be reported to the appropriate government agency, regardless of the size of the spill; and

- In the event of a spill, the spill prevention plan will be adjusted to include measures to prevent a recurrence. A description of the spill, what caused it, and effective cleanup measures will be included.

Inspection programs

- Site entrances will be inspected routinely to assure maintenance of the proper thickness of the aggregate; and
- All control measures will be inspected at least once a week, and inspections and assessments will be documented.

V3

Have you consulted with a concrete contractor to determine whether it is practical to limit truck wash-down to off-site locations?

TRUCK WASH-DOWN

Applicant consulted with experienced wind facility contractors in the course of the preparation of this Application, including a balance-of-plant contractor, a concrete contractor, and a civil engineer.

The balance-of-plant contractor's *best practices* handbook requires off-site concrete truck wash-down.

The concrete contractor confirms that standard practice at the time of pour is to rinse the concrete truck into the foundation hole and to complete wash-down at the concrete batch plant.

Water for this foundation-hole rinse is included in construction water requirement estimates.

W1

Please explain the basis or method you used to determine the unit costs shown on page 2. NOTE: The site restoration cost estimate must account for additional areas of temporary disturbance caused by the restoration activity. These areas would also have to be restored. Your estimate should include removal and site restoration of the field workshops. The estimate must include general costs (such as permits, mobilization, engineering, overhead, utility disconnects), a performance bond, administrative and project management costs, and a contingency adder to address future developments. Our own preliminary site restoration estimate is in the range of $19.7 million, but we are continuing internal discussions of how the estimates of wind project site restoration might be reduced. Any information that you can provide to verify the restoration cost estimates could be helpful in this discussion.

SITE RESTORATION

Applicant understands that the worst-case site restoration estimate is calculated as if the state, rather than a defaulting facility owner, completes the work of facility retirement and site restoration. For this reason, Applicant will work with the Council's staff to refine staff's preliminary estimate, as well as to provide additional information and materials as might assist ongoing discussion of this issue.

RAI # 2 EXHIBIT X: NOISE

X1

Respond to OAR 345-021-0010(1)(x). A noise analysis (including modeling data used to show compliance under OAR 340-035-0035(1)(B)(iii)(IV) and (VI)) must be included as part of a "complete" application. You must analyze the potential noise levels at any noise sensitive property that could receive significant noise from the proposed facility, whether or not the noise sensitive properties (typically residences) are owned by "the project's landlords."

NOISE ANALYSIS

Applicant's predicted noise contours for its "worst-case" turbine, the Vestas V-90, are shown in figures RAI#2 X1a and RAI#2 X1b. Applicant located all noise sensitive properties (all were residences) within one mile of the site boundary, and recorded each of these property's GPS address. Thirty-one such properties were identified. Figures RAI#2 X1a and RAI#2 X1b show only those properties within the 35 dBA contour. The turbine array used for the analysis placed turbines as close as practical to the site boundaries and these residences.

Computations

Noise contours were computed from the noise emission level of 109.2 dB LWA for Vestas 3 MW turbines in accordance with the following procedure:

1. A 501 x 501 (=251501) point computation grid was set up for the area encompassing the turbine array with a 2000 meter open space around the perimeter.
2. The Easting (*X*) and Northing (*Y*) coordinates of each wind turbine site and each calculation grid were stored in computer files.
3. Distances were computed for each turbine/grid point pair

$$d_{T,G} = \sqrt{\left(X_T - X_G\right)^2 + \left(Y_T - Y_G\right)^2 + HubHeight^2}$$

4. The A-weighted sound pressure level (*SLA*) from each turbine and grid point was computed from the Effective A-Weighted Sound Power Level (*LWA*).

$$SLA_{T,HG} = LWA - 10\log\left(2pd_{T,G}^2\right) - .00328d_{T,G}$$

   where $d_{T,G}$ is the distance in meters from turbine *T* to grid point *G*. The first loss term results from hemispherical wave spreading and the second from atmospheric absorption.

5. The total sound pressure level at each grid point was determined as the sum of contributions from all turbines

$$SLA_G = 10\log\left[\sum_T 10^{\left(SLA_{T,G}/10\right)}\right]$$

6. The Matlab contour function was used to interpolate the gridded noise levels and compute and plot constant noise level contours on 5 dB intervals. Locations of proposed turbine sites and known off-site residences were overlaid on the contour plots for reference

The noise contours computed in the above manner provide a conservative determination of turbine noise levels at off-site and on-site locations. They are conservative because:

a. They assume all turbines are generating noise at the maximum level demonstrated by manufacturer testing.

b. They assume all grid points are exposed to noise from all turbines, whereas in practice, many turbines will be shielded by terrain features and/or the energy from more distant turbines will be partially dissipated by ground absorption.

c. Elevation offsets between turbine sites and actual off-site locations have been ignored, so that $d_{T,G}$ is slightly understated.

Results

OAR 340-035-0035 allows for a 10 dBA increase over an assumed ambient noise level of 26 dBA. Noise sensitive properties within the 35 dBA contour might, therefore, be impacted by the facility.

When turbines are selected, and the facility layout is determined for each phase of the Shepherds Flat Wind Farm, the noise analysis will be repeated. Should any noise sensitive properties remain within the 35 dBA contour, actual background noise measurements will be taken in order to ascertain whether the facility layout complies with the regulation. In the event that the noise level is increased by more than 10 dBA at a noise sensitive property, a noise easement will be sought from the affected property owner as provided for in the regulation. In the event that an easement cannot be secured, the facility layout will be changed until the regulation's allowable noise levels are met.

Figure RAI#2 X1a

Noise Contours - 192 Wind Turbines at 109.2 dB LWA

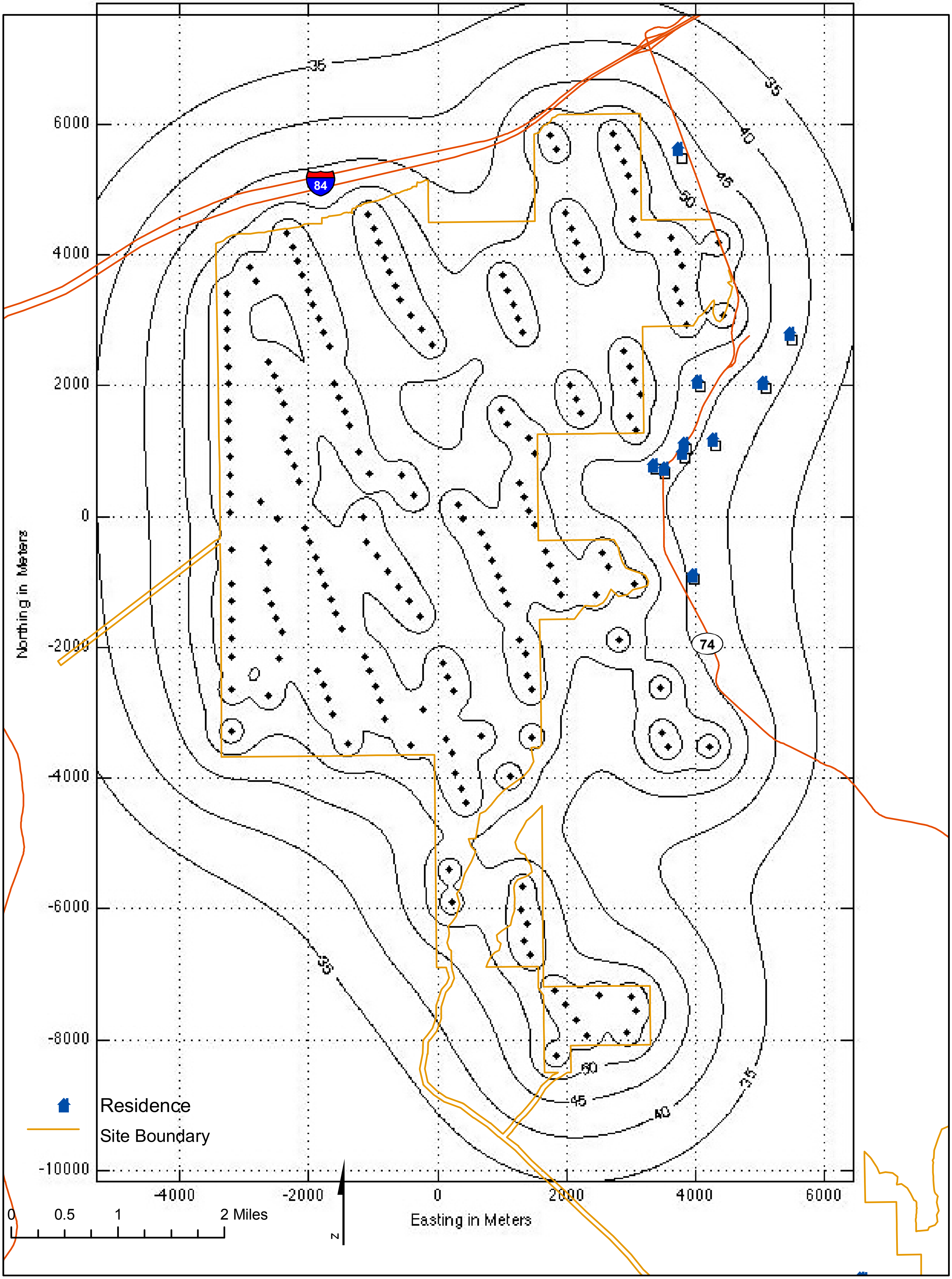
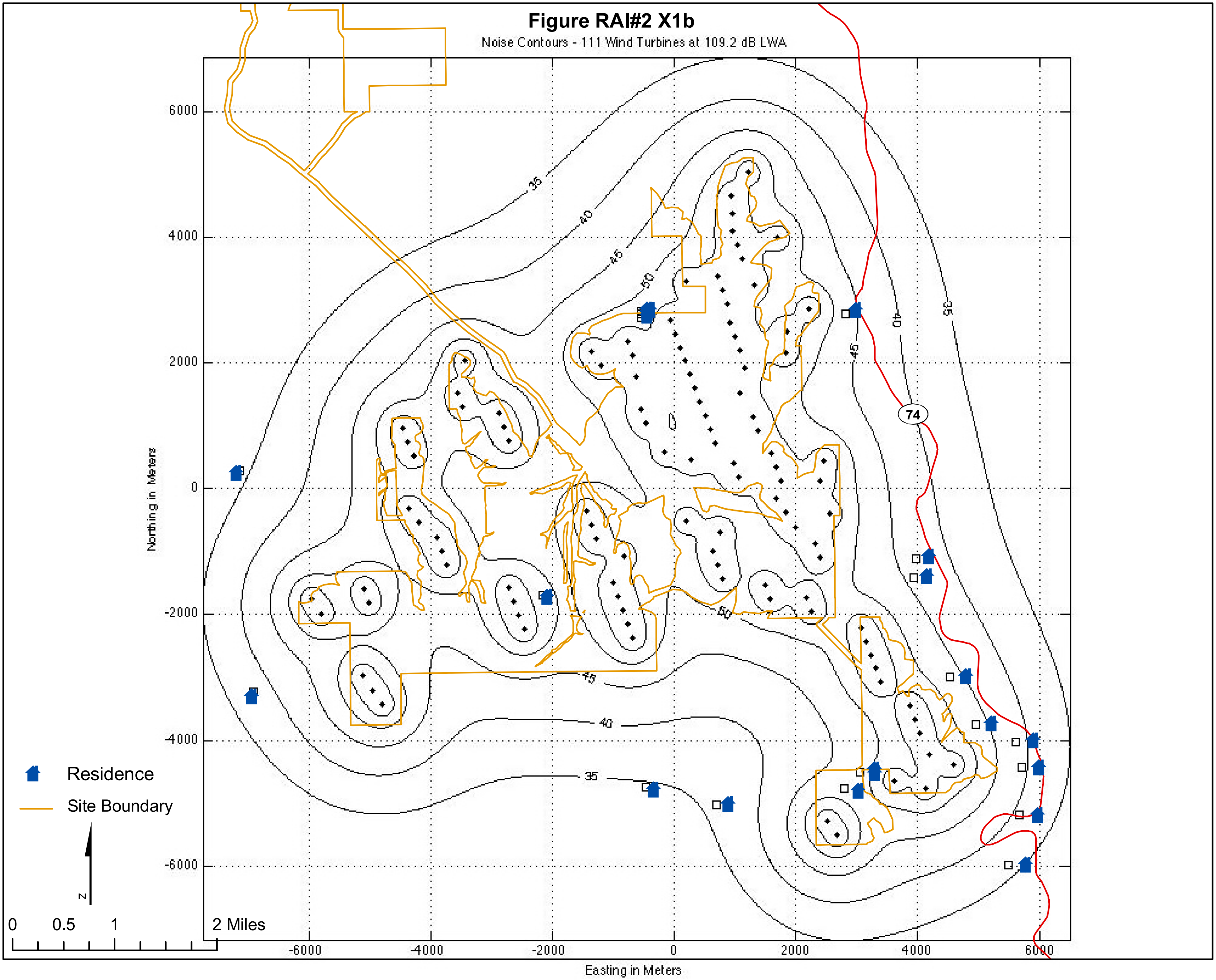


Figure RAI#2 X1b

Noise Contours - 111 Wind Turbines at 109.2 dB LWA



RAI#3, X2: NOISE

In computing noise levels likely to be generated by the SFWF, CFS applied the sound power level guaranteed for the Vestas V-90 wind turbine (as shown on Table B-1). The Department expects the applicant to add the manufacturer's uncertainty level to the guaranteed maximum sound power level before making predictions. Please recalculate the noise contours using a reference sound power level of 111.2 dBA, i.e., the manufacturer's guaranteed sound power level plus the manufacturer's uncertainty level.

MANUFACTURER'S UNCERTAINTY LEVEL

Applicant's responses to RAI#3, X9 and X10 provide noise contours calculated using a reference sound power level of 111.2 dBA.

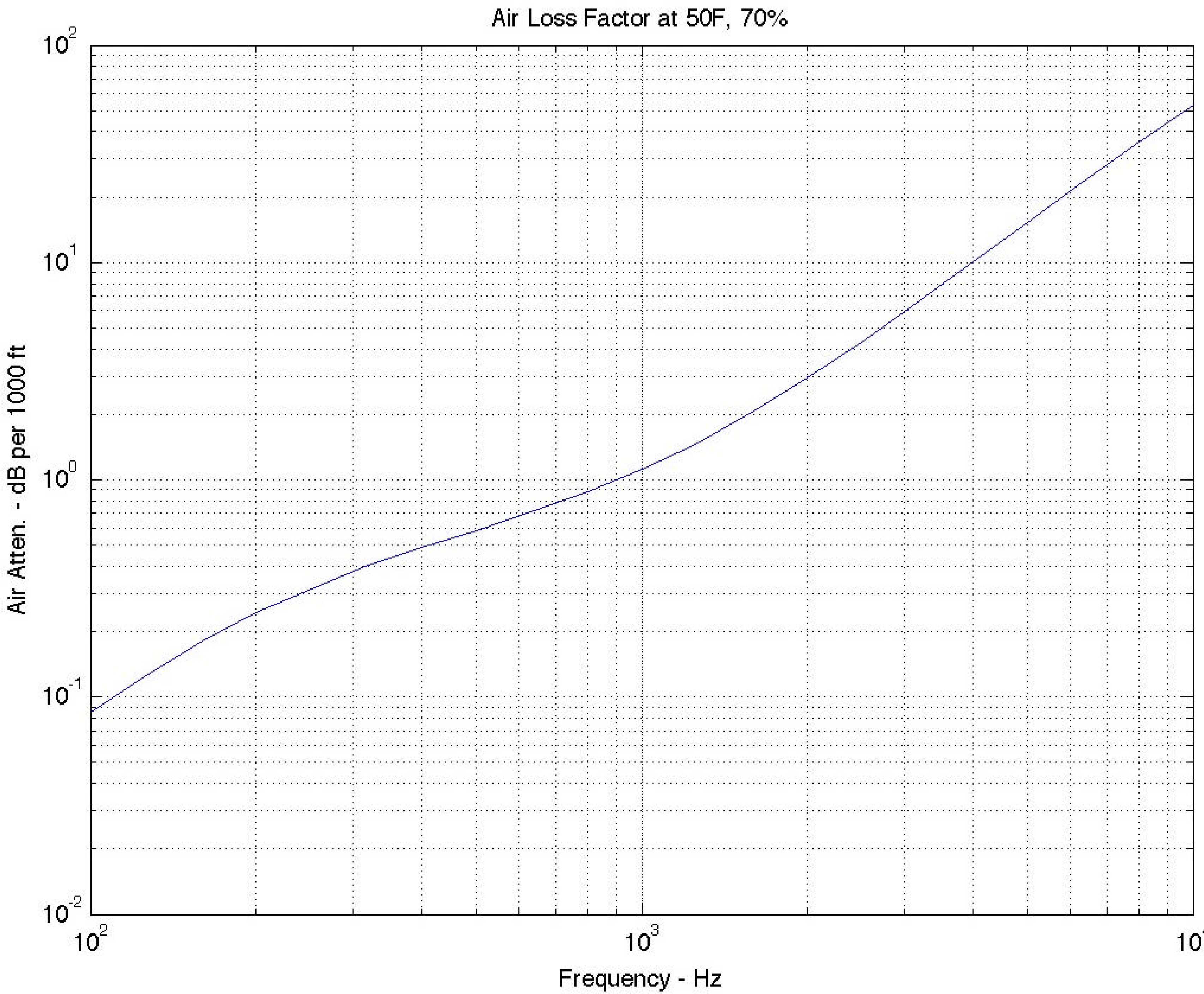
RAI#3, X3: NOISE

*CSF stated that the amount of atmospheric absorption expected to be present between each turbine and each receiver was computed using the term, 0.00328*$d_{T,G}$ *where "d" is the distance in meters between the turbine "T" and the grid point "G." While this basic equation is correct, the amount of reduction provided by atmospheric absorption between a source and receiver depends on the frequency spectrum of the sound source. Please confirm that the computations of sound pressure level were made using the frequency spectrum data provided for the turbines and not just the overall A-weighted sound power level data and that atmospheric absorption was calculated using a temperature of* 50^0 *F and a relative humidity of 70%.*

ATMOSPHERIC ABSORPTION

Contours were computed with A-weighted noise emissions using the 1 dB per 1,000 ft excess attenuation factor. This approach virtually always produces a result within one dB or so of the more rigorous spectral approach and is also virtually always on the conservative side. With sound propagation over thousands of feet, uncertainties associated with ground conditions, vegetation and atmospheric turbulence negate any gain in precision that one might hope to achieve through another approach.

Please see Figure RAI#3 X3.



Air Loss Factor at 50F, 70%
Air Atten. - dB per 1000 ft
Frequency - Hz
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{2}
10^{3}
10^{4}

RAI#3, X4: NOISE

CSF stated that the sound power level of the Vestas V-90 turbine was used in the calculations because the guaranteed overall sound power level of the Vestas turbine was higher than the sound power level guaranteed for all of the other turbine alternatives (i.e. the V-90 is the "worst-case" turbine, as indicated by Table B-1). While the overall sound power level of the Vestas V-90 turbine is higher than that generated by all other turbines, the resulting sound pressure level at receivers may actually be slightly higher for the Siemens SWT-2.3-93 turbine than the Vestas turbine due to the frequency spectrum associated with the turbine and the fact that the amount of atmospheric absorption between the turbine and the receiver depends on the frequency spectrum of the turbine. To ensure the analysis adequately predicts the loudest noise levels that might be generated by the SFWF, please provide a prediction of the sound pressure level that would be found at 1000, 2000 and 3000 feet from a Vestas V-90 turbine and 1000, 2000 and 3000 feet from a Siemens SWT-2.3-93 turbine using a temperature of 500 F and a relative humidity of 70%.

TURBINE COMPARISONS

Applicant has provided a facility configuration, using the Vestas V-90 turbine, that would meet the Council's noise standard (please see applicant's response to RAI#3 X10).

RAI#3, X5: NOISE

CSF provided Figures RAI#2 X1a and RAI#2 X1b to show the noise levels that will radiate from the proposed wind turbines. CSF presented the predicted noise levels using noise contours on the two figures that show the noise levels every 5 dB between 35 dBA and 55 dBA. CSF stated that noise sensitive receivers were located and placed on the figures using GPS addresses. While the location of the noise sensitive receivers may be accurate, it is not possible to determine the predicted sound pressure level at each of the noise sensitive receivers by reference to these figures. In addition, reference to the figures does not enable the reviewer to determine the exact locations of all the facility turbines. Please revise the figures to show the location of all the turbines and noise sensitive receivers included in the noise analysis, and include for each turbine and each noise sensitive receiver an identifying name or number.

IDENTIFICATION OF RECEIVERS AND TURBINES

Please see Table RAI#3 X5.

Shepherds Flat Wind Farm Noise Sensitive Properties Within One Mile of the Facility Boundary

	Residence Location							Nearest Turbine Location						
Residence	degrees	minutes	seconds	degrees	minutes	seconds	elevation(M)	degrees	minutes	seconds	degrees	minutes	seconds	Distance (miles)
1	45	46	21 N	120	2	1 W	156	45	46	22 N	120	2	27 W	0.35514
2	45	44	51 N	120	0	43 W	83	45	44	59 N	120	1	30 W	0.648946
3	45	44	28 N	120	1	48 W	154	45	44	27 N	120	2	25 W	0.512957
4	45	44	27 N	120	1	2 W	174	45	44	27 N	120	2	25 W	1.128472
5	45	43	59 N	120	1	37 W	113	45	44	2 N	120	2	24 W	0.629795
6	45	43	57 N	120	1	57 W	107	45	44	2 N	120	2	24 W	0.37035
7	45	43	53 N	120	1	59 W	119	45	44	2 N	120	2	24 W	0.384823
8	45	43	47 N	120	2	19 W	106	45	44	2 N	120	2	24 W	0.308397
9	45	43	45 N	120	2	12 W	111	45	44	2 N	120	2	24 W	0.383242
10	45	42	53 N	120	1	52 W	138	45	42	49 N	120	2	23 W	0.429502
11	45	37	8 N	119	59	58 W	315	45	37	6 N	119	59	57 W	0.043403
12	45	37	8 N	119	59	56 W	312	45	37	6 N	119	59	57 W	0.0279
13	45	37	7 N	119	57	26 W	188	45	37	7 N	119	57	52 W	0.366951
14	45	37	7 N	119	59	58 W	316	45	37	6 N	119	59	57 W	0.0279
15	45	35	46 N	120	4	57 W	233	45	34	40 N	120	4	13 W	1.373928
16	45	37	5 N	119	59	58 W	314	Residence is within the site boundary						
17	45	35	44 N	120	3	16 W	233	45	35	44 N	120	3	15 W	1.36522
18	45	35	19 N	120	5	28 W	210	45	34	40 N	120	4	13 W	1.247149
19	45	35	1 N	119	56	34 W	221	45	35	1 N	119	57	42 W	0.923304
20	45	34	42 N	120	1	12 W	301	Residence is within the site boundary						
21	45	34	51 N	119	56	35 W	218	45	34	30 N	119	57	10 W	0.61505
22	45	33	52 N	120	4	47 W	237	45	33	51 N	120	3	35 W	0.982481
23	45	34	0 N	119	56	8 W	231	45	33	50 N	119	56	19 W	0.237596
24	45	33	35 N	119	55	49 W	234	45	33	25 N	119	55	59 W	0.23549
25	45	33	26 N	119	55	19 W	238	45	33	11 N	119	55	45 W	0.435049
26	45	33	13 N	119	55	15 W	238	45	33	11 N	119	55	45 W	0.411887
27	45	33	11 N	119	57	15 W	355	45	33	13 N	119	57	14 W	0.036378
28	45	33	3 N	119	59	55 W	310	45	33	1 N	119	57	58 W	1.598011
29	45	33	2 N	119	57	27 W	337	Residence is within the site boundary						
30	45	32	54 N	119	59	2 W	400	45	32	54 N	119	57	59 W	0.865744
31	45	32	49 N	119	55	16 W	239	45	33	11 N	119	55	45 W	0.589022
32	45	32	23 N	119	55	25 W	319	45	32	42	119	57	2 W	1.348405
								Substation Locations						
								45	43	60 N	120	5	0 W	
								45	35	49 N	119	59	4 W	

RAI#3, X6: NOISE

Figures X1a and X2b do not depict the proposed substations. Please revise the figures to include the locations of the substations, including coordinates.

<u>SUBSTATION LOCATIONS</u>

Please see Figures RAI# 3 X1a and RAI#3 X1b. Substation coordinates may be found in the table included in Applicant's response to RAI#3 X5.

Figure RAI#3 X1a

Noise Contours - 192 Wind Turbines at 109.2 dB LWA

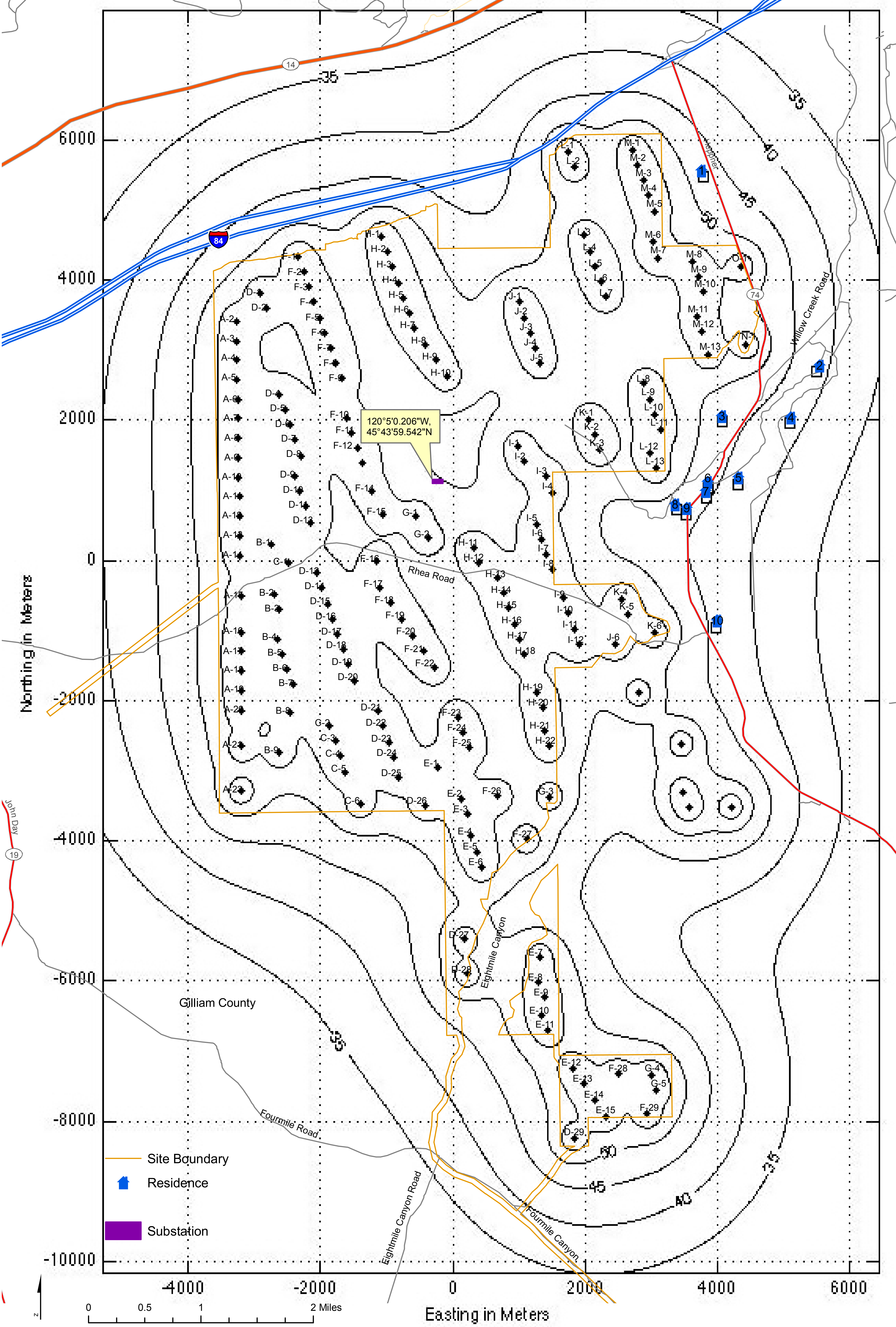
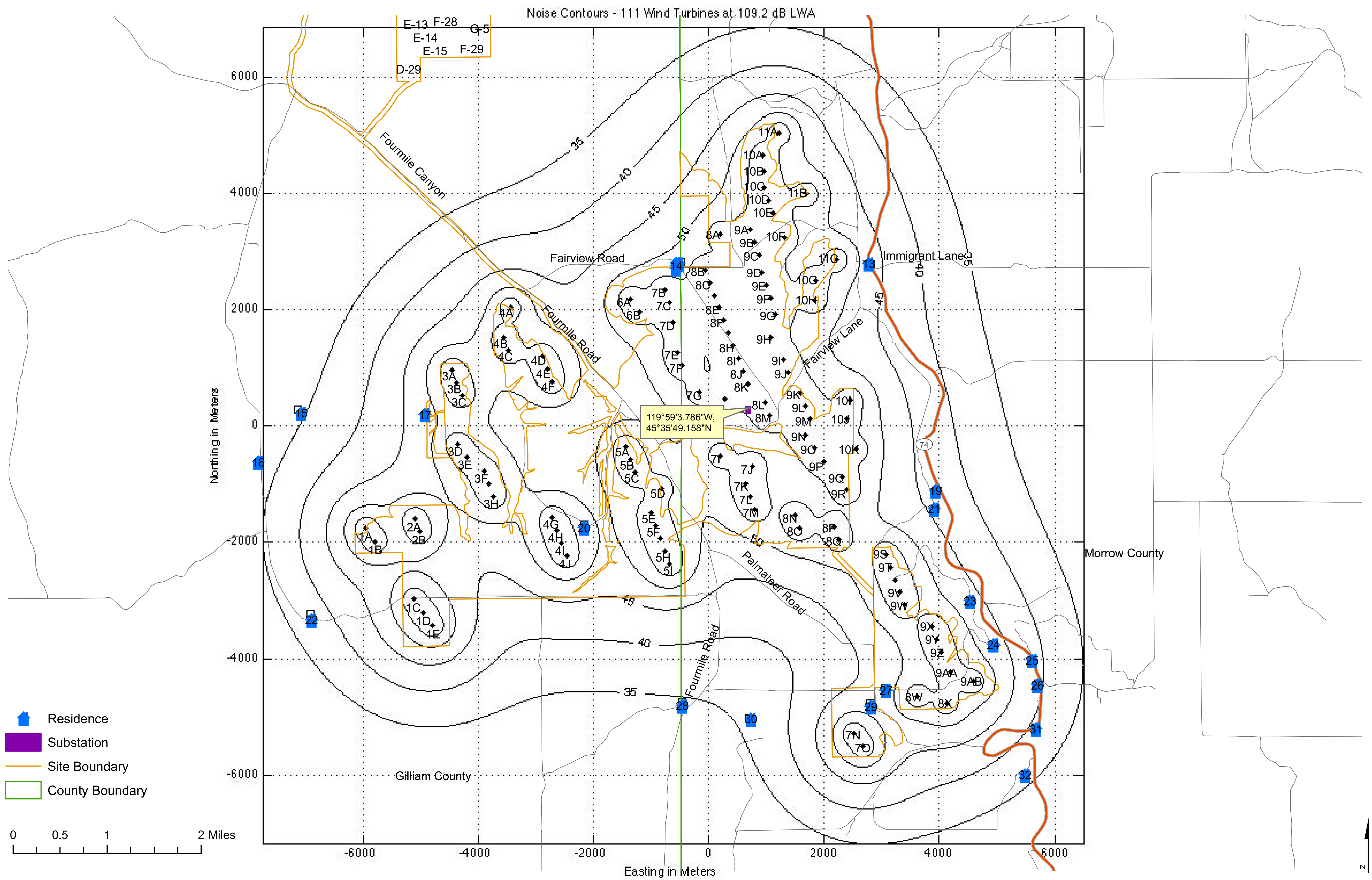


Figure RAI#3 X1b



RAI#3, X7: NOISE

Figures X1a and X1b depict the general locations of noise sensitive receivers and wind turbines by means of X-Y coordinates. These figures would more effectively reflect site and surrounding attributes if they were transferred to USGS quadrangle maps. Please provide noise contour figures that show the precise locations of noise sensitive receivers, turbines and substations relative to surrounding features and the site boundary. Please label the major features (for example, county boundary line, major roads, Eightmile Canyon, Fourmile Canyon).

NOISE CONTOUR FIGURES

USGS quadrangle maps depicting the site and surrounding attributes have been provided by applicant in Exhibit C. Figures X1a and X1b depict precise (GPS based) locations of noise sensitive receivers and wind turbines—precision which would be lost were noise contours to be drawn on USGS quadrangle maps.

Applicant has layered additional major features onto its noise contour analysis. Please see Figures RAI#3 X1a and RAI#3 X1b.

RAI#3, X8: NOISE

Please provide sound levels that will be associated with the substations and ensure that the noise from the substations is included in the calculation of overall noise levels at each noise sensitive receiver.

SUBSTATION NOISE

Project substations have added to Figures RAI#3 X1a and RAI#3 X1b. Applicant notes that the northern substation is located 2.04 miles from the nearest noise sensitive receiver, and the southern substation is located 1.55 miles from the nearest noise sensitive receiver—to far in each case to impact those residences.

RAI#3, X9: NOISE

After completion of the corrected noise analysis, please provide a table showing the predicted total sound pressure level at each noise sensitive receiver and the contribution from each turbine and substation included in the calculation to the total sound pressure level predicted at each noise sensitive receiver.

PREDICTED TOTAL SOUND PRESSURE

North Turbines and Residences:

Residence Number:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
D-29	-4623	5073151	-25.1	-15.9	-11.5	-12.5	-8.1	-7.5	-6.9	-5.8	-5.6	0.7
E-15	-4150	5073462	-23.6	-14.1	-9.9	-10.7	-6.4	-5.8	-5.2	-4.2	-4.0	2.5
F-29	-3517	5073490	-23.3	-13.3	-9.4	-9.9	-5.8	-5.3	-4.8	-3.8	-3.6	3.2
E-14	-4314	5073691	-22.8	-13.4	-9.1	-10.0	-5.6	-5.0	-4.4	-3.3	-3.1	3.4
G- 5	-3381	5073833	-21.9	-11.8	-7.9	-8.4	-4.3	-3.8	-3.2	-2.3	-2.1	4.8
E-13	-4478	5073919	-22.0	-12.7	-8.3	-9.3	-4.9	-4.1	-3.6	-2.4	-2.3	4.1
G- 4	-3462	5074051	-21.1	-11.0	-7.0	-7.6	-3.4	-2.9	-2.3	-1.4	-1.2	5.8
F-28	-3960	5074059	-21.2	-11.5	-7.3	-8.1	-3.8	-3.1	-2.6	-1.5	-1.3	5.4
E-12	-4642	5074148	-21.2	-12.1	-7.5	-8.6	-4.1	-3.4	-2.8	-1.6	-1.5	4.9
E-11	-5020	5074681	-19.4	-10.6	-5.8	-7.1	-2.5	-1.6	-1.0	0.3	0.4	6.6
E-10	-5101	5074899	-18.6	-9.9	-5.0	-6.4	-1.7	-0.8	-0.2	1.1	1.2	7.3
E- 9	-5071	5075154	-17.5	-8.9	-3.9	-5.3	-0.6	0.3	0.9	2.3	2.3	8.5
E- 8	-5152	5075372	-16.8	-8.2	-3.1	-4.6	0.1	1.1	1.7	3.1	3.2	9.2
D-28	-6235	5075487	-17.4	-10.0	-4.4	-6.4	-1.5	-0.4	0.2	1.8	1.8	6.9
E- 7	-5143	5075731	-15.3	-6.9	-1.6	-3.2	1.6	2.6	3.2	4.7	4.7	10.8
D-27	-6265	5075984	-15.6	-8.3	-2.6	-4.7	0.3	1.5	2.1	3.8	3.7	8.7
E- 6	-6014	5077019	-11.2	-4.1	1.9	-0.4	4.7	6.1	6.7	8.5	8.4	13.2
E- 5	-6095	5077238	-10.5	-3.5	2.6	0.1	5.3	6.8	7.4	9.2	9.1	13.7
F-27	-5335	5077409	-8.8	-1.0	4.9	2.7	8.0	9.3	10.0	11.8	11.7	17.1
E- 4	-6177	5077456	-9.7	-3.0	3.2	0.7	5.9	7.4	8.0	9.9	9.7	14.1
E- 3	-6235	5077779	-8.6	-2.1	4.3	1.6	6.9	8.4	9.0	11.0	10.8	14.8
D-26	-6880	5077901	-9.2	-3.5	3.0	0.0	5.2	6.9	7.4	9.5	9.2	12.4
C- 6	-7855	5077918	-11.0	-6.5	0.1	-3.1	2.0	3.7	4.2	6.3	5.9	8.2
E- 2	-6317	5077997	-7.9	-1.6	4.9	2.1	7.4	9.0	9.6	11.6	11.4	15.1
G- 3	-4984	5078022	-6.0	2.1	8.2	5.9	11.4	12.8	13.4	15.3	15.3	20.9
F-26	-5780	5078037	-6.9	0.0	6.4	3.8	9.2	10.7	11.4	13.4	13.2	17.6
A-22	-9650	5078100	-14.5	-11.9	-5.3	-8.8	-4.1	-2.3	-1.9	0.2	-0.2	0.9
D-25	-7272	5078304	-8.4	-3.5	3.2	0.0	5.1	6.9	7.4	9.6	9.2	11.6
C- 5	-8069	5078376	-9.8	-5.9	0.8	-2.6	2.4	4.2	4.7	6.9	6.4	8.1
E- 1	-6682	5078433	-6.8	-1.3	5.4	2.3	7.6	9.3	9.9	12.1	11.7	14.5
D-24	-7345	5078588	-7.5	-3.0	3.8	0.5	5.7	7.5	8.0	10.2	9.8	11.8
C- 4	-8151	5078595	-9.2	-5.6	1.2	-2.3	2.7	4.5	5.0	7.1	6.7	8.1

Residence Number:			1	2	3	4	5	6	7	8	9	10
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
B- 9	-9073	5078654	-11.3	-8.6	-1.9	-5.5	-0.7	1.1	1.6	3.7	3.2	4.1
F-25	-6215	5078714	-4.9	1.0	7.8	4.7	10.1	11.9	12.5	14.7	14.4	17.4
A-21	-9645	5078739	-12.5	-10.4	-3.7	-7.4	-2.8	-0.9	-0.5	1.6	1.1	1.7
H-22	-4995	5078740	-3.0	4.7	11.3	8.6	14.3	15.9	16.6	18.7	18.6	23.6
D-23	-7428	5078806	-6.9	-2.6	4.2	0.8	5.9	7.8	8.3	10.5	10.1	11.8
C- 3	-8232	5078813	-8.7	-5.4	1.5	-2.1	2.9	4.7	5.2	7.4	6.9	8.0
F-24	-6296	5078933	-4.2	1.4	8.4	5.1	10.6	12.4	13.0	15.3	14.9	17.5
D-22	-7510	5079025	-6.3	-2.3	4.6	1.1	6.2	8.1	8.6	10.8	10.4	11.7
C- 2	-8314	5079032	-8.1	-5.1	1.8	-1.8	3.0	4.9	5.4	7.6	7.1	7.9
F-23	-6378	5079151	-3.5	1.8	8.9	5.5	10.9	12.8	13.4	15.7	15.3	17.4
B- 8	-8905	5079217	-9.0	-6.8	0.1	-3.6	1.1	3.0	3.4	5.6	5.1	5.4
D-21	-7591	5079243	-5.7	-2.0	5.0	1.3	6.4	8.3	8.8	11.1	10.6	11.6
A-20	-9637	5079246	-10.9	-9.4	-2.6	-6.4	-1.8	0.1	0.5	2.6	2.1	2.2
A-19	-9636	5079535	-10.0	-8.8	-2.0	-5.8	-1.3	0.6	1.0	3.1	2.6	2.4
B- 7	-8866	5079614	-7.6	-5.8	1.1	-2.7	2.0	3.9	4.3	6.5	6.0	5.9
D-20	-7943	5079683	-5.0	-2.2	4.8	1.0	5.9	7.9	8.3	10.6	10.1	10.3
A-18	-9642	5079814	-9.2	-8.3	-1.4	-5.4	-0.9	1.0	1.4	3.5	3.0	2.5
B- 6	-8948	5079833	-7.2	-5.6	1.3	-2.6	2.0	4.0	4.3	6.6	6.0	5.6
F-22	-6737	5079868	-1.5	2.6	9.9	6.1	11.4	13.5	14.0	16.5	15.9	16.4
D-19	-8025	5079902	-4.5	-2.0	5.1	1.1	6.0	8.0	8.4	10.7	10.2	10.0
B- 5	-9029	5080051	-6.7	-5.5	1.4	-2.6	2.0	4.0	4.3	6.5	6.0	5.3
A-17	-9647	5080093	-8.4	-7.8	-0.9	-4.9	-0.5	1.4	1.8	3.9	3.3	2.5
F-21	-6902	5080097	-1.0	2.6	10.0	6.0	11.2	13.3	13.8	16.3	15.7	15.7
D-18	-8107	5080120	-3.9	-1.9	5.3	1.2	6.0	8.1	8.5	10.8	10.2	9.7
B- 4	-9112	5080270	-6.3	-5.4	1.5	-2.5	2.0	3.9	4.3	6.5	5.9	5.0
F-20	-7066	5080325	-0.5	2.5	10.0	5.9	11.0	13.1	13.6	16.0	15.4	14.9
D-17	-8188	5080339	-3.4	-1.7	5.4	1.3	6.0	8.1	8.5	10.8	10.2	9.3
A-16	-9653	5080372	-7.6	-7.3	-0.5	-4.5	-0.2	1.7	2.1	4.2	3.6	2.5
F-19	-7230	5080554	-0.1	2.4	9.9	5.7	10.7	12.8	13.2	15.7	15.1	14.1
D-16	-8270	5080557	-3.0	-1.6	5.5	1.4	6.0	8.1	8.4	10.7	10.1	8.9
B- 3	-9072	5080685	-4.9	-4.6	2.4	-1.7	2.6	4.7	5.0	7.2	6.5	5.2
D-15	-8352	5080776	-2.5	-1.6	5.6	1.4	5.9	8.0	8.3	10.6	10.0	8.5
F-18	-7394	5080782	0.2	2.3	9.7	5.4	10.3	12.4	12.8	15.3	14.6	13.2
A-15	-9654	5080878	-6.2	-6.6	0.3	-3.9	0.3	2.3	2.6	4.7	4.1	2.5
B- 2	-9154	5080903	-4.6	-4.5	2.4	-1.8	2.5	4.5	4.8	7.0	6.4	4.7
D-14	-8434	5080994	-2.1	-1.5	5.6	1.4	5.8	7.9	8.2	10.5	9.8	8.0
F-17	-7559	5081011	0.6	2.1	9.5	5.1	9.8	12.0	12.4	14.8	14.1	12.3
D-13	-8516	5081213	-1.6	-1.5	5.6	1.3	5.6	7.7	8.0	10.3	9.6	7.5
C- 1	-8941	5081351	-2.6	-3.0	4.0	-0.3	3.8	5.9	6.2	8.4	7.7	5.5
F-16	-7597	5081373	1.7	2.5	10.0	5.5	10.1	12.2	12.6	14.9	14.2	11.8
A-14	-9662	5081460	-4.7	-5.8	1.0	-3.3	0.7	2.7	3.0	5.1	4.4	2.2
B- 1	-9204	5081623	-2.7	-3.7	3.2	-1.2	2.8	4.9	5.1	7.3	6.6	4.1
G- 2	-6831	5081703	5.1	6.4	14.1	9.4	14.1	16.4	16.7	19.3	18.4	15.2
A-13	-9668	5081738	-4.0	-5.5	1.3	-3.1	0.8	2.8	3.1	5.1	4.4	2.0
D-12	-8600	5081937	0.2	-0.9	6.2	1.7	5.7	7.8	8.1	10.2	9.5	6.5

Residence Number:			1	2	3	4	5	6	7	8	9	10
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
A-12	-9673	5082017	-3.3	-5.2	1.5	-2.9	0.9	2.9	3.1	5.2	4.5	1.7
G- 1	-7004	5082020	5.7	6.1	13.8	9.0	13.4	15.7	16.0	18.4	17.6	13.9
F-15	-7508	5082058	4.2	4.0	11.4	6.7	10.9	13.2	13.4	15.7	14.9	11.4
D-11	-8682	5082156	0.5	-1.0	6.0	1.5	5.4	7.5	7.7	9.8	9.1	5.9
A-11	-9679	5082296	-2.7	-5.0	1.7	-2.7	0.9	2.9	3.1	5.1	4.4	1.4
D-10	-8764	5082374	0.8	-1.1	5.8	1.3	5.1	7.1	7.3	9.4	8.7	5.3
F-14	-7688	5082379	4.6	3.6	10.9	6.1	10.1	12.3	12.5	14.7	13.9	10.1
A-10	-9684	5082576	-2.0	-4.8	1.8	-2.6	0.9	2.9	3.1	5.0	4.3	1.0
D- 9	-8846	5082593	1.1	-1.2	5.6	1.1	4.7	6.7	6.9	8.9	8.2	4.6
F-13	-7816	5082776	5.3	3.4	10.6	5.8	9.5	11.6	11.8	13.9	13.1	8.8
A- 9	-9690	5082854	-1.4	-4.7	1.9	-2.5	0.9	2.8	3.0	4.9	4.2	0.6
D- 8	-8747	5082888	2.2	-0.6	6.2	1.6	5.1	7.1	7.3	9.3	8.5	4.6
F-12	-7899	5082995	5.6	3.2	10.2	5.5	9.0	11.1	11.3	13.3	12.5	8.0
D- 7	-8829	5083107	2.4	-0.8	5.9	1.3	4.6	6.6	6.8	8.7	7.9	3.8
A- 8	-9694	5083133	-0.9	-4.5	2.0	-2.5	0.8	2.7	2.8	4.7	4.0	0.2
F-11	-7980	5083213	5.9	3.0	9.9	5.1	8.5	10.6	10.7	12.7	11.9	7.2
D- 6	-8911	5083325	2.6	-1.1	5.5	0.9	4.2	6.1	6.3	8.1	7.4	3.1
A- 7	-9700	5083412	-0.3	-4.4	1.9	-2.5	0.6	2.5	2.6	4.5	3.7	-0.3
F-10	-8062	5083432	6.2	2.7	9.5	4.7	8.0	10.0	10.1	12.0	11.2	6.4
D- 5	-8993	5083544	2.7	-1.4	5.1	0.6	3.7	5.6	5.7	7.5	6.8	2.4
A- 6	-9705	5083691	0.2	-4.4	1.9	-2.6	0.4	2.3	2.4	4.2	3.4	-0.8
D- 4	-9074	5083761	2.9	-1.7	4.7	0.2	3.1	5.1	5.1	6.9	6.1	1.6
A- 5	-9711	5083970	0.6	-4.4	1.8	-2.7	0.2	2.0	2.1	3.8	3.1	-1.3
F- 9	-8136	5083983	7.2	2.5	9.0	4.3	7.1	9.1	9.1	10.9	10.0	4.8
H-10	-6541	5084019	13.8	9.9	17.0	11.8	14.6	16.6	16.6	18.3	17.4	10.8
F- 8	-8218	5084201	7.3	2.1	8.5	3.8	6.5	8.4	8.4	10.1	9.3	4.0
H- 9	-6705	5084248	13.8	9.1	15.9	10.8	13.4	15.3	15.3	16.9	16.0	9.4
A- 4	-9716	5084249	1.1	-4.4	1.6	-2.8	-0.1	1.7	1.8	3.4	2.7	-1.9
F- 7	-8300	5084420	7.3	1.7	7.9	3.3	5.8	7.7	7.7	9.3	8.5	3.1
H- 8	-6870	5084476	13.7	8.3	14.8	9.8	12.2	14.1	14.0	15.5	14.7	8.1
A- 3	-9722	5084527	1.5	-4.5	1.4	-3.0	-0.4	1.4	1.4	3.0	2.3	-2.5
F- 6	-8382	5084638	7.4	1.3	7.4	2.8	5.2	7.0	7.0	8.5	7.7	2.2
H- 7	-7035	5084704	13.5	7.4	13.7	8.8	11.0	12.8	12.7	14.2	13.3	6.8
A- 2	-9727	5084807	1.8	-4.6	1.2	-3.2	-0.8	1.0	1.0	2.5	1.8	-3.1
F- 5	-8463	5084857	7.4	0.9	6.8	2.2	4.5	6.3	6.2	7.7	6.9	1.4
H- 6	-7118	5084920	13.6	6.9	12.9	8.2	10.2	12.0	11.8	13.2	12.4	5.9
D- 2	-9269	5084986	4.0	-2.7	3.0	-1.4	0.9	2.6	2.6	4.1	3.4	-1.8
F- 4	-8546	5085075	7.3	0.4	6.1	1.6	3.8	5.5	5.5	6.9	6.1	0.5
J- 1	-5453	5085077	22.0	14.8	20.8	15.7	16.9	18.5	18.2	19.1	18.3	10.3
H- 5	-7200	5085138	13.6	6.4	12.2	7.5	9.3	11.1	10.9	12.2	11.4	4.9
D- 1	-9352	5085205	3.9	-3.2	2.4	-1.9	0.2	1.9	1.9	3.3	2.6	-2.7
F- 3	-8628	5085294	7.2	-0.1	5.5	1.0	3.0	4.8	4.7	6.1	5.3	-0.4
H- 4	-7282	5085357	13.6	5.8	11.4	6.8	8.5	10.2	10.0	11.3	10.5	3.9
F- 2	-8709	5085512	7.1	-0.6	4.8	0.4	2.3	4.0	3.9	5.2	4.5	-1.2
H- 3	-7365	5085575	13.5	5.2	10.6	6.1	7.6	9.3	9.1	10.3	9.5	2.9

Residence Number:			1	2	3	4	5	6	7	8	9	10
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
F- 1	-8791	5085731	6.9	-1.1	4.2	-0.2	1.6	3.2	3.1	4.4	3.7	-2.1
H- 2	-7446	5085793	13.4	4.6	9.8	5.4	6.8	8.4	8.2	9.3	8.6	2.0
H- 1	-7528	5086012	13.2	4.0	9.0	4.7	5.9	7.4	7.3	8.3	7.6	1.0
E-14A	-4232	5073576	-23.2	-13.7	-9.5	-10.3	-6.0	-5.4	-4.8	-3.7	-3.6	3.0
E-13A	-4396	5073805	-22.4	-13.1	-8.7	-9.6	-5.2	-4.6	-4.0	-2.9	-2.7	3.8
G- 4A	-3422	5073942	-21.5	-11.4	-7.5	-8.0	-3.8	-3.3	-2.8	-1.9	-1.6	5.3
E-12A	-4560	5074033	-21.6	-12.4	-7.9	-8.9	-4.5	-3.8	-3.2	-2.0	-1.9	4.5
D-24A	-7309	5078446	-8.0	-3.3	3.5	0.2	5.4	7.2	7.7	9.9	9.5	11.7
C- 4A	-8110	5078486	-9.5	-5.8	1.0	-2.4	2.5	4.3	4.8	7.0	6.6	8.1
D-23A	-7386	5078697	-7.2	-2.8	4.0	0.7	5.8	7.6	8.1	10.4	9.9	11.8
C- 3A	-8192	5078704	-9.0	-5.5	1.3	-2.2	2.8	4.6	5.1	7.3	6.8	8.1
D-22A	-7469	5078915	-6.6	-2.5	4.4	0.9	6.1	7.9	8.4	10.7	10.2	11.7
C- 2A	-8273	5078923	-8.4	-5.2	1.6	-2.0	3.0	4.8	5.3	7.5	7.0	8.0
D-21A	-7550	5079134	-6.0	-2.2	4.8	1.2	6.3	8.2	8.7	11.0	10.5	11.6
A-19A	-9637	5079391	-10.5	-9.1	-2.3	-6.1	-1.5	0.3	0.7	2.9	2.3	2.3
B- 7A	-8885	5079416	-8.3	-6.3	0.6	-3.2	1.5	3.4	3.9	6.1	5.5	5.7
D-20B	-7767	5079463	-5.3	-2.1	4.9	1.2	6.2	8.1	8.6	10.9	10.4	10.9
A-18A	-9639	5079675	-9.6	-8.5	-1.7	-5.6	-1.1	0.8	1.2	3.3	2.8	2.4
B- 6A	-8907	5079723	-7.4	-5.7	1.2	-2.7	2.0	3.9	4.3	6.5	6.0	5.8
A-17A	-9645	5079954	-8.8	-8.0	-1.2	-5.2	-0.7	1.2	1.6	3.7	3.1	2.5
D-18A	-8066	5080011	-4.2	-2.0	5.2	1.2	6.0	8.0	8.5	10.8	10.2	9.8
D-17A	-8148	5080230	-3.7	-1.8	5.3	1.3	6.0	8.1	8.5	10.8	10.2	9.5
A-16B	-9650	5080232	-8.0	-7.6	-0.7	-4.7	-0.4	1.6	1.9	4.1	3.5	2.5
D-16A	-8229	5080448	-3.2	-1.7	5.5	1.4	6.0	8.1	8.5	10.8	10.1	9.1
D-15A	-8311	5080667	-2.7	-1.6	5.6	1.4	6.0	8.0	8.4	10.7	10.0	8.7
D-14A	-8393	5080885	-2.3	-1.5	5.6	1.4	5.9	7.9	8.3	10.6	9.9	8.3
D-13A	-8475	5081104	-1.8	-1.5	5.6	1.3	5.7	7.8	8.1	10.4	9.7	7.8
A-13A	-9665	5081599	-4.3	-5.7	1.1	-3.2	0.8	2.8	3.0	5.1	4.4	2.1
A-12A	-9671	5081877	-3.6	-5.4	1.4	-3.0	0.9	2.9	3.1	5.2	4.5	1.8
D-11A	-8641	5082047	0.4	-0.9	6.1	1.6	5.6	7.7	7.9	10.0	9.3	6.2
A-11A	-9676	5082157	-3.0	-5.1	1.6	-2.8	0.9	2.9	3.1	5.2	4.4	1.5
D-10A	-8723	5082265	0.7	-1.0	5.9	1.4	5.3	7.3	7.5	9.6	8.9	5.6
A-10A	-9682	5082436	-2.3	-4.9	1.8	-2.7	0.9	2.9	3.1	5.1	4.4	1.2
D- 9A	-8805	5082484	1.0	-1.2	5.7	1.2	4.9	6.9	7.1	9.2	8.4	4.9
A- 9A	-9687	5082715	-1.7	-4.7	1.9	-2.6	0.9	2.9	3.0	5.0	4.2	0.8
D- 8A	-8797	5082740	1.6	-0.9	5.9	1.3	4.9	6.9	7.1	9.1	8.3	4.6
A- 8A	-9692	5082994	-1.1	-4.6	1.9	-2.5	0.8	2.8	2.9	4.8	4.1	0.4
D- 7A	-8788	5082997	2.3	-0.7	6.0	1.4	4.9	6.9	7.0	9.0	8.2	4.2
D- 6A	-8870	5083216	2.5	-0.9	5.7	1.1	4.4	6.4	6.5	8.4	7.7	3.5
A- 7A	-9697	5083273	-0.6	-4.5	2.0	-2.5	0.7	2.6	2.7	4.6	3.8	0.0
D- 5A	-8952	5083434	2.7	-1.2	5.3	0.7	3.9	5.9	6.0	7.8	7.1	2.7
A- 6A	-9703	5083552	-0.1	-4.4	1.9	-2.5	0.5	2.4	2.5	4.3	3.6	-0.5
D -4A	-9034	5083652	2.8	-1.5	4.9	0.4	3.4	5.3	5.4	7.2	6.5	2.0
A- 5A	-9708	5083830	0.4	-4.4	1.8	-2.6	0.3	2.2	2.3	4.0	3.3	-1.0
D- 3B	-9115	5083870	2.9	-1.8	4.5	-0.1	2.9	4.8	4.8	6.6	5.8	1.2

Residence Number:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
D- 3A	-9156	5083979	2.9	-2.0	4.3	-0.3	2.6	4.5	4.5	6.3	5.5	0.8
A- 4A	-9713	5084110	0.9	-4.4	1.7	-2.7	0.0	1.9	1.9	3.6	2.9	-1.6
H- 9A	-6623	5084133	13.8	9.5	16.4	11.3	14.0	16.0	15.9	17.6	16.7	10.1
H- 8A	-6788	5084362	13.8	8.7	15.3	10.3	12.8	14.7	14.6	16.2	15.3	8.8
A- 3A	-9719	5084388	1.3	-4.4	1.5	-2.9	-0.3	1.6	1.6	3.2	2.5	-2.2
H- 7A	-6952	5084590	13.6	7.9	14.2	9.3	11.6	13.5	13.4	14.8	14.0	7.5
A- 2A	-9724	5084667	1.6	-4.5	1.3	-3.1	-0.6	1.2	1.2	2.8	2.0	-2.8
H- 6A	-7076	5084812	13.6	7.2	13.3	8.5	10.6	12.4	12.3	13.7	12.9	6.3
A- 1A	-9730	5084946	2.0	-4.6	1.1	-3.3	-1.0	0.8	0.8	2.3	1.5	-3.4
J- 1A	-5412	5084968	21.8	15.1	21.3	16.1	17.5	19.1	18.8	19.7	18.9	10.9
H- 5A	-7159	5085029	13.6	6.7	12.6	7.8	9.8	11.5	11.4	12.7	11.9	5.4
H- 4A	-7241	5085248	13.6	6.1	11.8	7.2	8.9	10.6	10.5	11.7	11.0	4.4
H- 3A	-7323	5085466	13.6	5.5	11.0	6.5	8.1	9.7	9.6	10.8	10.0	3.4
H- 2A	-7405	5085684	13.5	4.9	10.3	5.8	7.2	8.8	8.7	9.8	9.0	2.5
H- 1A	-7487	5085903	13.3	4.3	9.4	5.0	6.3	7.9	7.7	8.8	8.1	1.5
F-28B	-3738	5073774	-22.2	-12.4	-8.3	-9.0	-4.8	-4.2	-3.7	-2.7	-2.5	4.3
E-10A	-5060	5074790	-19.0	-10.3	-5.4	-6.7	-2.1	-1.2	-0.6	0.7	0.8	7.0
E- 9A	-5086	5075027	-18.1	-9.4	-4.4	-5.9	-1.1	-0.2	0.3	1.7	1.8	7.9
E- 8A	-5112	5075263	-17.2	-8.6	-3.5	-5.0	-0.2	0.7	1.3	2.7	2.8	8.9
E- 7A	-5148	5075552	-16.0	-7.5	-2.4	-3.9	0.9	1.9	2.5	3.9	3.9	10.0
E- 5A	-6055	5077128	-10.9	-3.8	2.2	-0.1	5.0	6.4	7.0	8.9	8.7	13.4
E- 4A	-6136	5077347	-10.1	-3.3	2.9	0.4	5.6	7.1	7.7	9.6	9.4	13.9
E- 3A	-6206	5077617	-9.2	-2.5	3.8	1.1	6.4	7.9	8.5	10.5	10.3	14.5
F-26B	-5558	5077723	-7.9	-0.5	5.7	3.3	8.7	10.1	10.7	12.6	12.5	17.4
E- 2A	-6276	5077888	-8.2	-1.8	4.6	1.8	7.1	8.7	9.3	11.3	11.1	15.0
D-25B	-7076	5078102	-8.8	-3.5	3.1	0.0	5.2	6.9	7.4	9.6	9.2	12.0
C- 5B	-7962	5078147	-10.4	-6.2	0.5	-2.8	2.2	4.0	4.5	6.6	6.2	8.2
E- 1B	-6499	5078215	-7.3	-1.4	5.2	2.2	7.5	9.2	9.8	11.9	11.6	14.9
F-25B	-5997	5078376	-5.9	0.6	7.2	4.3	9.7	11.4	12.0	14.1	13.9	17.6
A-21B	-9648	5078420	-13.5	-11.2	-4.5	-8.1	-3.4	-1.6	-1.2	0.9	0.5	1.3
F-24A	-6255	5078824	-4.5	1.2	8.1	4.9	10.4	12.2	12.7	15.0	14.7	17.4
B- 8A	-8989	5078936	-10.1	-7.7	-0.9	-4.6	0.2	2.1	2.5	4.6	4.2	4.8
A-20B	-9641	5078993	-11.7	-9.9	-3.1	-6.9	-2.3	-0.4	0.0	2.1	1.6	1.9
F-23A	-6337	5079042	-3.8	1.6	8.6	5.3	10.7	12.6	13.2	15.5	15.1	17.5
C- 1A	-8356	5079142	-7.9	-5.0	1.9	-1.8	3.1	5.0	5.5	7.7	7.2	7.9
F-22B	-6558	5079510	-2.5	2.3	9.5	5.9	11.2	13.2	13.8	16.2	15.7	17.0
D-19A	-7984	5079793	-4.7	-2.1	5.0	1.1	6.0	8.0	8.4	10.7	10.1	10.1
B- 5A	-8989	5079942	-7.0	-5.6	1.4	-2.6	2.0	4.0	4.3	6.6	6.0	5.5
F-21A	-6819	5079983	-1.2	2.6	10.0	6.1	11.3	13.4	13.9	16.4	15.8	16.1
B- 4A	-9070	5080160	-6.5	-5.5	1.5	-2.5	2.0	4.0	4.3	6.5	5.9	5.2
F-20A	-6984	5080211	-0.8	2.6	10.0	6.0	11.1	13.2	13.7	16.2	15.6	15.3
F-19A	-7148	5080440	-0.3	2.5	9.9	5.8	10.8	13.0	13.4	15.9	15.3	14.5
B- 3A	-9092	5080477	-5.6	-5.0	2.0	-2.1	2.3	4.3	4.7	6.9	6.2	5.1
A-15B	-9654	5080625	-6.9	-6.9	-0.1	-4.2	0.1	2.0	2.4	4.5	3.9	2.5
F-18A	-7312	5080668	0.1	2.4	9.8	5.6	10.5	12.6	13.1	15.5	14.8	13.6

Residence Number:			**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
B- 2A	-9113	5080794	-4.7	-4.5	2.4	-1.8	2.6	4.6	4.9	7.1	6.5	5.0
F-17A	-7476	5080897	0.4	2.2	9.6	5.3	10.1	12.2	12.6	15.0	14.3	12.7
F-16A	-7578	5081192	1.1	2.3	9.7	5.3	10.0	12.1	12.5	14.9	14.2	12.0
D-12B	-8558	5081575	-0.7	-1.1	6.0	1.5	5.7	7.8	8.1	10.3	9.6	7.1
G- 1A	-6918	5081861	5.4	6.2	14.0	9.2	13.8	16.1	16.4	18.9	18.0	14.5
F-14A	-7598	5082218	4.4	3.8	11.2	6.4	10.6	12.8	13.0	15.2	14.4	10.7
F-13A	-7752	5082577	5.0	3.5	10.7	6.0	9.8	12.0	12.2	14.3	13.5	9.4
F-12A	-7858	5082885	5.5	3.3	10.4	5.6	9.3	11.4	11.5	13.6	12.8	8.4
F-11A	-7939	5083104	5.8	3.1	10.1	5.3	8.8	10.9	11.0	13.0	12.2	7.6
F-10A	-8021	5083322	6.0	2.8	9.7	4.9	8.3	10.3	10.4	12.4	11.5	6.8
F- 9A	-8099	5083707	6.7	2.6	9.3	4.5	7.6	9.6	9.6	11.5	10.7	5.6
F- 8A	-8177	5084092	7.2	2.3	8.8	4.0	6.8	8.7	8.8	10.5	9.7	4.4
F- 7A	-8259	5084311	7.3	1.9	8.2	3.5	6.2	8.1	8.1	9.7	8.9	3.5
F- 6A	-8341	5084529	7.4	1.5	7.7	3.0	5.5	7.4	7.3	8.9	8.1	2.7
F- 5A	-8423	5084748	7.4	1.1	7.1	2.5	4.8	6.6	6.6	8.1	7.3	1.8
F- 4A	-8504	5084966	7.4	0.6	6.5	1.9	4.1	5.9	5.9	7.3	6.5	0.9
D- 1A	-9311	5085095	4.0	-2.9	2.7	-1.7	0.5	2.3	2.3	3.7	3.0	-2.3
F- 3A	-8587	5085185	7.3	0.2	5.8	1.3	3.4	5.1	5.1	6.5	5.7	0.1
F- 2A	-8668	5085403	7.2	-0.3	5.2	0.7	2.7	4.4	4.3	5.7	4.9	-0.8
F- 1A	-8750	5085622	7.0	-0.9	4.5	0.1	1.9	3.6	3.5	4.8	4.1	-1.7
F-28C	-3628	5073632	-22.8	-12.8	-8.9	-9.5	-5.3	-4.7	-4.2	-3.2	-3.0	3.8
F-28A	-3849	5073917	-21.7	-12.0	-7.8	-8.5	-4.3	-3.7	-3.1	-2.1	-1.9	4.9
D-27C	-6265	5075612	-17.0	-9.6	-4.0	-6.0	-1.1	0.1	0.6	2.3	2.2	7.3
D-27B	-6265	5075736	-16.5	-9.2	-3.5	-5.6	-0.7	0.5	1.1	2.8	2.7	7.8
D-27A	-6265	5075860	-16.0	-8.7	-3.1	-5.2	-0.2	1.0	1.6	3.3	3.2	8.2
F-26C	-5446	5077566	-8.3	-0.7	5.3	3.0	8.3	9.7	10.3	12.2	12.1	17.3
F-26A	-5669	5077880	-7.4	-0.2	6.1	3.6	8.9	10.4	11.0	13.0	12.9	17.5
D-25C	-6978	5078002	-9.0	-3.5	3.0	0.0	5.2	6.9	7.4	9.5	9.2	12.2
C- 5C	-7908	5078032	-10.7	-6.3	0.3	-2.9	2.1	3.8	4.3	6.4	6.1	8.2
E- 1C	-6408	5078106	-7.6	-1.5	5.0	2.1	7.5	9.1	9.7	11.8	11.5	15.0
D-25A	-7174	5078203	-8.6	-3.5	3.1	0.0	5.2	6.9	7.4	9.6	9.2	11.8
F-25C	-5889	5078206	-6.4	0.3	6.8	4.1	9.5	11.1	11.7	13.8	13.6	17.6
A-21C	-9649	5078260	-14.0	-11.5	-4.9	-8.4	-3.7	-1.9	-1.5	0.6	0.1	1.1
C- 5A	-8016	5078262	-10.1	-6.1	0.6	-2.7	2.3	4.1	4.6	6.7	6.3	8.2
E- 1A	-6591	5078324	-7.1	-1.4	5.3	2.3	7.6	9.3	9.8	12.0	11.7	14.7
F-25A	-6106	5078545	-5.4	0.8	7.5	4.5	10.0	11.7	12.3	14.5	14.2	17.5
A-21A	-9646	5078579	-13.0	-10.8	-4.1	-7.7	-3.1	-1.3	-0.8	1.3	0.8	1.5
A-20C	-9643	5078866	-12.1	-10.2	-3.4	-7.1	-2.5	-0.7	-0.2	1.9	1.4	1.8
A-20A	-9639	5079119	-11.3	-9.6	-2.9	-6.6	-2.0	-0.2	0.2	2.4	1.9	2.1
F-22C	-6468	5079331	-3.0	2.1	9.2	5.7	11.1	13.0	13.6	16.0	15.5	17.3
D-20C	-7679	5079353	-5.5	-2.1	5.0	1.3	6.3	8.2	8.7	11.0	10.5	11.3
D-20A	-7855	5079573	-5.2	-2.2	4.9	1.1	6.1	8.0	8.5	10.8	10.3	10.6
F-22A	-6647	5079689	-2.0	2.5	9.7	6.0	11.4	13.4	13.9	16.3	15.8	16.8
A-15C	-9653	5080498	-7.3	-7.1	-0.3	-4.4	-0.1	1.9	2.2	4.4	3.7	2.5
A-15A	-9654	5080752	-6.6	-6.7	0.1	-4.0	0.2	2.2	2.5	4.6	4.0	2.5

Residence Number:			1	2	3	4	5	6	7	8	9	10
			OASLA									
Turbine	East	North	**30.1**	**25.3**	**31.9**	**27.4**	**31.1**	**33.0**	**33.3**	**35.2**	**34.6**	**34.8**
D-12A	-8579	5081756	-0.2	-1.0	6.1	1.6	5.7	7.8	8.1	10.3	9.5	6.8
F-15A	-7417	5081897	4.0	4.1	11.6	6.9	11.3	13.5	13.8	16.2	15.4	12.1
D- 2H	-9168	5084091	3.1	-2.0	4.2	-0.4	2.4	4.3	4.3	6.0	5.3	0.6
D- 2G	-9181	5084203	3.2	-2.1	4.1	-0.5	2.2	4.1	4.2	5.8	5.1	0.3
D- 2F	-9194	5084315	3.4	-2.2	3.9	-0.6	2.1	3.9	3.9	5.6	4.8	0.0
D- 2E	-9206	5084427	3.5	-2.2	3.8	-0.7	1.9	3.7	3.7	5.4	4.6	-0.3
D- 2D	-9219	5084538	3.6	-2.3	3.7	-0.8	1.7	3.5	3.5	5.1	4.4	-0.6
D- 2C	-9232	5084650	3.7	-2.4	3.5	-1.0	1.5	3.3	3.3	4.9	4.1	-0.9
D- 2B	-9244	5084762	3.8	-2.5	3.4	-1.1	1.3	3.1	3.1	4.6	3.9	-1.2
D- 2A	-9257	5084874	3.9	-2.6	3.2	-1.2	1.1	2.9	2.8	4.4	3.6	-1.5

South Turbines and Residences:

Residence Number:			11	12	14	13	16	15	17	18	20	19
			OASLA									
Turbine	East	North	**36.6**	**36.5**	**36.6**	**32.1**	**36.7**	**36.5**	**33.0**	**35.2**	**35.3**	**39.3**
2B	-4434	5065162	5.9	5.8	6.0	-5.7	6.2	23.9	23.4	-5.4	-5.2	24.8
8O	2149	5065221	12.7	12.8	12.8	14.3	13.1	-5.1	-7.3	27.2	27.8	19.5
2A	-4516	5065381	6.4	6.2	6.5	-5.6	6.6	25.3	24.4	-5.7	-5.6	24.3
8N	2068	5065439	13.8	13.9	14.0	15.3	14.3	-4.6	-6.9	27.0	27.3	19.9
7M	1380	5065553	15.7	15.7	15.8	14.5	16.1	-1.6	-3.9	22.7	23.0	23.9
7L	1299	5065772	16.9	17.0	17.1	15.3	17.4	-1.0	-3.5	22.3	22.4	24.3
7K	1218	5065990	18.2	18.2	18.3	16.1	18.6	-0.5	-3.1	21.9	21.8	24.5
3E	-3620	5066436	13.0	12.8	13.1	-0.1	13.3	23.6	20.2	-1.9	-1.9	28.2
9O	2411	5066594	18.2	18.3	18.3	21.9	18.6	-5.3	-8.1	28.8	28.1	16.9
3D	-3784	5066664	13.1	12.9	13.2	-0.3	13.4	24.9	21.1	-2.7	-2.7	26.4
3C	-3705	5067502	15.9	15.7	16.0	1.3	16.2	24.7	19.8	-2.9	-3.0	23.4
3B	-3787	5067721	16.1	15.9	16.2	1.2	16.4	25.1	19.8	-3.4	-3.6	22.1
4F	-2139	5067737	23.8	23.6	24.0	8.5	24.2	15.7	11.5	3.6	3.3	27.0
3A	-3868	5067939	16.3	16.1	16.4	1.1	16.5	25.3	19.8	-3.9	-4.2	20.9
4E	-2220	5067957	24.4	24.1	24.5	8.4	24.7	16.0	11.6	3.0	2.7	25.4
4D	-2302	5068175	24.8	24.5	24.9	8.4	25.1	16.2	11.7	2.3	2.0	24.0
4C	-2888	5068272	22.0	21.8	22.1	5.8	22.2	19.2	14.2	-0.3	-0.6	22.3
4B	-2970	5068491	22.1	21.9	22.2	5.7	22.3	19.2	14.2	-0.9	-1.3	20.9
4A	-2863	5069007	23.8	23.5	23.8	6.5	23.9	17.6	12.5	-1.3	-1.7	18.4
10A	1525	5071627	28.0	28.2	27.8	26.1	27.5	-6.2	-10.4	5.6	4.4	3.1
11A	1804	5072010	24.9	25.1	24.7	25.4	24.4	-8.0	-12.2	4.6	3.4	1.0
2A1	-4475	5065271	6.1	6.0	6.2	-5.7	6.4	24.6	23.9	-5.6	-5.4	24.5
8N1	2108	5065330	13.2	13.3	13.4	14.8	13.7	-4.8	-7.1	27.1	27.6	19.7
7L1	1340	5065662	16.3	16.4	16.4	14.9	16.8	-1.3	-3.7	22.6	22.7	24.1
7K1	1259	5065881	17.5	17.6	17.7	15.7	18.0	-0.8	-3.3	22.1	22.2	24.4
7J1	1273	5066139	18.8	18.9	19.0	17.0	19.3	-0.7	-3.3	22.1	22.0	23.9
3D1	-3702	5066550	13.1	12.9	13.2	-0.2	13.4	24.2	20.7	-2.3	-2.3	27.3
3B1	-3746	5067612	16.1	15.9	16.1	1.3	16.3	24.9	19.8	-3.1	-3.3	22.8

Residence Number:			11	12	14	13	16	15	17	18	20	19
			OASLA									
Turbine	East	North	**36.6**	**36.5**	**36.6**	**32.1**	**36.7**	**36.5**	**33.0**	**35.2**	**35.3**	**39.3**
3A1	-3827	5067830	16.2	16.0	16.3	1.2	16.4	25.2	19.8	-3.7	-3.9	21.5
4E1	-2179	5067847	24.1	23.9	24.2	8.5	24.5	15.9	11.6	3.3	3.0	26.2
4D1	-2261	5068066	24.6	24.3	24.7	8.4	24.9	16.1	11.7	2.7	2.3	24.7
4C1	-2595	5068223	23.4	23.2	23.5	7.1	23.7	17.7	13.0	1.0	0.7	23.2
4B1	-2929	5068381	22.1	21.8	22.1	5.7	22.3	19.2	14.2	-0.6	-0.9	21.6
10B	1523	5071767	27.3	27.4	27.1	25.4	26.8	-6.4	-10.7	5.1	3.8	2.5
3C2	-3784	5066778	13.5	13.3	13.6	-0.1	13.8	25.0	21.0	-2.7	-2.8	26.0
3C1	-3784	5066892	13.8	13.6	13.9	0.1	14.1	25.1	21.0	-2.8	-2.9	25.6

Residence Number:			22	21	23	24	25	26	27	28	29	30	31
			OASLA										
Turbine	East	North	**29.4**	**33.7**	**25.3**	**21.7**	**20.3**	**29.7**	**29.7**	**29.0**	**29.6**	**18.2**	**16.2**
2B	-4434	5065162	-8.0	28.0	-10.2	-13.1	-13.8	-3.3	10.8	-2.6	5.4	-14.6	-14.9
8O	2149	5065221	22.5	-3.7	18.4	14.6	13.2	23.1	20.2	22.2	21.5	11.1	9.1
2A	-4516	5065381	-8.5	27.4	-10.7	-13.6	-14.4	-3.9	9.9	-3.3	4.6	-15.1	-15.5
8N	2068	5065439	21.6	-3.5	17.4	13.7	12.3	21.7	19.4	20.9	20.4	10.1	8.1
7M	1380	5065553	17.8	-0.7	14.0	10.5	9.1	19.1	20.5	18.6	20.3	7.2	5.5
7L	1299	5065772	16.9	-0.6	13.1	9.6	8.3	17.8	19.5	17.3	19.0	6.3	4.5
7K	1218	5065990	16.0	-0.5	12.2	8.7	7.4	16.6	18.5	16.1	17.8	5.4	3.5
3E	-3620	5066436	-5.7	19.0	-8.4	-11.3	-12.2	-2.3	9.8	-1.9	5.0	-13.3	-14.1
9O	2411	5066594	19.4	-6.2	14.9	11.5	9.8	16.5	13.2	15.4	13.9	7.3	4.8
3D	-3784	5066664	-6.6	18.7	-9.3	-12.3	-13.2	-3.3	8.4	-3.0	3.7	-14.4	-15.2
3C	-3705	5067502	-7.5	14.9	-10.4	-13.3	-14.3	-5.0	5.6	-4.7	1.3	-15.7	-16.7
3B	-3787	5067721	-8.1	14.2	-11.0	-14.0	-15.0	-5.8	4.6	-5.6	0.3	-16.4	-17.4
4F	-2139	5067737	-1.8	9.0	-5.0	-8.0	-9.2	-0.3	8.2	-0.3	4.6	-10.8	-12.1
3A	-3868	5067939	-8.8	13.5	-11.7	-14.7	-15.7	-6.6	3.5	-6.4	-0.6	-17.1	-18.2
4E	-2220	5067957	-2.6	8.5	-5.8	-8.7	-9.9	-1.2	7.1	-1.2	3.6	-11.6	-13.0
4D	-2302	5068175	-3.3	8.0	-6.5	-9.5	-10.7	-2.1	6.0	-2.1	2.5	-12.4	-13.8
4C	-2888	5068272	-5.7	9.5	-8.8	-11.8	-12.9	-4.2	4.5	-4.2	0.8	-14.5	-15.9
4B	-2970	5068491	-6.5	8.8	-9.6	-12.5	-13.7	-5.1	3.4	-5.1	-0.2	-15.3	-16.7
4A	-2863	5069007	-7.2	6.5	-10.4	-13.3	-14.5	-6.3	1.5	-6.4	-1.9	-16.2	-17.7
10A	1525	5071627	-3.0	-14.2	-6.7	-9.0	-10.7	-7.1	-7.5	-8.0	-8.3	-13.3	-16.0
11A	1804	5072010	-4.0	-16.1	-7.7	-9.9	-11.6	-8.4	-9.3	-9.3	-9.9	-14.3	-17.0
2A1	-4475	5065271	-8.2	27.7	-10.5	-13.4	-14.1	-3.6	10.3	-2.9	5.0	-14.8	-15.2
8N1	2108	5065330	22.1	-3.6	17.9	14.2	12.7	22.4	19.8	21.6	21.0	10.6	8.6
7L1	1340	5065662	17.4	-0.7	13.6	10.0	8.7	18.4	20.0	18.0	19.6	6.8	5.0
7K1	1259	5065881	16.5	-0.6	12.7	9.2	7.8	17.2	19.0	16.7	18.4	5.8	4.0
7J1	1273	5066139	15.9	-1.0	12.0	8.6	7.2	16.1	17.6	15.6	17.0	5.1	3.2
3D1	-3702	5066550	-6.2	18.9	-8.8	-11.8	-12.7	-2.8	9.1	-2.4	4.4	-13.8	-14.6
3B1	-3746	5067612	-7.8	14.6	-10.7	-13.6	-14.7	-5.4	5.1	-5.2	0.8	-16.0	-17.1
3A1	-3827	5067830	-8.5	13.9	-11.4	-14.3	-15.4	-6.2	4.0	-6.0	-0.2	-16.7	-17.8
4E1	-2179	5067847	-2.2	8.7	-5.4	-8.4	-9.5	-0.7	7.7	-0.7	4.1	-11.2	-12.5
4D1	-2261	5068066	-2.9	8.3	-6.2	-9.1	-10.3	-1.6	6.6	-1.7	3.1	-12.0	-13.4
4C1	-2595	5068223	-4.5	8.8	-7.7	-10.6	-11.8	-3.2	5.3	-3.2	1.7	-13.5	-14.8
4B1	-2929	5068381	-6.1	9.2	-9.2	-12.2	-13.3	-4.7	4.0	-4.7	0.3	-14.9	-16.3

Residence Number:			22	21	23	24	25	26	27	28	29	30	31
			OASLA										
Turbine	East	North	**29.4**	**33.7**	**25.3**	**21.7**	**20.3**	**29.7**	**29.7**	**29.0**	**29.6**	**18.2**	**16.2**
10B	1523	5071767	-3.5	-14.6	-7.3	-9.5	-11.2	-7.6	-8.1	-8.5	-8.8	-13.9	-16.5
3C2	-3784	5066778	-6.8	18.3	-9.5	-12.4	-13.4	-3.6	8.0	-3.2	3.4	-14.6	-15.4
3C1	-3784	5066892	-6.9	17.8	-9.7	-12.6	-13.6	-3.8	7.6	-3.5	3.0	-14.8	-15.6

RAI#3, X10: NOISE

CSF has requested deferral of the final noise analysis pending determination of the facility layout for each phase of construction. In order for the Department to recommend to the Council that the applicant can meet the noise standard, the applicant must prepare a preliminary site configuration showing that the standard can be met, i.e., that the sound pressure level at each noise sensitive receiver does not exceed allowable limits or, where applicable, that the applicant has received from the occupants of the noise sensitive receiver the appropriate waiver. Please provide a noise analysis for a facility configuration that would meet the noise standard, including noise contour maps and a table showing the predicted total sound pressure level at each noise sensitive receiver and the contribution from each turbine and substation to the total sound pressure level predicted at each noise sensitive receiver.

ALLOWABLE LIMITS

Please see Applicant's response to RAI#3, X9 for tables showing the predicted total sound pressure level at each noise sensitive receiver (residence).

In the Southern Project Area, 6 residences in three locations show predicted total sound pressure levels in excess of the allowable limits but well within the limits allowed with a noise waiver. All of these residences are owned by the project landlords, and all of these landlords have agreed to enter into the appropriate waiver agreement should the final facility configuration produce sound pressure levels which exceed allowable limits.

Please see Figure RAI#3, X1a and Figure RAI#3, X1b for noise contour maps.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Monday, October 29, 2007 11:08 AM
To: 'John White'; 'jflarson@PacificEnergySystems.com'
Cc: 'Carol Pilz Weisskopf'; Kathy
Subject: RE: Conference call for noise

Yes, this is a mess. I've put my comments in your text (>>):

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Monday, October 29, 2007 10:15 AM
To: Patricia Pilz
Cc: kstandlee@acoustechgroup.com; Noiseybw@aol.com; jflarson@pacificenergysystems.com
Subject: Re: Conference call for noise

Pat,
I have attached some questions from Kerrie Standlee to help frame our discussion during the conference call this afternoon.

In addition, I would like to confirm with you the evolution of your responses to the Exhibit X RAIs to make sure that we all have the same understanding. It appears to me (correct me if this is not accurate) that in the responses to the RAI #2 questions, you were trying to demonstrate compliance based on a "worst-case" analysis approach. For example, the response to RAI X1 states that the "worst-case" turbine was used in the analysis and further states that the turbine layout shown in Figures RAI #2 X1a and X1b "placed turbines as close as practical to the site boundaries and these residences."

>>Yes, although it was pretty much the typical layout.

In RAI X6 (RAI #3), we asked that the substations be added to the figures. You did so in Figures RAI #3 X1a and X1b (you also added some geographical reference information, in response to RAI X7) It appears that these figures are otherwise identical to the figures you submitted in response to RAI X1; that is, the turbine layout is intentionally a worst-case layout, placing turbines as close as possible to residences.

>>Yes. We did not have the new analysis done yet, as we did not yet have
>>buy-in on the sound level from Vestas. We produced those maps to add
>>the geographical information requested to help the process along.

In responding to RAI X10, you followed a different approach. Instead of trying to show compliance based on a worst-case layout, you presented a new turbine layout intending to show a configuration that would comply with the noise regulations, using a sound pressure level (SPL) of 111.2 dBA in the analysis.

This was in response to our RAI X2, in which we noted that the analysis must include the uncertainty band of +/- 2 dBA. For the Vestas V-90, this would make the assumed maximum SPL 111.2 instead of 109.2.

>>Yes. Once Vestas agreed, we did the whole thing over again, and
>>produced the tables and other information that was requested.

Figures RAI #3 X1a and X1b Revised present a new layout. For this layout, 75 turbines were moved from the southern project area to the northern project area.

>>Yes. We moved turbines around to produce a layout that complied with
>>the standard as we understood RAI#3, X10.

As Kerrie's questions point out, these layouts do not identify each turbine used in the analysis with a unique identification number.

>>Actually, they do. We did not add every turbine number to the maps
>>because we thought it would be too hard to read. But the numbers are
>>rationally organized, and we thought one could identify each turbine
>>on the map with reference to the turbine numbers in the table.

He also notes that residences 11, 12, 16 and 32 are not shown on the figures.

>>Residences 11, 12, 14 and 16 are in one compound (they are all stacked
>>on each other on the map). We thought that one could see this by the
>>location coordinates.

>>There is no residence 32. On our original location tables and maps, we
>>ended up with a non-existent residence (original residence number 17).
>>We found this error and therefore corrected it in the final tables and
>>maps. There are only 31 residences.

I would add that the residence identifying numbers shown on the revised figures are inconsistent with the residence identifying numbers shown on the original figures RAI #3 X1a and X1b. See, for example residences 18 and 20 on the Revised X1b compared to the original X1b, where the same two houses are identified as 19 and 21.

>>Yes, because we renumbered them when we eliminated 17.

As a result of the differing layouts and different turbine and residence numbering schemes, it is impossible for us to match the data in the tables that you have submitted in response to RAI X5 and X9 with any set of layout figures.

>>The new maps and the X9 tables are consistent. But we did not think to
>>give you a new residence location table. I will format that now and
>>send it to you.

Although I have not taken the time to compare the various X1a/X1b maps with other maps that you have provided — for example the maps showing habitat avoidance areas — my guess is that the noise maps do not show the "typical" layout that you have used elsewhere in the application.

>>No. It was built for noise, but is consistent with habitat avoidance
>>and cultural resources corridors.

Ultimately, we need to craft a noise compliance condition that cross-references a noise-compliant turbine layout. Ideally, that layout would also be compliant with other site certificate conditions (in particular, conditions that will require avoidance of certain kinds of habitat). The condition, for example, might say that the certificate holder "must" build the facility in conformance with the noise-compliant "default" layout (or demonstrate how a different layout would comply with the noise regulations).

>>The condition we propose is that we must demonstrate how our final
>>layout will comply with the noise regulations. Because that is the
>>time we will take actual background noise level readings at the
>>residences and use them instead of the default.

I want to avoid requiring a default layout in the noise condition that, in fact, is unbuildable because of a conflict with the habitat-related conditions (or other conditions that might restrict turbine locations).

>>I'll call you on this as I do not understand.

I had hoped to avoid asking you to produce another set of maps this late in the completeness phase, but I think that is now unavoidable. We should discuss this further in today's conference call or afterward, but we will very likely need to have another set of maps showing a noise-compliant (and otherwise buildable) layout that identifies each turbine and each residence with identifying numbers that can be matched up with the data tables.

>>OK.

Regards,
John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

Comments on Additional Information Sent by Applicant of Shepherds Flat Wind Farm in Response to RAI#3, Section X Questions

1. In RAI#3, X3, the applicant was requested to confirm that the sound level computations had been made using the octave band sound power level data associated with the wind turbines and not just the overall A-weighted sound power level data provided by the manufacturer. In addition, the applicant was asked to confirm that the calculations were made assuming a temperature of 50 degrees F and a relative humidity of 70%.

   The applicant responded in a September 2007 response stating the sound level computations were made using the overall A-weighted sound power level data supplied by the manufacturer instead of the octave band sound power levels. In addition, the applicant stated the analysis was made with the assumption that the atmosphere will provide at least 1 dB of excess attenuation in the overall A-weighted sound level at a receiver for every 1000 feet of distance between the turbines and the receiver. The applicant stated that this approach virtually always produces a result that is within 1 dB or so of that predicted by the more rigorous spectral approach. And the applicant said the result using the overall sound power level is virtually always on the conservative side. While the applicant may very well be correct to conclude that the DEQ noise regulation will be met at all receivers, unless I have the results of the calculations using the spectral data, I will not be able to corroborate that conclusion. I still request that the applicant supply the results of an analysis using octave band frequency sound power level data instead of just the A-weighted overall sound power levels.

2. In RAI#3, X5, the applicant was requested to revise Figures RAI#2 X1a and RAI#2 X1b and show the location of all the turbines and noise sensitive receivers and include for each turbine and noise sensitive receptor, an identifying name or number.

   In September, 2007, in response to RAI#3 X7, the applicant supplied Figure RAI#3 X1a and RAI#3 X1b showing wind turbines with a letter and number identifier (B-1 for instance) and residences with a number identifier. The title to Figure RAI#3 X1a indicated the figure showed the location of 192 wind turbines with 109.2 dB LWA. The title to Figure RAI#3 X1b indicated the figure showed the location of 111 wind turbines with 109.2 LWA. It was noted that Residence 11, 12 and 16 were not included on either of the two figures and it was noted that the positions of some of the turbines within a string were either not shown or listed (for instance turbines A-1, D-3 or 7A were not on identified on either of the figures and there were some turbines shown on Figure RAI#3 X1a where there were no identifying letters or numbers).

   In October, 2007, the applicant submitted Figure RAI#3 X1a (revised) and RAI#3 X1b (revised). While the two figures were similar to the original RAI#3 X1a and RAI#3 X1b, both figures had substantial differences from the original ones. The title of RAI#3 X1a had been changed from 192 wind turbines with 109.2 dB LWA to 267 wind turbines with 111.2 dB LWA and the title of RAI#3 X1b had been changed from 111 wind turbines with 109.2 LWA to 36 wind turbines with 111.2 LWA. In addition, turbine identifiers were shown in the figures for just a few of the turbines in each string and it appears that many turbines have been removed from some of the strings shown in the original figures and inserted among other strings shown in the new figures without turbine identification numbers. Thus it is difficult to know which turbines are which in the revised figures.

In addition to providing the two revised figures in October 2007, the applicant supplied Table RAI#3 X5 to identify the location of 32 residences located within one mile of the facility boundary in terms of degrees, minutes and seconds North and West and the location of the turbine nearest each residence also in terms of degrees, minutes and seconds North and West. It was noted however that, of the 32 residences, the location of residences 11, 12, 16 and 32 were not shown. It was also noted that in Table RAI#3 X5, the location of the turbine nearest residences 16, 20 and 29 were not given. The information in the table indicated the three residences were within the project site boundary but no explanation was given as to why the turbine locations were not given for those residences. Finally, there was no turbine identifier associated with the data shown in Table RAI#3 X5 which would have been very helpful in connecting the data in Table 5 with the data in Figures RAI#3 X1a (revised) and RAI#3 X1b (revised).

Consequently, I will be asking to have each of the turbines and each of the residences identified in Figures RAI#3 X1a and X1b (revised) and I will ask to have the turbine identifiers listed in Table RAI#3 X5.

3. In RAI#3, X8, the applicant was asked to provide the sound levels associated with the substations that would be included in the project. In response, the applicant basically provided a statement saying the substations were located too far from any residences to contribute to the noise at any residence. While this statement may in fact be true, we would still like to have the sound power levels of the transformers included in the record so it will be easier to conduct the final review in the future and so that the public can see all the data that was included in the analysis. I will be asking the applicant to supply the sound data for the record.

4. In RAI#3, X9, the applicant was asked to provide a table showing the predicted total sound pressure level at each receiver and the contribution of each turbine to the overall sound pressure level at each receiver. In October 2007, the applicant supplied a table as requested. However, the layout of the data in the table is so random that it will take a significant amount of time just to verify that the data for all turbines affecting a residence has been included in the table and to get a feel for how much energy is contributed to the exposure at a residence by different strings in the project. The information in the table is used to allow a quick review of the projected noise levels at receivers in the future when the applicant submits

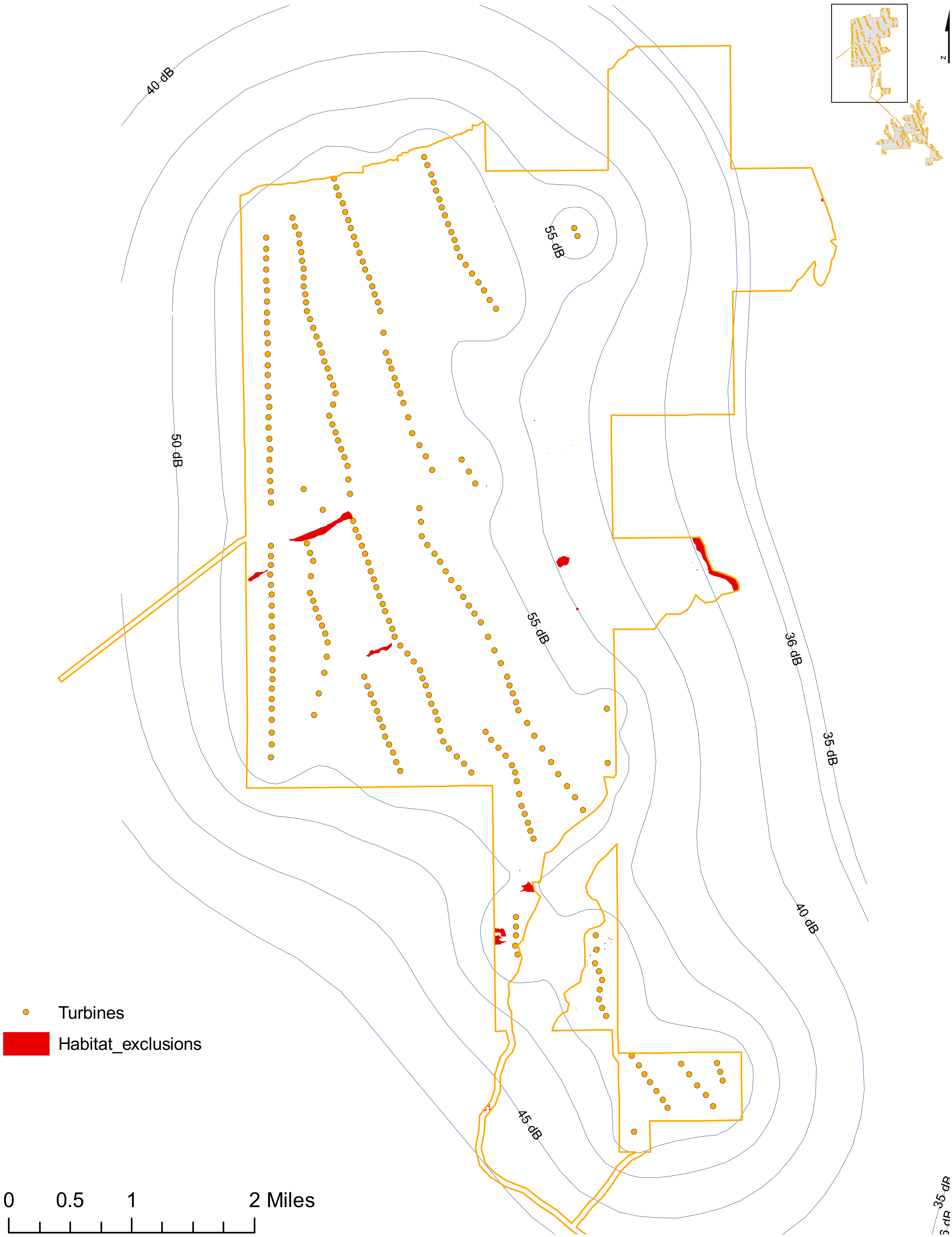
the final layout of the turbines within the requested corridor. I will be asking the applicant to revise the table and present the data in a more organized manner.

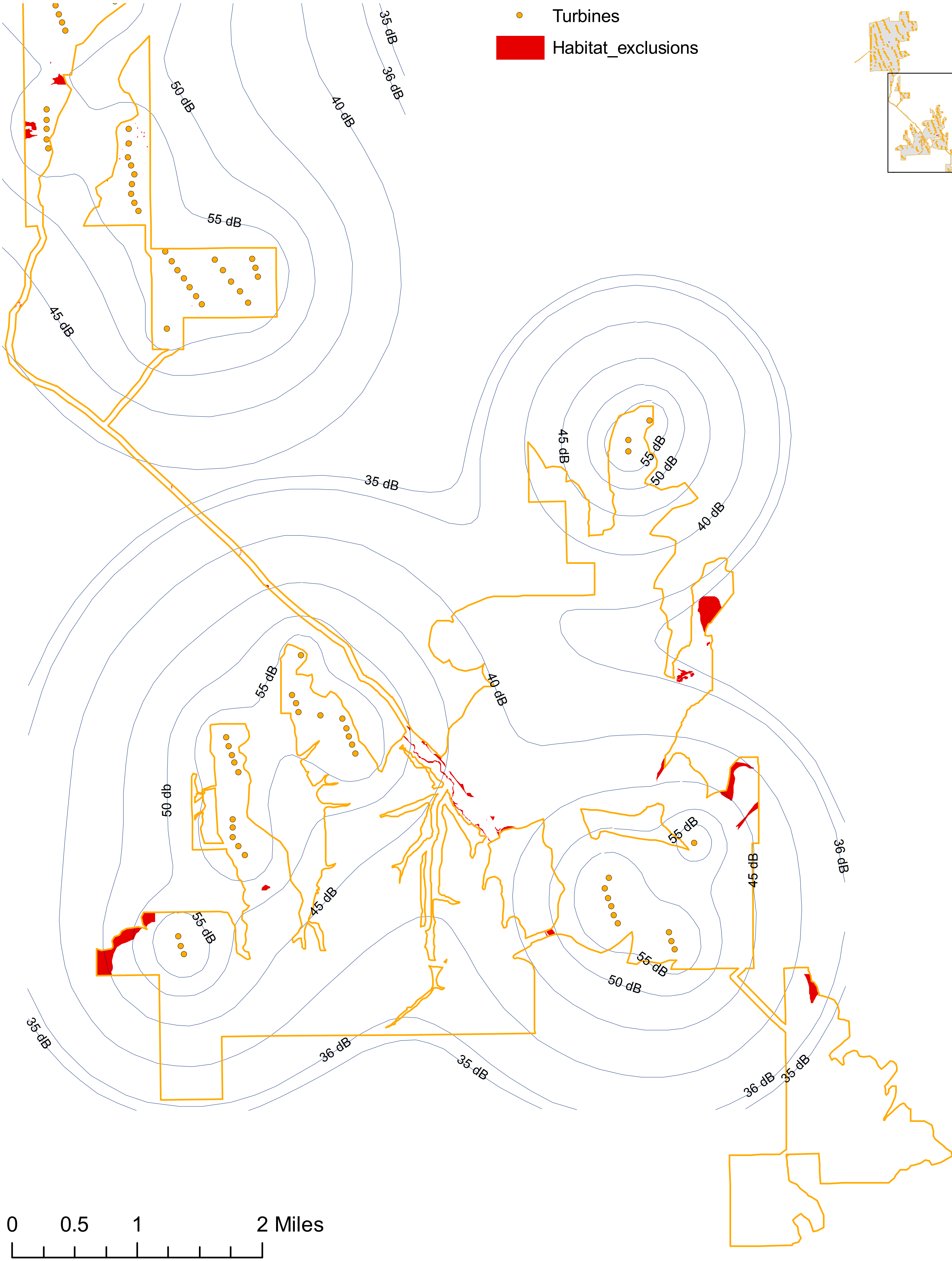
Patricia Pilz

From: Carol Pilz Weisskopf [carol@pilzandco.com]
Sent: Monday, October 29, 2007 5:41 PM
To: John White
Cc: Pat; John Larson
Subject: Noise layout and habitat

Noise S.pdf   Noise N.pdf

I noticed you were concerned that the turbine siting for the noise analysis did not take into consideration our habitat exclusions. I prepared maps showing both, and excluded habitats (including the trees) have all been avoided.


40 dB
55 dB
50 dB
55 dB
36 dB
35 dB
40 dB
45 dB
35 dB
Turbines
Habitat_exclusions
0
0.5
1
2 Miles



Turbines
Habitat_exclusions
35 dB
36 dB
40 dB
45 dB
50 dB
55 dB
50 db
0
0.5
1
2 Miles

Patricia Pilz

From: John White [John.White@state.or.us]
Sent: Thursday, November 08, 2007 2:59 PM
To: kstandlee@acoustechgroup.com
Cc: pat@pilzandco.com
Subject: RE: Noise submittals

Kerrie,
At the time you wrote the message below, you were addressing the "November 4 version of the Shepherds Flat Wind Farm site plan" and the related data (Noise110407.xls). You concluded we had sufficient information for completeness.

Subsequently Carol sent a new configuration that uses 280 Siemens 2.3 MW turbines in the north section and 23 Vestas V90 turbines in the south. She sent a data table (Noise110607.xls) and a contour map of the north area (FigureRAI#3X1c.pdf) via e-mail copied to you on 11/6.

The message from Bruce Walker on 11/6 (earlier in the day) included the octave band SPLs for both the Vestas and the Siemens turbines.

The use of the Siemens turbines appears to reduce the sound levels predicted at residences 1-10 in the north area, compared to the November 4 configuration. While it appears to me that Exhibit X is still complete under this revised configuration, would you please confirm for the record that you agree?

Thanks,

John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us
>>> "Kerrie Standlee" <kstandlee@acoustechgroup.com> 11/06/07 10:35 AM
>>> >>>
John and Pat,

I just got off the phone talking with Bruce Walker and he explained to me that the octave band sound power levels presented in Table B-2 of the application were A-weighted levels and not un-weighted levels. Given that information, the analysis provided by Bruce has sufficiently predicted the maximum noise level at receptors for the layout shown in the November 4 version of the Shepherds Flat Wind Farm site plan. Therefore, I conclude that we have enough information in the record now to find the noise section of the application complete.

Kerrie Standlee
phone 503-646-4420; fax 503-646-3385

-----Original Message-----
From: Noiseybw@aol.com [mailto:Noiseybw@aol.com]
Sent: Tuesday, November 06, 2007 9:14 AM
To: John.White@state.or.us; kstandlee@acoustechgroup.com; Noiseybw@aol.com; Pat@pilzandco.com
Cc: dgrant@caithnessenergy.com; jflarson@PacificEnergySystems.com; carol@pilzandco.com
Subject: Re: Noise submittals

In a message dated 11/6/07 4:57:12 AM, John.White@state.or.us writes:

It appears from Bruce's message that he used the appropriate sound power levels in the calculation, but I will wait for Kerrie to review this. I am a bit puzzled by the comment that the Table B-2 values add up to 109.3. Kerrie found the total to be 107.5, but perhaps he can confer with Bruce to figure out the discrepancy. For the record, we would still like to know the octave band sound power levels that were used as input to the calculation.

John,

I have confirmed that the problem was double-Aweighting. Possibly the tabulated octaves were not explicitly stated to be A-weighted.

The values we used are shown in the atteched exerpt from the Matlab script. The LwAOct values are straight from the manufacturers' ratings. 2 dB was added prior to running as shown. (If you aren't familiar with Matlab, give me a call and I'll walk you through it.)

For Vestas, LwA is 109.3 and LwAA is 107.5. LwA recalculated after adding 2 dB is 111.3 as reported. The extra tenth of a dB compared to the 109.2 dB stated LwA probably results from round-off or the distribution of noise in the octave bands. We just left it is as an added conservatism pad.

For Siemens, LwA is 107.0 and LwAA is 103.9. LwA recalculated after adding 2 dB is 109.0 as reported.

For both cases, the octave band sound powers were preserved through the distance attenuation process and then added for each reception point to recover the overall A-weighted sound level.

```
ORantifudge=2 % Evaluate at upper end of turbine uncertainty range OctFreq=[63 125 250 500
1000 2000 4000 8000] % ISO Octave Bands
Awt=Aweight(OctFreq)
%LwAOct=[92.4 97.4 101.6 104.2 104.3 99.4 93.1 82.9] % Vestas V90 Octaves LwAOct=[86.3
95.3 102.0 102.6 99.0 95.0 90.2 85.4] % Siemens SWT-2.3 Octaves
LwA=10*log10(sum(10.^(LwAOct/10)))
LwAA=10*log10(sum(10.^((LwAOct+Awt)/10)))
LwAOct=LwAOct+ORantifudge*ones(size(LwAOct))
LwA=10*log10(sum(10.^(LwAOct/10)));
TurbPower=10.^((LwAOct-120)/10);
```

Respectfully,

Bruce

Bruce Walker, Ph.D., INCE Bd. Cert.
Channel Islands Acoustics
805-484-8000
FAX 805-482-5075
bwalker@channelislandsacoustics.com
noiseybw@aol.com

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]

Sent: Monday, November 12, 2007 2:18 PM

To: 'John White'; 'jflarson@pacificenergysystems.com'; 'kstandlee@acoustechgroup.com'

Cc: Derrel A. Grant

Subject: Unified noise correspondence

Here is the unified noise information.

Regards,
Pat

Patricia Pilz
Pilz & Co, LLC
656 San Miguel Way
Sacramento, CA 95819
(T) 916-456-7651
(M) 916-803-0602

Noise analysis description

Turbine layout

The submitted noise layout places 280 Siemens SWT-2.3-93 turbines in the north project area and 23 Vestas V90 turbines in the south project area. This layout requires four transformers in the north substation and one transformer in the south substation. Each turbine and residence has been assigned a unique identifying number. The identifying number assigned to each of the 303 turbines and 31 residences shown in the tabulation of sound levels in the attached Excel file (Noise final.xls) is identical to that shown for the corresponding turbine or residence shown in the attached figures (RAI#3X1aRevision3.PDF, RAI#3X1bRevision3.PDF and RAI#3 X1c.PDF). Although all turbine identification numbers have been shown in these figures, please note that residence numbers 11, 12, 14 and 16 in the south project area are all located in the same compound and are therefore not individually discernable at the scale of the map.

The facility as shown in the noise layout is physically buildable. The turbine locations for the noise analysis comply with proposed siting restrictions (habitat avoidance areas and turbine setbacks from the Columbia River bluffs and the Willow Creek Valley). Turbine placement is consistent with string locations shown in the typical layout, and therefore the noise layout does not conflict with the cultural resource survey corridors. The locations of both substations in the noise layout are identical to their locations in the typical layout.

Location data

Noise final.xls shows each location for 303 turbines, five transformers and 31 residences, with latitude and longitude presented in degrees, minutes and seconds using the NAD83 reference datum. Residence locations are to the nearest whole second, and facility component locations shown to the nearest tenth of a second.

Sound level computations

Sound level computations tabulated in Noise final.xls for all turbines were based on the octave band sound power level data associated with each turbine model, as supplied by the corresponding manufacturer and shown in Table B-2 of revised Exhibit B. Although not stated in the table, the Vestas and Siemens data are A-weighted sound levels.

The octave band sound power levels were adjusted to result in overall A-weighted sound power levels 2.0 dB(A) higher than the unadjusted sum, resulting in overall sound levels of 111.3 and 109.0 dB(A) for the Vestas and Siemens turbines, respectively. These are 2.1 and 2.0 dB(A) higher than the manufacturer’s guaranteed maximum sound power levels shown in Table B-1 for the Vestas and Siemens turbines, respectively. For both turbine models, the octave band sound powers were preserved through the distance attenuation process and then added for each residence to recover the overall A-weighted sound level.

Sound levels tabulated in Noise final.xls for transformers were computed using overall A-weighted sound power level data, using 105 dB(A) for each transformer in the north substation and 101 dB(A) for the single transformer in the south substation. Sound contours shown for the north turbines in RAI#3 X1c.PDF were based on an overall A-weighted sound power level of

109.0 dB(A). This represents the manufacturer's maximum guaranteed sound power level for the Siemens turbines (Exhibit B Table B-1) plus an uncertainty level of 2.0 dB(A).

Calculation of the data compiled in Noise final.xls assumed a temperature of 50°F and a relative humidity of 70%. Ground attenuation was set at 0 dB per km. Topographical data were not included in the model so terrain effects were ignored. All turbine locations for calculations tabulated in Noise final.xls are as shown in the attached figures.

RAI#3X1c.PDF shows noise contours produced by 280 SWT-2.3-93 turbines in the north project area. Turbine and residence locations in this figure are identical to those shown in RAI#3X1aRevision3.PDF and tabulated in Noise final.xls. The attenuation rate used in developing these contours was adjusted to give the best match between contours and the sound levels generated from the octave data.

Consistency with previous submissions

Noise final.xls has been formatted to allow it to be conveniently printed, with some editing to clarify headings, tab names and column labels. It contains the exact turbine and transformer sound levels, turbine and transformer locations and turbine and residence identifying numbers as Noise110607.xls, submitted on November 6, 2007. In Noise final.xls, the turbine and transformer locations, turbine and residence identifying numbers and south project area turbine sound levels are identical to those in Noise110407.xls, submitted on November 4, 2007. The residence identifying numbers and location data in Noise final.xls are identical to those in CorrectedResidencesTable.PDF submitted on October 29, 2007 and in ResidenceLocationTable.xls, submitted on November 2, 2007.

The attached figures have been formatted to display the identification number of the turbines, and an error in identification of one turbine in RAI#3X1bRevision3.PDF as submitted on November 4, 2007 was corrected. Other than the number of the misidentified turbine, residences and turbine locations and identification numbers in the attached figures are identical to those shown in correspondingly named figures submitted November 4 and November 6, 2007.

Figure RAI#3 X1a revision 3

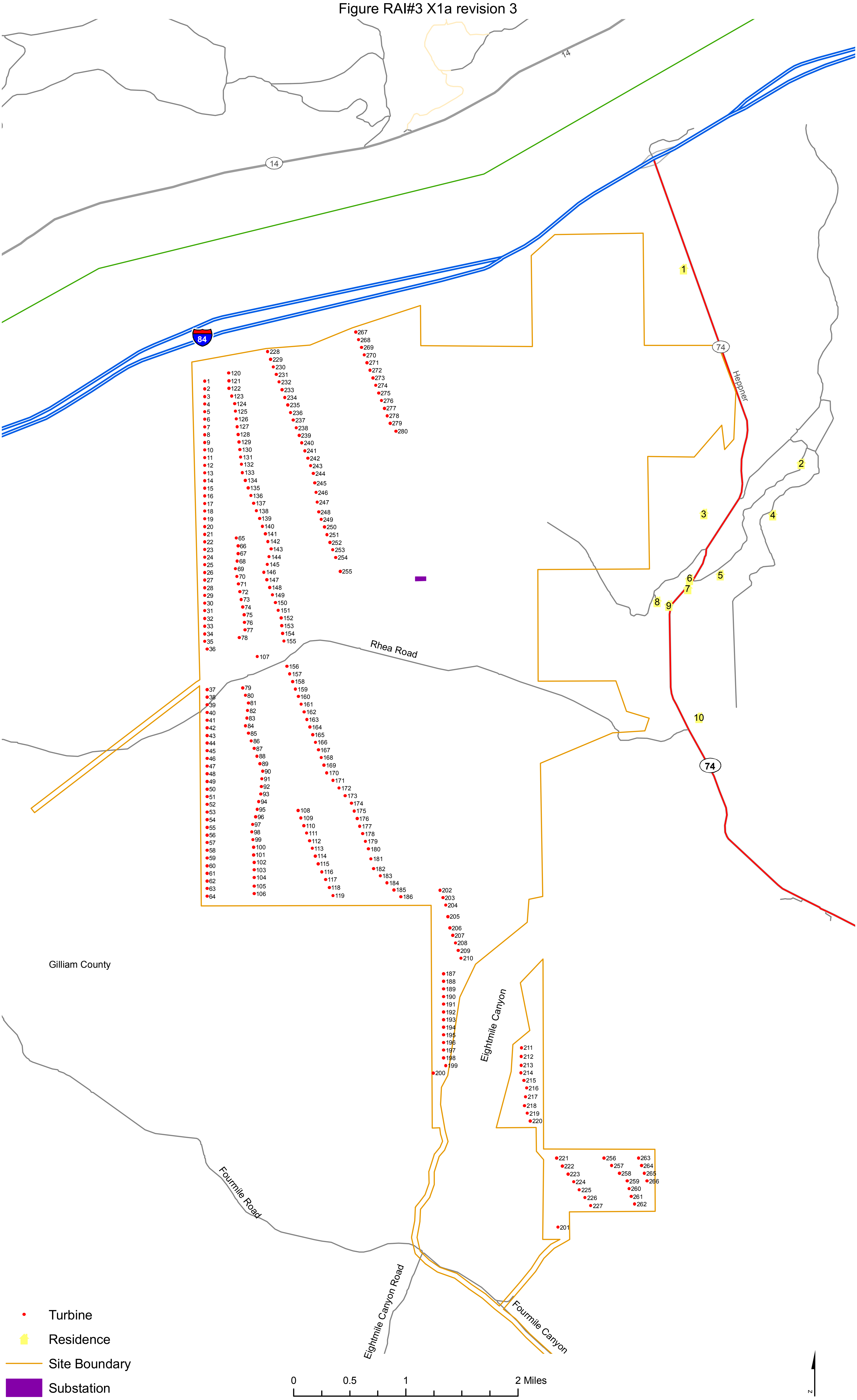


Figure RAI#3 X1b revision 3

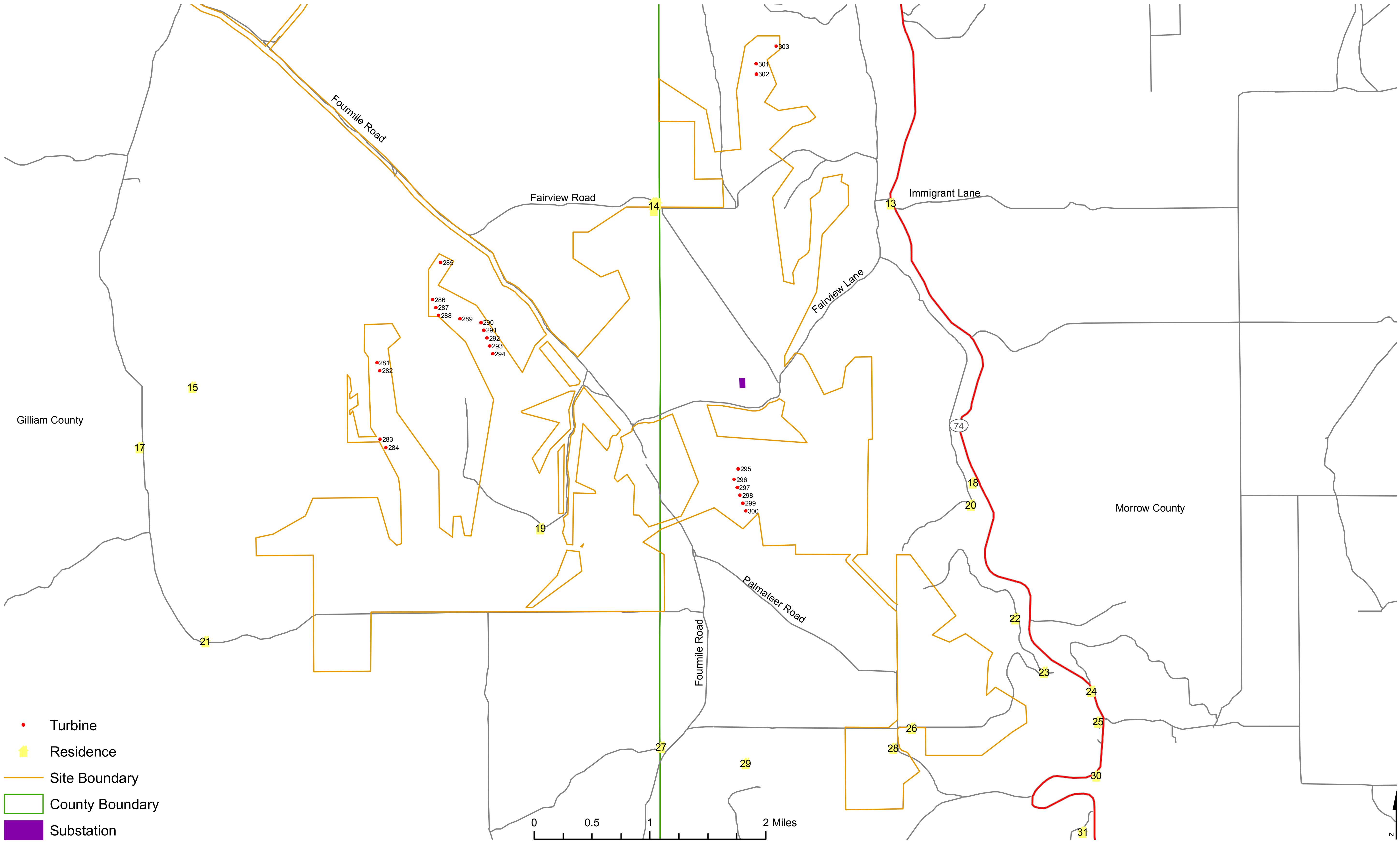
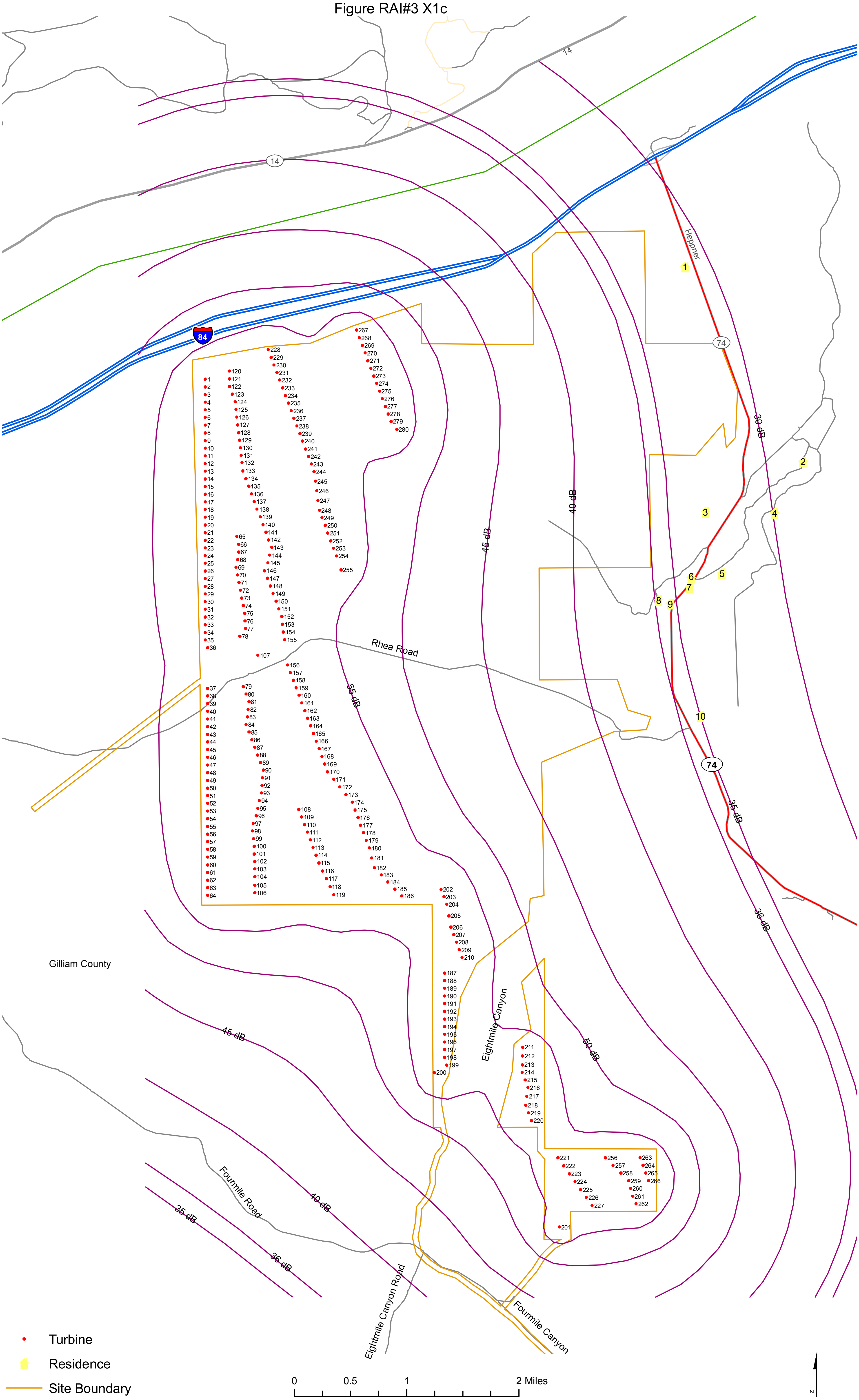


Figure RAI#3 X1c



Residence locations

Residence	Longitude			Latitude		
ID	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-120	2	1	45	46	21
2	-120	0	43	45	44	51
3	-120	1	48	45	44	28
4	-120	1	2	45	44	27
5	-120	1	37	45	43	59
6	-120	1	57	45	43	57
7	-120	1	59	45	43	53
8	-120	2	19	45	43	47
9	-120	2	12	45	43	45
10	-120	1	52	45	42	53
11*	-119	59	58	45	37	8
12*	-119	59	56	45	37	8
13	-119	57	26	45	37	7
14*	-119	59	58	45	37	7
15	-120	4	57	45	35	46
16*	-119	59	58	45	37	5
17	-120	5	28	45	35	19
18	-119	56	34	45	35	1
19	-120	1	12	45	34	42
20	-119	56	35	45	34	51
21	-120	4	47	45	33	52
22	-119	56	8	45	34	0
23	-119	55	49	45	33	35
24	-119	55	19	45	33	26
25	-119	55	15	45	33	13
26	-119	57	15	45	33	11
27	-119	59	55	45	33	3
28	-119	57	27	45	33	2
29	-119	59	2	45	32	54
30	-119	55	16	45	32	49
31	-119	55	25	45	32	23

* These 4 residences are in the same compound.

North turbine locations: Turbines are Siemens SWT-2.3-93

Turbine ID	Longitude Degrees	Longitude Minutes	Longitude Seconds	Latitude Degrees	Latitude Minutes	Latitude Seconds
1	-120	7	19.3	45	45	30.8
2	-120	7	19.3	45	45	27.2
3	-120	7	19.3	45	45	23.7
4	-120	7	19.3	45	45	20.1
5	-120	7	19.4	45	45	16.5
6	-120	7	19.4	45	45	13.0
7	-120	7	19.4	45	45	9.4
8	-120	7	19.4	45	45	5.8
9	-120	7	19.4	45	45	2.3
10	-120	7	19.5	45	44	58.7
11	-120	7	19.5	45	44	55.1
12	-120	7	19.5	45	44	51.6
13	-120	7	19.5	45	44	48.0
14	-120	7	19.6	45	44	44.5
15	-120	7	19.6	45	44	40.9
16	-120	7	19.6	45	44	37.3
17	-120	7	19.6	45	44	33.8
18	-120	7	19.7	45	44	30.2
19	-120	7	19.7	45	44	26.6
20	-120	7	19.7	45	44	23.1
21	-120	7	19.7	45	44	19.5
22	-120	7	19.8	45	44	16.0
23	-120	7	19.8	45	44	12.4
24	-120	7	19.8	45	44	8.8
25	-120	7	19.8	45	44	5.3
26	-120	7	19.9	45	44	1.7
27	-120	7	19.9	45	43	58.1
28	-120	7	19.9	45	43	54.6
29	-120	7	19.9	45	43	51.0
30	-120	7	19.9	45	43	47.5
31	-120	7	20.0	45	43	43.9
32	-120	7	20.0	45	43	40.3
33	-120	7	20.0	45	43	36.8
34	-120	7	20.0	45	43	33.2
35	-120	7	20.1	45	43	29.6
36	-120	7	18.5	45	43	26.1
37	-120	7	18.7	45	43	7.2
38	-120	7	18.7	45	43	3.7
39	-120	7	18.7	45	43	0.1
40	-120	7	18.7	45	42	56.6
41	-120	7	18.8	45	42	53.0
42	-120	7	18.8	45	42	49.4
43	-120	7	18.8	45	42	45.9
44	-120	7	18.8	45	42	42.3
45	-120	7	18.9	45	42	38.7
46	-120	7	18.9	45	42	35.2
47	-120	7	18.9	45	42	31.6

North turbine locations: Turbines are Siemens SWT-2.3-93

Turbine ID	Longitude Degrees	Longitude Minutes	Longitude Seconds	Latitude Degrees	Latitude Minutes	Latitude Seconds
48	-120	7	18.9	45	42	28.0
49	-120	7	19.0	45	42	24.5
50	-120	7	19.0	45	42	20.9
51	-120	7	19.0	45	42	17.4
52	-120	7	19.0	45	42	13.8
53	-120	7	19.0	45	42	10.2
54	-120	7	19.1	45	42	6.7
55	-120	7	19.1	45	42	3.1
56	-120	7	19.1	45	41	59.5
57	-120	7	19.1	45	41	56.0
58	-120	7	19.2	45	41	52.4
59	-120	7	19.2	45	41	48.9
60	-120	7	19.2	45	41	45.3
61	-120	7	19.2	45	41	41.7
62	-120	7	19.3	45	41	38.2
63	-120	7	19.3	45	41	34.6
64	-120	7	19.3	45	41	31.0
65	-120	6	58.8	45	44	17.6
66	-120	6	57.8	45	44	14.1
67	-120	6	57.6	45	44	10.5
68	-120	6	58.2	45	44	6.9
69	-120	6	59.4	45	44	3.4
70	-120	6	58.5	45	43	59.8
71	-120	6	57.5	45	43	56.3
72	-120	6	56.6	45	43	52.7
73	-120	6	55.7	45	43	49.1
74	-120	6	54.8	45	43	45.6
75	-120	6	53.9	45	43	42.0
76	-120	6	53.6	45	43	38.4
77	-120	6	53.4	45	43	34.9
78	-120	6	57.3	45	43	31.3
79	-120	6	55.2	45	43	8.0
80	-120	6	53.3	45	43	4.4
81	-120	6	51.4	45	43	0.9
82	-120	6	51.9	45	42	57.4
83	-120	6	52.4	45	42	53.8
84	-120	6	53.3	45	42	50.3
85	-120	6	51.4	45	42	46.8
86	-120	6	49.6	45	42	43.2
87	-120	6	47.7	45	42	39.7
88	-120	6	45.8	45	42	36.1
89	-120	6	44.0	45	42	32.6
90	-120	6	42.1	45	42	29.1
91	-120	6	42.6	45	42	25.5
92	-120	6	43.0	45	42	22.0
93	-120	6	43.5	45	42	18.5
94	-120	6	44.7	45	42	15.0

North turbine locations: Turbines are Siemens SWT-2.3-93

Turbine	Longitude			Latitude		
ID	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
95	-120	6	45.8	45	42	11.4
96	-120	6	46.9	45	42	7.9
97	-120	6	48.9	45	42	4.4
98	-120	6	49.4	45	42	0.8
99	-120	6	48.7	45	41	57.3
100	-120	6	48.4	45	41	53.8
101	-120	6	48.4	45	41	50.3
102	-120	6	48.1	45	41	46.7
103	-120	6	48.1	45	41	43.2
104	-120	6	48.1	45	41	39.7
105	-120	6	48.1	45	41	35.7
106	-120	6	48.2	45	41	32.1
107	-120	6	45.2	45	43	22.4
108	-120	6	18.6	45	42	10.8
109	-120	6	16.7	45	42	7.2
110	-120	6	14.9	45	42	3.7
111	-120	6	13.0	45	42	0.1
112	-120	6	11.2	45	41	56.6
113	-120	6	9.3	45	41	53.1
114	-120	6	7.4	45	41	49.5
115	-120	6	5.6	45	41	46.0
116	-120	6	3.1	45	41	42.2
117	-120	6	0.7	45	41	38.5
118	-120	5	58.2	45	41	34.8
119	-120	5	55.8	45	41	31.1
120	-120	7	3.3	45	45	34.5
121	-120	7	3.3	45	45	30.9
122	-120	7	3.3	45	45	27.3
123	-120	7	1.5	45	45	23.8
124	-120	6	59.6	45	45	20.2
125	-120	6	59.0	45	45	16.6
126	-120	6	58.5	45	45	13.1
127	-120	6	57.9	45	45	9.5
128	-120	6	57.4	45	45	5.9
129	-120	6	56.8	45	45	2.4
130	-120	6	56.2	45	44	58.8
131	-120	6	55.7	45	44	55.3
132	-120	6	55.1	45	44	51.7
133	-120	6	54.5	45	44	48.1
134	-120	6	52.7	45	44	44.6
135	-120	6	50.8	45	44	41.0
136	-120	6	49.0	45	44	37.4
137	-120	6	47.1	45	44	33.8
138	-120	6	45.2	45	44	30.3
139	-120	6	43.4	45	44	26.7
140	-120	6	41.5	45	44	23.1
141	-120	6	39.6	45	44	19.6

North turbine locations: Turbines are Siemens SWT-2.3-93

Turbine	Longitude			Latitude		
ID	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
142	-120	6	37.8	45	44	16.0
143	-120	6	35.9	45	44	12.4
144	-120	6	37.1	45	44	8.9
145	-120	6	38.2	45	44	5.3
146	-120	6	40.5	45	44	1.8
147	-120	6	38.7	45	43	58.2
148	-120	6	36.8	45	43	54.6
149	-120	6	34.9	45	43	51.1
150	-120	6	33.1	45	43	47.5
151	-120	6	31.2	45	43	43.9
152	-120	6	29.3	45	43	40.3
153	-120	6	28.8	45	43	36.8
154	-120	6	28.4	45	43	33.2
155	-120	6	27.4	45	43	29.6
156	-120	6	25.6	45	43	17.9
157	-120	6	23.7	45	43	14.4
158	-120	6	21.8	45	43	10.8
159	-120	6	20.0	45	43	7.3
160	-120	6	18.1	45	43	3.7
161	-120	6	16.2	45	43	0.2
162	-120	6	14.4	45	42	56.6
163	-120	6	12.5	45	42	53.1
164	-120	6	10.6	45	42	49.6
165	-120	6	8.7	45	42	46.0
166	-120	6	6.9	45	42	42.4
167	-120	6	5.0	45	42	38.9
168	-120	6	3.2	45	42	35.4
169	-120	6	1.3	45	42	31.8
170	-120	5	59.4	45	42	28.3
171	-120	5	55.4	45	42	24.7
172	-120	5	51.3	45	42	21.1
173	-120	5	47.3	45	42	17.5
174	-120	5	43.2	45	42	13.9
175	-120	5	41.4	45	42	10.4
176	-120	5	39.5	45	42	6.9
177	-120	5	37.7	45	42	3.3
178	-120	5	35.8	45	41	59.8
179	-120	5	33.9	45	41	56.2
180	-120	5	32.1	45	41	52.7
181	-120	5	30.4	45	41	48.1
182	-120	5	28.7	45	41	43.5
183	-120	5	24.2	45	41	40.2
184	-120	5	19.7	45	41	36.9
185	-120	5	15.2	45	41	33.6
186	-120	5	10.7	45	41	30.4
187	-120	4	42.6	45	40	54.5
188	-120	4	42.6	45	40	50.9

North turbine locations: Turbines are Siemens SWT-2.3-93

Turbine	Longitude			Latitude		
ID	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
189	-120	4	42.6	45	40	47.4
190	-120	4	42.6	45	40	43.8
191	-120	4	42.7	45	40	40.3
192	-120	4	42.7	45	40	36.7
193	-120	4	42.7	45	40	33.1
194	-120	4	42.7	45	40	29.6
195	-120	4	42.8	45	40	26.0
196	-120	4	42.8	45	40	22.4
197	-120	4	42.8	45	40	18.9
198	-120	4	42.8	45	40	15.3
199	-120	4	41.5	45	40	11.7
200	-120	4	49.5	45	40	8.2
201	-120	3	27.6	45	38	56.1
202	-120	4	44.6	45	41	33.4
203	-120	4	42.8	45	41	29.8
204	-120	4	40.9	45	41	26.3
205	-120	4	39.6	45	41	21.1
206	-120	4	38.3	45	41	15.8
207	-120	4	36.4	45	41	12.3
208	-120	4	34.6	45	41	8.7
209	-120	4	32.7	45	41	5.2
210	-120	4	30.9	45	41	1.6
211	-120	3	51.0	45	40	19.8
212	-120	3	51.2	45	40	15.7
213	-120	3	51.3	45	40	11.7
214	-120	3	51.5	45	40	8.2
215	-120	3	49.6	45	40	4.6
216	-120	3	47.8	45	40	1.1
217	-120	3	48.5	45	39	57.0
218	-120	3	49.2	45	39	52.8
219	-120	3	47.4	45	39	49.3
220	-120	3	45.5	45	39	45.8
221	-120	3	28.2	45	39	28.4
222	-120	3	24.5	45	39	24.7
223	-120	3	20.7	45	39	20.9
224	-120	3	16.9	45	39	17.2
225	-120	3	13.2	45	39	13.5
226	-120	3	9.4	45	39	9.8
227	-120	3	5.7	45	39	6.1
228	-120	6	37.3	45	45	44.3
229	-120	6	35.4	45	45	40.7
230	-120	6	33.5	45	45	37.2
231	-120	6	31.7	45	45	33.7
232	-120	6	29.8	45	45	30.1
233	-120	6	27.9	45	45	26.6
234	-120	6	26.1	45	45	23.0
235	-120	6	24.2	45	45	19.5

North turbine locations: Turbines are Siemens SWT-2.3-93

Turbine	Longitude			Latitude		
ID	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
236	-120	6	22.3	45	45	15.9
237	-120	6	20.5	45	45	12.4
238	-120	6	18.6	45	45	8.8
239	-120	6	16.7	45	45	5.3
240	-120	6	14.8	45	45	1.8
241	-120	6	13.0	45	44	58.2
242	-120	6	11.1	45	44	54.7
243	-120	6	9.2	45	44	51.1
244	-120	6	7.4	45	44	47.6
245	-120	6	6.6	45	44	43.1
246	-120	6	5.7	45	44	38.6
247	-120	6	4.9	45	44	34.2
248	-120	6	4.1	45	44	29.7
249	-120	6	2.2	45	44	26.1
250	-120	6	0.3	45	44	22.6
251	-120	5	58.5	45	44	19.1
252	-120	5	56.6	45	44	15.5
253	-120	5	54.7	45	44	12.0
254	-120	5	52.9	45	44	8.4
255	-120	5	49.9	45	44	2.0
256	-120	2	56.7	45	39	28.3
257	-120	2	51.6	45	39	24.7
258	-120	2	46.5	45	39	21.1
259	-120	2	41.4	45	39	17.5
260	-120	2	40.2	45	39	14.0
261	-120	2	38.9	45	39	10.4
262	-120	2	36.4	45	39	6.8
263	-120	2	33.7	45	39	28.2
264	-120	2	31.9	45	39	24.6
265	-120	2	30.0	45	39	21.0
266	-120	2	28.1	45	39	17.5
267	-120	5	38.8	45	45	53.2
268	-120	5	36.9	45	45	49.7
269	-120	5	35.0	45	45	46.1
270	-120	5	33.2	45	45	42.6
271	-120	5	31.3	45	45	39.0
272	-120	5	29.4	45	45	35.5
273	-120	5	27.6	45	45	32.0
274	-120	5	25.7	45	45	28.4
275	-120	5	23.8	45	45	24.8
276	-120	5	21.9	45	45	21.3
277	-120	5	20.1	45	45	17.8
278	-120	5	18.1	45	45	14.3
279	-120	5	16.2	45	45	10.8
280	-120	5	12.5	45	45	7.0

North turbine noise analysis using A-weighted octave band data

	North residences: residence number and sound level [dB (A)]									
Turbine	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ID	**31.58**	**28.497**	**33.34**	**30.149**	**32.898**	**34.304**	**34.49**	**35.963**	**35.494**	**35.139**
1	7.7677	2.3908	6.5175	3.2698	4.8514	6.1336	6.1112	7.2021	6.6434	2.7786
2	7.6841	2.4369	6.6091	3.3485	4.9753	6.2692	6.2526	7.3615	6.8011	2.9727
3	7.5952	2.4788	6.6958	3.423	5.0951	6.4004	6.3897	7.5168	6.9546	3.1642
4	7.5012	2.5164	6.7775	3.4932	5.2107	6.5273	6.5225	7.6676	7.1039	3.3529
5	7.4019	2.5497	6.854	3.559	5.3219	6.6496	6.6508	7.8141	7.2489	3.5389
6	7.2977	2.5787	6.9255	3.6204	5.4287	6.7674	6.7746	7.9559	7.3895	3.7219
7	7.1885	2.6034	6.9917	3.6774	5.5311	6.8804	6.8938	8.0931	7.5255	3.9019
8	7.0745	2.6237	7.0526	3.73	5.6289	6.9887	7.0083	8.2254	7.6569	4.0789
9	6.9556	2.6396	7.1083	3.778	5.7221	7.092	7.118	8.3529	7.7835	4.2527
10	6.8321	2.6512	7.1585	3.8215	5.8106	7.1905	7.2228	8.4753	7.9052	4.4233
11	6.7041	2.6584	7.2034	3.8605	5.8943	7.2839	7.3227	8.5925	8.022	4.5905
12	6.5715	2.6611	7.2428	3.8948	5.9732	7.3721	7.4174	8.7046	8.1337	4.7543
13	6.4346	2.6595	7.2767	3.9246	6.0473	7.4552	7.507	8.8112	8.2402	4.9145
14	6.2934	2.6535	7.3051	3.9497	6.1164	7.533	7.5914	8.9125	8.3415	5.0712
15	6.148	2.6431	7.3279	3.9701	6.1805	7.6054	7.6705	9.0081	8.4374	5.2241
16	5.9986	2.6284	7.3452	3.9859	6.2395	7.6725	7.7443	9.0981	8.5278	5.3732
17	5.8451	2.6093	7.3569	3.997	6.2935	7.7341	7.8125	9.1824	8.6127	5.5184
18	5.6878	2.5858	7.363	4.0034	6.3423	7.7902	7.8753	9.2609	8.692	5.6597
19	5.5267	2.5579	7.3635	4.0052	6.3859	7.8406	7.9325	9.3334	8.7656	5.7968
20	5.3619	2.5258	7.3584	4.0022	6.4243	7.8855	7.9842	9.4	8.8334	5.9298
21	5.1936	2.4893	7.3477	3.9945	6.4575	7.9247	8.0301	9.4605	8.8953	6.0585
22	5.0217	2.4486	7.3314	3.9822	6.4854	7.9582	8.0703	9.5149	8.9514	6.1828
23	4.8465	2.4036	7.3095	3.9652	6.508	7.9859	8.1048	9.5631	9.0014	6.3027
24	4.668	2.3543	7.2821	3.9435	6.5252	8.0079	8.1335	9.6051	9.0455	6.418
25	4.4863	2.3009	7.2492	3.9172	6.5372	8.0241	8.1564	9.6408	9.0835	6.5287
26	4.3015	2.2433	7.2108	3.8863	6.5437	8.0345	8.1735	9.6701	9.1154	6.6347
27	4.1137	2.1816	7.1669	3.8507	6.5449	8.0391	8.1847	9.6931	9.1411	6.7359
28	3.923	2.1157	7.1176	3.8106	6.5408	8.0379	8.19	9.7098	9.1607	6.8322
29	3.7294	2.0458	7.0629	3.7659	6.5313	8.0308	8.1895	9.72	9.1741	6.9235
30	3.5332	1.9719	7.0029	3.7167	6.5165	8.018	8.1831	9.7238	9.1813	7.0098
31	3.3343	1.894	6.9376	3.6629	6.4963	7.9993	8.1709	9.7212	9.1823	7.091
32	3.1328	1.8122	6.8671	3.6048	6.4708	7.9749	8.1528	9.7122	9.177	7.167

North turbine noise analysis using A-weighted octave band data

	North residences: residence number and sound level [dB (A)]									
Turbine	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ID	**31.58**	**28.497**	**33.34**	**30.149**	**32.898**	**34.304**	**34.49**	**35.963**	**35.494**	**35.139**
33	2.9288	1.7265	6.7914	3.5422	6.4401	7.9447	8.1288	9.6968	9.1656	7.2378
34	2.7225	1.637	6.7106	3.4752	6.404	7.9088	8.0991	9.675	9.1479	7.3033
35	2.5138	1.5437	6.6248	3.4039	6.3628	7.8672	8.0636	9.6468	9.1241	7.3634
36	2.388	1.5485	6.6441	3.4345	6.4286	7.9349	8.1378	9.7311	9.212	7.5322
37	1.2332	0.97219	6.0813	2.9629	6.096	7.5907	7.8238	9.4431	8.9508	7.7309
38	1.009	0.85228	5.9605	2.861	6.0174	7.5086	7.7471	9.3694	8.8827	7.7507
39	0.78316	0.72903	5.8353	2.7552	5.934	7.4213	7.665	9.2899	8.8087	7.7647
40	0.55561	0.60248	5.7058	2.6456	5.8457	7.3288	7.5776	9.2044	8.7291	7.7731
41	0.32646	0.4727	5.5721	2.5322	5.7528	7.2312	7.485	9.1132	8.6437	7.7757
42	0.095775	0.33974	5.4343	2.415	5.6552	7.1286	7.3872	9.0163	8.5528	7.7726
43	-0.13639	0.20367	5.2924	2.2942	5.553	7.0211	7.2844	8.9139	8.4564	7.7638
44	-0.36997	0.064537	5.1466	2.1698	5.4463	6.9087	7.1767	8.8059	8.3546	7.7492
45	-0.60493	-0.077594	4.997	2.0419	5.3352	6.7916	7.064	8.6927	8.2475	7.729
46	-0.8412	-0.22266	4.8437	1.9105	5.2197	6.6699	6.9466	8.5741	8.1352	7.703
47	-1.0787	-0.37061	4.6866	1.7757	5.0999	6.5436	6.8245	8.4504	8.0178	7.6714
48	-1.3175	-0.52138	4.5261	1.6376	4.976	6.4128	6.6978	8.3216	7.8954	7.6342
49	-1.5574	-0.67491	4.362	1.4962	4.8479	6.2777	6.5666	8.188	7.7682	7.5913
50	-1.7984	-0.83114	4.1946	1.3516	4.7158	6.1383	6.431	8.0495	7.6361	7.543
51	-2.0405	-0.99002	4.0238	1.2039	4.5798	5.9948	6.2911	7.9063	7.4994	7.4891
52	-2.2837	-1.1515	3.8499	1.0532	4.4399	5.8471	6.1471	7.7585	7.3581	7.4297
53	-2.5278	-1.3155	3.6728	0.89939	4.2963	5.6955	5.9989	7.6063	7.2123	7.3649
54	-2.7729	-1.4819	3.4927	0.74269	4.1489	5.5401	5.8467	7.4497	7.0622	7.2948
55	-3.0189	-1.6508	3.3097	0.58312	3.998	5.3808	5.6906	7.2889	6.9078	7.2194
56	-3.2658	-1.822	3.1238	0.42076	3.8435	5.2179	5.5307	7.124	6.7494	7.1388
57	-3.5134	-1.9956	2.9352	0.25567	3.6856	5.0514	5.3671	6.9551	6.5869	7.053
58	-3.7619	-2.1714	2.7438	0.087903	3.5244	4.8814	5.1999	6.7824	6.4205	6.9621
59	-4.0112	-2.3494	2.5499	-0.082465	3.3599	4.708	5.0292	6.6058	6.2504	6.8663
60	-4.2612	-2.5295	2.3534	-0.25537	3.1922	4.5313	4.8551	6.4257	6.0765	6.7655
61	-4.5118	-2.7117	2.1545	-0.43076	3.0214	4.3515	4.6777	6.2419	5.8991	6.6599
62	-4.7632	-2.8959	1.9532	-0.60857	2.8476	4.1685	4.4971	6.0548	5.7182	6.5495
63	-5.0151	-3.0822	1.7495	-0.78873	2.6708	3.9825	4.3134	5.8643	5.5339	6.4345
64	-5.2677	-3.2703	1.5437	-0.97118	2.4912	3.7936	4.1266	5.6707	5.3464	6.3148

North turbine noise analysis using A-weighted octave band data

	North residences: residence number and sound level [dB (A)]									
Turbine	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ID	**31.58**	**28.497**	**33.34**	**30.149**	**32.898**	**34.304**	**34.49**	**35.963**	**35.494**	**35.139**
65	6.4136	3.9085	8.8923	5.4674	8.0011	9.5051	9.6138	11.083	10.501	7.5512
66	6.2848	3.9263	8.9405	5.5172	8.0967	9.6084	9.7245	11.21	10.63	7.747
67	6.109	3.8914	8.9306	5.5126	8.1355	9.6531	9.7766	11.278	10.7	7.8908
68	5.8793	3.7947	8.8526	5.4439	8.1069	9.6285	9.7593	11.274	10.699	7.9716
69	5.6167	3.659	8.731	5.3343	8.0348	9.5589	9.6969	11.224	10.652	8.0111
70	5.4731	3.6582	8.7546	5.3638	8.1073	9.637	9.7825	11.325	10.755	8.1887
71	5.3281	3.6558	8.7754	5.3914	8.1775	9.7125	9.8654	11.422	10.855	8.3653
72	5.1763	3.6454	8.7866	5.4105	8.2385	9.7781	9.9384	11.51	10.944	8.5342
73	5.0232	3.6335	8.7948	5.4277	8.2969	9.8408	10.009	11.593	11.031	8.7018
74	4.8637	3.6136	8.7934	5.4364	8.3461	9.8934	10.069	11.667	11.108	8.8613
75	4.703	3.5921	8.7891	5.4432	8.3926	9.9431	10.126	11.736	11.181	9.0194
76	4.4976	3.5164	8.7246	5.393	8.3783	9.9299	10.12	11.741	11.189	9.1181
77	4.2896	3.4364	8.6543	5.338	8.3582	9.9102	10.107	11.738	11.19	9.2111
78	3.8582	3.0828	8.2852	4.9965	8.0328	9.5772	9.7791	11.409	10.869	8.9968
79	2.4793	2.4912	7.7184	4.5497	7.7824	9.3152	9.5595	11.231	10.727	9.4738
80	2.3392	2.4849	7.719	4.5681	7.834	9.3657	9.6168	11.296	10.797	9.6404
81	2.1952	2.4738	7.7131	4.5812	7.8793	9.4092	9.6672	11.353	10.859	9.8015
82	1.933	2.3098	7.5411	4.4329	7.7507	9.2745	9.5377	11.223	10.737	9.7772
83	1.6699	2.1429	7.3652	4.281	7.6174	9.1348	9.403	11.088	10.609	9.7466
84	1.384	1.9444	7.1548	4.0954	7.447	8.957	9.2298	10.913	10.441	9.6747
85	1.2323	1.9197	7.1304	4.0926	7.4724	8.9786	9.2578	10.945	10.479	9.8142
86	1.075	1.8875	7.0968	4.0815	7.4882	8.9901	9.2755	10.966	10.507	9.944
87	0.91214	1.8478	7.0541	4.0622	7.4946	8.9914	9.2829	10.976	10.523	10.064
88	0.74813	1.8063	7.0084	4.0406	7.4978	8.9891	9.2866	10.981	10.536	10.181
89	0.58088	1.7601	6.9566	4.0137	7.4947	8.98	9.2833	10.978	10.541	10.291
90	0.41046	1.7093	6.8988	3.9817	7.4853	8.9639	9.2729	10.968	10.538	10.395
91	0.13519	1.5151	6.6876	3.7975	7.311	8.78	9.0928	10.783	10.36	10.312
92	-0.13854	1.3212	6.4763	3.6133	7.1359	8.5952	8.9116	10.596	10.181	10.227
93	-0.41467	1.1224	6.2593	3.4235	6.9541	8.4034	8.7232	10.401	9.9938	10.132
94	-0.72216	0.8788	5.9947	3.1859	6.7202	8.1588	8.4813	10.151	9.7514	9.9752
95	-1.0236	0.6417	5.7369	2.9549	6.4928	7.9206	8.2458	9.9079	9.5155	9.8238
96	-1.3268	0.40047	5.4745	2.7191	6.2597	7.6768	8.0044	9.6584	9.2733	9.6637

North turbine noise analysis using A-weighted octave band data

Turbine	North residences: residence number and sound level [dB (A)]									
	1	2	3	4	5	6	7	8	9	10
ID	31.58	28.497	33.34	30.149	32.898	34.304	34.49	35.963	35.494	35.139
97	-1.6637	0.11111	5.1616	2.4322	5.9711	7.3769	7.7062	9.3506	8.9725	9.4373
98	-1.9399	-0.096444	4.9344	2.2313	5.7745	7.1699	7.502	9.1389	8.7679	9.3152
99	-2.1684	-0.23946	4.7745	2.0982	5.6502	7.0358	7.3712	9.002	8.6386	9.2755
100	-2.4146	-0.40819	4.5872	1.9377	5.4957	6.8711	7.2095	8.8333	8.4772	9.1993
101	-2.6743	-0.59696	4.3787	1.7557	5.3177	6.6826	7.0236	8.6397	8.2908	9.0941
102	-2.9203	-0.76792	4.1884	1.5921	5.159	6.5133	6.8571	8.4657	8.124	9.01
103	-3.1812	-0.96102	3.9748	1.4049	4.9743	6.318	6.6641	8.2645	7.9299	8.894
104	-3.4426	-1.1561	3.759	1.2152	4.7866	6.1196	6.4679	8.0599	7.7323	8.7728
105	-3.7405	-1.3804	3.5108	0.99665	4.5695	5.8902	6.2409	7.8231	7.5034	8.6287
106	-4.0052	-1.5814	3.2883	0.80031	4.3739	5.6836	6.0363	7.6096	7.2968	8.4955
107	3.9429	3.6193	8.9028	5.6267	8.7951	10.359	10.583	12.26	11.726	10.055
108	0.036464	2.1602	7.3339	4.5667	8.2373	9.6834	10.031	11.739	11.354	11.873
109	-0.161	2.0755	7.2316	4.4967	8.1824	9.6174	9.9702	11.672	11.297	11.932
110	-0.36036	1.9855	7.1229	4.4205	8.1196	9.5432	9.9007	11.596	11.23	11.98
111	-0.56473	1.8892	7.0066	4.3374	8.0488	9.4604	9.8224	11.51	11.154	12.019
112	-0.77071	1.788	6.8844	4.2484	7.9706	9.3699	9.7361	11.416	11.069	12.047
113	-0.97729	1.6851	6.7595	4.1572	7.8892	9.2757	9.646	11.317	10.98	12.07
114	-1.1861	1.578	6.6294	4.0612	7.8017	9.1751	9.5493	11.212	10.884	12.085
115	-1.3997	1.4648	6.492	3.9584	7.7063	9.0661	9.444	11.096	10.778	12.091
116	-1.6066	1.3685	6.3703	3.8737	7.6301	8.9755	9.3575	10.999	10.692	12.123
117	-1.8174	1.2676	6.2426	3.7839	7.5476	8.8779	9.2638	10.894	10.598	12.148
118	-2.0309	1.1618	6.1088	3.6884	7.4579	8.7728	9.1623	10.781	10.495	12.163
119	-2.2462	1.0508	5.969	3.5867	7.3607	8.6599	9.0528	10.659	10.383	12.166
120	9.0073	3.4196	7.5287	4.255	5.7659	7.0419	7.005	8.069	7.5048	3.4684
121	8.9239	3.4728	7.6315	4.3427	5.9013	7.1901	7.1592	8.2426	7.6761	3.674
122	8.8349	3.5217	7.7292	4.426	6.0326	7.334	7.3091	8.412	7.8433	3.8771
123	8.8774	3.6968	7.9574	4.635	6.2877	7.6027	7.583	8.7048	8.133	4.1873
124	8.9164	3.8714	8.1852	4.8439	6.5433	7.8722	7.8577	8.9987	8.4239	4.4997
125	8.8489	3.9458	8.3086	4.9531	6.7011	8.0427	8.0344	9.1952	8.6182	4.7296
126	8.7789	4.0188	8.4301	5.0612	6.8579	8.2123	8.2101	9.3909	8.8118	4.9601
127	8.6997	4.0842	8.5431	5.1615	7.0073	8.3742	8.3784	9.5791	8.9981	5.1855
128	8.6181	4.1482	8.6541	5.2606	7.1555	8.5348	8.5456	9.7663	9.1834	5.4113

North turbine noise analysis using A-weighted octave band data

	North residences: residence number and sound level [dB (A)]									
Turbine	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ID	**31.58**	**28.497**	**33.34**	**30.149**	**32.898**	**34.304**	**34.49**	**35.963**	**35.494**	**35.139**
129	8.5308	4.2076	8.7597	5.3551	7.2993	8.6909	8.7082	9.949	9.3644	5.6347
130	8.4347	4.2592	8.8563	5.4416	7.4353	8.8388	8.8629	10.124	9.5376	5.8525
131	8.3363	4.3093	8.9507	5.5267	7.5699	8.9852	9.0161	10.297	9.7094	6.0706
132	8.2324	4.3546	9.0394	5.607	7.6997	9.1265	9.1643	10.465	9.8765	6.2858
133	8.1202	4.392	9.1188	5.6792	7.8213	9.2593	9.3042	10.625	10.035	6.4952
134	8.0928	4.5188	9.293	5.8421	8.035	9.4857	9.5374	10.879	10.287	6.7879
135	8.0588	4.6409	9.4619	6.0006	8.2446	9.7079	9.7665	11.129	10.536	7.0791
136	8.0152	4.7549	9.6217	6.151	8.4466	9.9222	9.988	11.372	10.777	7.3656
137	7.9681	4.8673	9.7792	6.3001	8.6475	10.135	10.208	11.613	11.017	7.6533
138	7.9146	4.9748	9.9309	6.4443	8.8438	10.344	10.424	11.85	11.253	7.9391
139	7.8547	5.0772	10.076	6.5835	9.0354	10.547	10.635	12.083	11.484	8.223
140	7.7885	5.1745	10.216	6.7175	9.2221	10.745	10.841	12.31	11.711	8.5047
141	7.716	5.2665	10.349	6.8464	9.4037	10.938	11.042	12.532	11.932	8.7841
142	7.6374	5.3533	10.475	6.97	9.58	11.125	11.237	12.748	12.148	9.0611
143	7.5526	5.4348	10.595	7.0881	9.7508	11.306	11.426	12.959	12.359	9.3355
144	7.2765	5.2967	10.473	6.9789	9.6842	11.243	11.372	12.919	12.322	9.3909
145	6.9988	5.1543	10.346	6.8646	9.611	11.173	11.31	12.87	12.278	9.4398
146	6.6537	4.9308	10.128	6.6654	9.4476	11.01	11.154	12.725	12.137	9.4026
147	6.553	4.9917	10.22	6.7609	9.5928	11.163	11.315	12.905	12.319	9.6583
148	6.4468	5.0471	10.305	6.8507	9.7321	11.31	11.471	13.079	12.494	9.9106
149	6.3351	5.0971	10.382	6.9348	9.8651	11.45	11.619	13.245	12.663	10.159
150	6.2181	5.1415	10.453	7.0129	9.9917	11.583	11.76	13.404	12.824	10.404
151	6.0959	5.1803	10.516	7.0852	10.112	11.709	11.895	13.556	12.978	10.645
152	5.9686	5.2136	10.572	7.1514	10.225	11.827	12.022	13.7	13.125	10.882
153	5.7585	5.1438	10.513	7.1093	10.223	11.826	12.029	13.718	13.148	11.005
154	5.5481	5.0724	10.451	7.065	10.217	11.821	12.031	13.731	13.167	11.126
155	5.3593	5.0274	10.416	7.0479	10.24	11.844	12.063	13.774	13.215	11.276
156	4.6519	4.7615	10.164	6.8646	10.172	11.771	12.015	13.754	13.214	11.63
157	4.4989	4.7576	10.169	6.8889	10.235	11.835	12.087	13.836	13.302	11.825
158	4.3395	4.7469	10.165	6.906	10.291	11.889	12.149	13.908	13.38	12.014
159	4.1783	4.7321	10.155	6.918	10.34	11.936	12.205	13.971	13.45	12.197
160	4.0131	4.7118	10.138	6.9239	10.381	11.975	12.252	14.026	13.511	12.374

North turbine noise analysis using A-weighted octave band data

	North residences: residence number and sound level [dB (A)]									
Turbine	1	2	3	4	5	6	7	8	9	10
ID	31.58	28.497	33.34	30.149	32.898	34.304	34.49	35.963	35.494	35.139
161	3.8441	4.6861	10.113	6.9237	10.415	12.006	12.29	14.071	13.564	12.544
162	3.6689	4.6535	10.079	6.9161	10.441	12.028	12.32	14.105	13.606	12.708
163	3.4924	4.617	10.04	6.9035	10.46	12.042	12.341	14.131	13.64	12.864
164	3.3124	4.5751	9.9934	6.8849	10.472	12.048	12.355	14.148	13.665	13.014
165	3.1269	4.525	9.9365	6.8571	10.473	12.042	12.356	14.152	13.677	13.152
166	2.9376	4.471	9.874	6.8249	10.469	12.03	12.351	14.148	13.682	13.286
167	2.7475	4.4133	9.8061	6.7881	10.458	12.011	12.339	14.135	13.68	13.412
168	2.5543	4.3504	9.7313	6.7452	10.439	11.984	12.319	14.114	13.668	13.53
169	2.358	4.2824	9.6496	6.6965	10.414	11.949	12.29	14.083	13.646	13.64
170	2.1562	4.2076	9.5593	6.6401	10.379	11.904	12.251	14.04	13.614	13.74
171	2.0374	4.2551	9.5976	6.714	10.485	12.001	12.357	14.147	13.732	14.009
172	1.9123	4.2949	9.6255	6.7793	10.582	12.088	12.451	14.24	13.836	14.268
173	1.7811	4.327	9.6429	6.8358	10.667	12.162	12.534	14.32	13.928	14.518
174	1.6438	4.3513	9.6499	6.8836	10.742	12.225	12.604	14.386	14.007	14.757
175	1.425	4.248	9.5217	6.7942	10.666	12.133	12.518	14.29	13.922	14.811
176	1.2023	4.1375	9.3846	6.6964	10.579	12.031	12.42	14.182	13.826	14.85
177	0.97627	4.0228	9.2421	6.5939	10.486	11.923	12.316	14.067	13.722	14.883
178	0.75068	3.9055	9.096	6.4879	10.388	11.808	12.206	13.945	13.612	14.906
179	0.52449	3.7862	8.9468	6.3792	10.286	11.69	12.092	13.817	13.496	14.923
180	0.29466	3.6599	8.7896	6.2626	10.174	11.561	11.967	13.679	13.369	14.926
181	-0.033504	3.4472	8.5345	6.0583	9.9702	11.335	11.745	13.437	13.142	14.853
182	-0.36222	3.2311	8.2749	5.8497	9.7603	11.103	11.516	13.188	12.907	14.767
183	-0.49556	3.2406	8.2538	5.875	9.798	11.122	11.54	13.199	12.932	14.949
184	-0.6343	3.2428	8.223	5.8919	9.8252	11.13	11.553	13.197	12.944	15.117
185	-0.77557	3.2399	8.1853	5.9026	9.8442	11.129	11.557	13.185	12.946	15.274
186	-0.92476	3.2273	8.1355	5.9026	9.8504	11.115	11.547	13.158	12.933	15.416
187	-3.2939	1.7938	6.2644	4.4934	8.3473	9.3927	9.8395	11.238	11.134	14.742
188	-3.6015	1.5144	5.949	4.2069	8.0411	9.071	9.5164	10.898	10.8	14.446
189	-3.9085	1.2346	5.6336	3.9198	7.7344	8.7493	9.1932	10.558	10.466	14.147
190	-4.215	0.95422	5.3184	3.6321	7.4273	8.4275	8.87	10.219	10.132	13.846
191	-4.5209	0.67347	5.0034	3.344	7.1199	8.1057	8.5467	9.88	9.7984	13.543
192	-4.8263	0.39234	4.6885	3.0554	6.8121	7.7839	8.2234	9.5414	9.465	13.238

North turbine noise analysis using A-weighted octave band data

	North residences: residence number and sound level [dB (A)]									
Turbine	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
ID	**31.58**	**28.497**	**33.34**	**30.149**	**32.898**	**34.304**	**34.49**	**35.963**	**35.494**	**35.139**
193	-5.1311	0.11086	4.3739	2.7664	6.504	7.4622	7.9002	9.2033	9.1319	12.931
194	-5.4353	-0.17095	4.0595	2.4771	6.1958	7.1407	7.5771	8.8657	8.7991	12.623
195	-5.739	-0.45303	3.7454	2.1874	5.8874	6.8193	7.2542	8.5286	8.4666	12.313
196	-6.0421	-0.73538	3.4316	1.8975	5.5789	6.4981	6.9315	8.1921	8.1345	12.002
197	-6.3447	-1.018	3.118	1.6073	5.2702	6.1771	6.609	7.8561	7.8029	11.69
198	-6.6467	-1.3007	2.8048	1.3168	4.9616	5.8564	6.2868	7.5207	7.4717	11.377
199	-6.9223	-1.5361	2.5337	1.0755	4.7023	5.5822	6.0115	7.2297	7.1867	11.128
200	-7.3731	-2.0931	1.9801	0.5014	4.1093	4.996	5.421	6.643	6.5924	10.439
201	-12.309	-5.7816	-2.6341	-3.3313	-0.17061	0.33519	0.73772	1.5687	1.672	6.3794
202	0.037966	4.6848	9.5932	7.4452	11.504	12.749	13.206	14.821	14.628	17.554
203	-0.22504	4.5049	9.3674	7.2662	11.313	12.535	12.994	14.584	14.405	17.449
204	-0.48924	4.3213	9.1376	7.0827	11.117	12.316	12.775	14.343	14.175	17.333
205	-0.91854	3.9769	8.7283	6.7333	10.742	11.91	12.369	13.904	13.751	17.037
206	-1.3452	3.6305	8.3182	6.381	10.363	11.502	11.96	13.462	13.324	16.727
207	-1.6121	3.4354	8.0773	6.184	10.15	11.266	11.724	13.204	13.077	16.575
208	-1.8799	3.2372	7.8331	5.9831	9.9327	11.027	11.485	12.942	12.825	16.412
209	-2.1525	3.0313	7.5813	5.774	9.7058	10.778	11.236	12.67	12.564	16.235
210	-2.422	2.827	7.3312	5.5661	9.4796	10.531	10.988	12.4	12.303	16.055
211	-5.3982	0.77259	4.6522	3.4538	7.1039	7.8696	8.3182	9.4338	9.4649	14.143
212	-5.7562	0.41922	4.2646	3.088	6.7127	7.4663	7.9121	9.0139	9.0478	13.719
213	-6.1113	0.070459	3.8816	2.7271	6.3268	7.0682	7.5114	8.5994	8.6361	13.302
214	-6.4202	-0.23364	3.5484	2.4126	5.9909	6.7221	7.163	8.2395	8.2785	12.939
215	-6.7034	-0.48234	3.2592	2.1544	5.7089	6.4241	6.8631	7.9223	7.9669	12.648
216	-6.9862	-0.73122	2.9701	1.896	5.4267	6.1261	6.5632	7.6054	7.6554	12.356
217	-7.3513	-1.1018	2.5715	1.5133	5.0213	5.7118	6.1463	7.1782	7.2295	11.913
218	-7.718	-1.4741	2.1717	1.129	4.6146	5.2965	5.7284	6.7502	6.8028	11.469
219	-7.9995	-1.7244	1.8832	0.86917	4.332	4.9992	5.4292	6.4353	6.4928	11.175
220	-8.2816	-1.9773	1.593	0.60679	4.047	4.7	5.1281	6.119	6.1811	10.876
221	-9.5813	-3.0369	0.30371	-0.50214	2.81	3.3729	3.7918	4.6876	4.782	9.6056
222	-9.8657	-3.2746	0.017566	-0.75128	2.5329	3.0773	3.4941	4.3703	4.4711	9.3152
223	-10.149	-3.5127	-0.26826	-1.0009	2.2554	2.7818	3.1964	4.0535	4.1604	9.0229
224	-10.433	-3.7539	-0.55664	-1.2539	1.9745	2.4833	2.8957	3.7341	3.8469	8.7256

North turbine noise analysis using A-weighted octave band data

Turbine ID	North residences: residence number and sound level [dB (A)] 1 31.58	2 28.497	3 33.34	4 30.149	5 32.898	6 34.304	7 34.49	8 35.963	9 35.494	10 35.139
225	-10.719	-3.998	-0.84748	-1.51	1.6905	2.182	2.5922	3.4123	3.5308	8.4237
226	-11.008	-4.2478	-1.1436	-1.772	1.4005	1.8751	2.283	3.0851	3.209	8.1141
227	-11.296	-4.4976	-1.439	-2.034	1.1107	1.5687	1.9744	2.7589	2.8881	7.8036
228	11.164	5.0262	9.0275	5.7379	7.0569	8.2998	8.2298	9.2157	8.6476	4.2886
229	11.058	5.0682	9.1261	5.8175	7.1888	8.4464	8.3827	9.3902	8.819	4.4917
230	11.12	5.2673	9.3856	6.0524	7.4714	8.7444	8.6854	9.7126	9.1374	4.8212
231	11.175	5.4623	9.6409	6.2833	7.7506	9.039	8.985	10.032	9.453	5.1486
232	11.219	5.6502	9.8894	6.5079	8.0246	9.3287	9.2797	10.348	9.7643	5.4735
233	11.259	5.8375	10.138	6.7325	8.2996	9.6194	9.5757	10.665	10.077	5.8008
234	11.29	6.0213	10.383	6.9545	8.5735	9.9095	9.8713	10.982	10.391	6.1301
235	11.317	6.2039	10.628	7.1755	8.8468	10.199	10.166	11.299	10.704	6.4599
236	11.333	6.379	10.864	7.3895	9.1143	10.483	10.456	11.611	11.012	6.7868
237	11.338	6.5464	11.093	7.5965	9.3757	10.761	10.74	11.919	11.315	7.1108
238	11.336	6.7128	11.322	7.8034	9.6385	11.04	11.026	12.228	11.621	7.4391
239	11.329	6.8744	11.545	8.0056	9.8971	11.316	11.308	12.534	11.923	7.765
240	11.313	7.0313	11.763	8.2036	10.152	11.588	11.587	12.838	12.222	8.0905
241	11.289	7.1833	11.976	8.3971	10.404	11.856	11.863	13.139	12.519	8.4154
242	11.256	7.3304	12.184	8.5865	10.653	12.123	12.136	13.438	12.815	8.7416
243	11.217	7.4723	12.386	8.7708	10.897	12.384	12.405	13.732	13.106	9.0652
244	11.169	7.609	12.582	8.9501	11.138	12.641	12.67	14.024	13.393	9.388
245	10.992	7.659	12.696	9.0523	11.316	12.838	12.877	14.264	13.631	9.6932
246	10.808	7.7034	12.802	9.1487	11.488	13.028	13.079	14.498	13.863	9.9966
247	10.615	7.7356	12.892	9.232	11.647	13.204	13.266	14.717	14.081	10.29
248	10.414	7.7619	12.974	9.3094	11.799	13.373	13.447	14.93	14.292	10.583
249	10.325	7.8639	13.127	9.4544	12.007	13.596	13.679	15.19	14.55	10.895
250	10.231	7.9603	13.273	9.5936	12.209	13.813	13.905	15.443	14.801	11.204
251	10.13	8.0507	13.411	9.7267	12.405	14.023	14.125	15.69	15.047	11.511
252	10.02	8.1317	13.537	9.8501	12.591	14.223	14.335	15.927	15.283	11.812
253	9.9033	8.2092	13.659	9.9705	12.775	14.42	14.542	16.162	15.517	12.116
254	9.7854	8.2844	13.776	10.088	12.956	14.614	14.746	16.392	15.747	12.419
255	9.5196	8.3627	13.921	10.241	13.22	14.899	15.05	16.743	16.1	12.921
256	-9.3386	-2.386	0.73186	0.13312	3.3548	3.8171	4.2337	5.0268	5.1663	10.275

North turbine noise analysis using A-weighted octave band data

Turbine ID	1 31.58	2 28.497	3 33.34	4 30.149	5 32.898	6 34.304	7 34.49	8 35.963	9 35.494	10 35.139
	North residences: residence number and sound level [dB (A)]									
257	-9.6163	-2.6077	0.45112	-0.10308	3.0837	3.5237	3.9375	4.707	4.8539	9.9813
258	-9.8964	-2.8343	0.16603	-0.34451	2.8071	3.2254	3.6364	4.3827	4.5367	9.6802
259	-10.179	-3.0664	-0.12362	-0.5917	2.5249	2.9221	3.3301	4.0539	4.2147	9.371
260	-10.479	-3.3623	-0.44735	-0.89901	2.1967	2.5855	2.9914	3.706	3.8683	9.0099
261	-10.779	-3.6582	-0.77049	-1.2061	1.869	2.2497	2.6536	3.3592	3.5229	8.6497
262	-11.074	-3.9352	-1.0836	-1.4956	1.5548	1.9237	2.3252	3.018	3.1847	8.3046
263	-9.2251	-1.9856	0.95132	0.51217	3.6499	4.0334	4.4459	5.1571	5.3295	10.616
264	-9.527	-2.2774	0.62611	0.20762	3.3209	3.694	4.104	4.8038	4.9783	10.25
265	-9.8284	-2.5689	0.30153	-0.096522	2.9926	3.3554	3.763	4.4515	4.6282	9.8862
266	-10.13	-2.8607	-0.022755	-0.4009	2.6645	3.0173	3.4225	4.1	4.2787	9.5226
267	15.853	8.7544	12.613	9.2593	10.227	11.409	11.273	12.101	11.527	6.5385
268	15.934	8.994	12.93	9.5394	10.559	11.76	11.628	12.477	11.896	6.9003
269	16.004	9.2309	13.247	9.8184	10.892	12.112	11.984	12.856	12.269	7.2655
270	16.063	9.4631	13.559	10.093	11.222	12.462	12.339	13.232	12.64	7.6293
271	16.109	9.6879	13.865	10.362	11.548	12.808	12.69	13.607	13.008	7.9919
272	16.151	9.9155	14.176	10.635	11.879	13.16	13.046	13.988	13.382	8.3602
273	16.178	10.135	14.48	10.901	12.206	13.508	13.399	14.366	13.754	8.7272
274	16.194	10.351	14.78	11.163	12.531	13.855	13.752	14.745	14.126	9.0952
275	16.198	10.562	15.079	11.423	12.856	14.203	14.106	15.126	14.5	9.4667
276	16.192	10.768	15.371	11.678	13.177	14.548	14.456	15.505	14.872	9.8368
277	16.175	10.968	15.66	11.929	13.497	14.891	14.806	15.884	15.243	10.208
278	16.152	11.166	15.946	12.179	13.816	15.234	15.155	16.264	15.616	10.58
279	16.115	11.356	16.224	12.42	14.129	15.572	15.5	16.64	15.984	10.951
280	16.204	11.694	16.667	12.814	14.597	16.068	16.002	17.173	16.508	11.449

South turbine locations: Turbines are Vestas V90

Turbine	Longitude			Latitude		
ID	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
281	-120	2	56.4	45	35	57.0
282	-120	2	54.5	45	35	53.4
283	-120	2	54.6	45	35	22.6
284	-120	2	50.9	45	35	18.9
285	-120	2	15.3	45	36	42.0
286	-120	2	20.3	45	36	25.3
287	-120	2	18.5	45	36	21.7
288	-120	2	16.6	45	36	18.2
289	-120	2	3.1	45	36	16.6
290	-120	1	49.6	45	36	14.9
291	-120	1	47.7	45	36	11.4
292	-120	1	45.9	45	36	7.9
293	-120	1	44.0	45	36	4.3
294	-120	1	42.2	45	36	0.7
295	-119	59	5.2	45	35	8.3
296	-119	59	7.8	45	35	3.5
297	-119	59	6.0	45	34	59.9
298	-119	59	4.1	45	34	56.4
299	-119	59	2.3	45	34	52.8
300	-119	59	0.4	45	34	49.3
301	-119	58	52.0	45	38	10.5
302	-119	58	52.0	45	38	6.0
303	-119	58	39.0	45	38	18.4

South turbine noise analysis using A-weighted octave band data

Turbine ID	South residences: residence number and sound level [dB(A)] 11 39.187	12 39.135	14 39.207	13 34.597	16 39.253	15 35.516	17 31.88	18 33.539	20 33.572	19 40.333	22 28.99
281	20.348	20.185	20.413	8.7793	20.542	27.678	23.413	5.4577	5.3062	25.871	1.9949
282	20.259	20.099	20.328	8.8018	20.462	27.521	23.388	5.6577	5.5173	26.421	2.2382
283	17.943	17.809	18.024	7.6675	18.185	27.096	24.115	6.0933	6.0644	29.705	3.206
284	17.884	17.753	17.968	7.7555	18.134	26.531	23.738	6.387	6.3709	30.465	3.55
285	26.701	26.481	26.742	12.806	26.819	21.617	17.463	6.8448	6.501	22.264	2.4503
286	25.326	25.127	25.386	12.134	25.503	22.938	18.828	7.1268	6.8437	24.315	2.9798
287	25.287	25.09	25.351	12.197	25.478	22.916	18.867	7.3722	7.0991	24.88	3.2569
288	25.229	25.036	25.298	12.253	25.434	22.876	18.893	7.614	7.3511	25.452	3.5316
289	26.396	26.202	26.477	13.238	26.634	21.657	17.866	8.5954	8.3221	26.215	4.4161
290	27.553	27.359	27.646	14.233	27.83	20.463	16.843	9.5901	9.3051	26.88	5.3065
291	27.391	27.203	27.489	14.267	27.683	20.384	16.829	9.8404	9.5669	27.49	5.5923
292	27.207	27.026	27.31	14.292	27.512	20.291	16.806	10.088	9.8261	28.115	5.8771
293	26.999	26.825	27.106	14.308	27.317	20.187	16.773	10.333	10.084	28.759	6.1624
294	26.768	26.601	26.878	14.312	27.096	20.075	16.733	10.571	10.335	29.42	6.4435
295	22.624	22.687	22.757	21.092	23.025	7.3	5.3233	25.34	25.254	26.837	20.222
296	22.062	22.119	22.194	20.418	22.459	7.405	5.4793	25.113	25.098	27.323	20.316
297	21.547	21.604	21.677	20.101	21.938	7.2112	5.3275	25.325	25.359	27.241	20.682
298	21.04	21.096	21.168	19.776	21.425	7.017	5.1751	25.516	25.601	27.14	21.041
299	20.535	20.59	20.661	19.445	20.915	6.8155	5.0153	25.694	25.832	27.012	21.403
300	20.041	20.097	20.166	19.112	20.416	6.6144	4.8552	25.848	26.041	26.866	21.754
301	29.686	29.839	29.542	28.116	29.255	3.0037	-0.073565	11.67	10.734	9.6994	5.1424
302	30.332	30.498	30.188	28.68	29.9	3.208	0.13728	12.116	11.177	10.129	5.5523
303	27.651	27.798	27.521	28.058	27.261	1.8803	-1.1616	11.325	10.367	8.5382	4.7907

South turbine noise analysis using A-weighted octave band data

Turbine	South residences: residence number and sound level [dB(A)]									
	21	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
ID	**29.321**	**25.97**	**23.261**	**22.205**	**29.695**	**31.632**	**29.315**	**30.886**	**20.702**	**19.344**
281	19.177	-0.10627	-2.2181	-2.9567	3.7924	11.677	3.9512	8.4133	-3.9139	-4.6463
282	19.458	0.14446	-1.9744	-2.7083	4.0953	12.079	4.2635	8.7814	-3.6555	-4.3764
283	22.673	1.2469	-0.89949	-1.5641	5.7012	14.808	5.9861	11.123	-2.3732	-2.9385
284	22.786	1.5986	-0.55623	-1.2162	6.1113	15.336	6.4064	11.608	-2.0154	-2.5698
285	12.82	0.097917	-1.9798	-2.8506	3.1024	8.9776	3.0456	6.3885	-4.0714	-5.1048
286	14.609	0.67822	-1.4315	-2.2707	3.9772	10.426	3.9784	7.6469	-3.4248	-4.3809
287	14.854	0.95791	-1.1613	-1.9975	4.3061	10.833	4.3143	8.028	-3.1443	-4.092
288	15.091	1.2354	-0.89312	-1.7263	4.6333	11.239	4.6487	8.4082	-2.8657	-3.8049
289	14.55	2.0778	-0.069853	-0.92071	5.4323	11.838	5.4242	9.0795	-2.092	-3.067
290	13.97	2.9237	0.75685	-0.11259	6.2281	12.408	6.1943	9.7318	-1.3174	-2.3302
291	14.163	3.2119	1.0346	0.16827	6.5698	12.827	6.5432	10.127	-1.0291	-2.0333
292	14.35	3.4996	1.3118	0.4487	6.9121	13.249	6.893	10.524	-0.74082	-1.7361
293	14.534	3.7882	1.5898	0.73027	7.2574	13.679	7.2461	10.927	-0.451	-1.4369
294	14.713	4.0733	1.8645	1.0087	7.6007	14.11	7.5977	11.331	-0.1638	-1.1398
295	7.0853	17.104	14.408	13.306	20.404	21.619	19.956	21.143	11.714	10.259
296	7.4028	17.248	14.531	13.453	20.806	22.325	20.398	21.796	11.908	10.502
297	7.373	17.617	14.874	13.801	21.296	22.743	20.892	22.284	12.269	10.874
298	7.3408	17.982	15.213	14.146	21.789	23.161	21.389	22.777	12.626	11.244
299	7.3005	18.351	15.555	14.495	22.295	23.581	21.9	23.28	12.99	11.62
300	7.2571	18.713	15.89	14.838	22.801	23.996	22.411	23.784	13.348	11.992
301	-2.9217	2.3913	0.73269	-0.4548	2.13	1.7814	1.4646	1.2424	-2.3768	-4.2479
302	-2.6377	2.7852	1.1093	-0.081711	2.5519	2.2052	1.8856	1.6685	-2.0066	-3.8787
303	-3.9835	2.0608	0.4618	-0.73224	1.5784	0.91589	0.88641	0.47544	-2.6804	-4.5886

Transformer locations

Transformer ID	Longitude			Latitude		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Transformer 1 (North substation)	-120	5	0.2	45	43	59.5
Transformer 2 (North substation)	-120	5	0.2	45	43	59.5
Transformer 3 (North substation)	-120	5	0.2	45	43	59.5
Transformer 4 (North substation)	-120	5	0.2	45	43	59.5
Transformer 5 (South substation)	-119	59	3.8	45	35	49.2

Transformer sound levels using 105 dB (A) for each north transformer and 101 dB(A) for the south transformer

North residences: residence number and sound level [dB(A)]

Transformer ID	**1 13.926**	**2 13.834**	**3 20.104**	**4 16.02**	**5 19.437**	**6 21.348**	**7 21.523**	**8 23.473**	**9 22.724**	**10 18.812**
Transformer 1	7.9013	7.7779	14.04	9.9577	13.364	15.271	15.446	17.39	16.641	12.726
Transformer 2	7.9526	7.8508	14.125	10.035	13.449	15.36	15.535	17.483	16.733	12.801
Transformer 3	7.8968	7.8307	14.108	10.023	13.449	15.362	15.539	17.493	16.744	12.838
Transformer 4	7.8687	7.7906	14.061	9.9804	13.403	15.313	15.49	17.442	16.693	12.796
Transformer 5	-34.888	-26.445	-25.193	-24.542	-22.544	-22.671	-22.36	-22.19	-21.894	-17.038

South residences: residence number and sound level [dB(A)]

Transformer ID	**11 22.152**	**12 22.264**	**14 22.303**	**13 19.714**	**16 22.608**	**15 1.061**	**17 -1.4217**	**18 17.620**	**20 17.044**	**19 17.677**
Transformer 1	-19.443	-19.503	-19.522	-24.815	-19.681	-21.94	-24.354	-35.479	-36.149	-29.639
Transformer 2	-19.415	-19.476	-19.495	-24.78	-19.654	-21.939	-24.356	-35.448	-36.119	-29.623
Transformer 3	-19.364	-19.424	-19.443	-24.735	-19.603	-21.882	-24.299	-35.403	-36.073	-29.569
Transformer 4	-19.379	-19.439	-19.458	-24.755	-19.618	-21.882	-24.298	-35.42	-36.09	-29.578
Transformer 5	22.151	22.262	22.302	19.713	22.607	0.97245	-1.5116	17.62	17.044	17.677

South residences: residence number and sound level [dB(A)]

Transformer ID	**22 10.987**	**21 -1.0664**	**23 7.7497**	**24 5.2707**	**25 4.0524**	**26 9.6736**	**27 10.250**	**28 9.0954**	**29 9.6852**	**30 2.2205**	**31 0.509**
Transformer 1	-40.628	-31.89	-42.993	-44.584	-45.613	-42.185	-39.078	-42.533	-40.863	-47.251	-48.802
Transformer 2	-40.599	-31.889	-42.964	-44.554	-45.584	-42.161	-39.061	-42.509	-40.844	-47.223	-48.775
Transformer 3	-40.553	-31.834	-42.918	-44.51	-45.539	-42.113	-39.009	-42.46	-40.793	-47.178	-48.73
Transformer 4	-40.569	-31.834	-42.934	-44.526	-45.555	-42.126	-39.019	-42.474	-40.804	-47.193	-48.744
Transformer 5	10.987	-1.0809	7.7496	5.2705	4.0522	9.6735	10.249	9.0953	9.685	2.2203	0.50881

AA1

Respond to OAR 345-021-0010(1)(aa).

ELECTRIC TRANSMISSION LINES

Placement of Transmission Lines

Most of the electric transmission lines serving the proposed facility (collector lines and high-voltage lines) are within the facility's leased property, and therefore no rights-of-way corridors have been established.

Where transmission lines are placed at the perimeter of the property, or where transmission corridors have been established to connect portions of the property, all transmission rights-of-way are 250 feet wide. Rights-of-ways along roads were measured from the road centerline.

No commercial establishments, industrial facilities, schools, daycare centers or hospitals are within 200 feet on each side of the proposed center line of any proposed transmission line. Three occupied residences are within the site boundary, and one occupied residence is located within 200 feet of the proposed center line of a proposed transmission line.

Because transmission corridors have not been established within the site boundary, Applicant proposed to establish the distance from the proposed center line to the three residences within the site boundary by condition: 100 feet is proposed. The residence outside of the site boundary is located 180 feet from the center line of the proposed overhead collector line.

Predicted Electric and Magnetic Fields

Figures RAI#2 AA1a and RAI#2 AA1b were provided by Applicant's electrical consultant to show predicted field levels. The line in question is a ten mile, 230kV line for a 336 MW wind project.

Measures to Reduce Field Levels

Applicant's transmission systems are designed to minimize electric and or magnetic fields. Routine measures taken include: optimization of conductor phase alignments to minimize mutual coupling of the phases; and proper orientation of all line components to minimize electric and magnetic fields.

Assumptions and Methods

Applicant's consultant uses the Enviro software package to simulate operating conditions and calculate all currents and electric and magnetic fields. Sample plots of electric and magnetic field results are shown in Figures RAI#2 AA1a and RAI#2 AA1b.

Field Measurements

After the line is placed in service, actual field measurements of electric and magnetic field strengths are taken at various locations on the line route to confirm that the line, as constructed, conforms to the levels calculated during design.

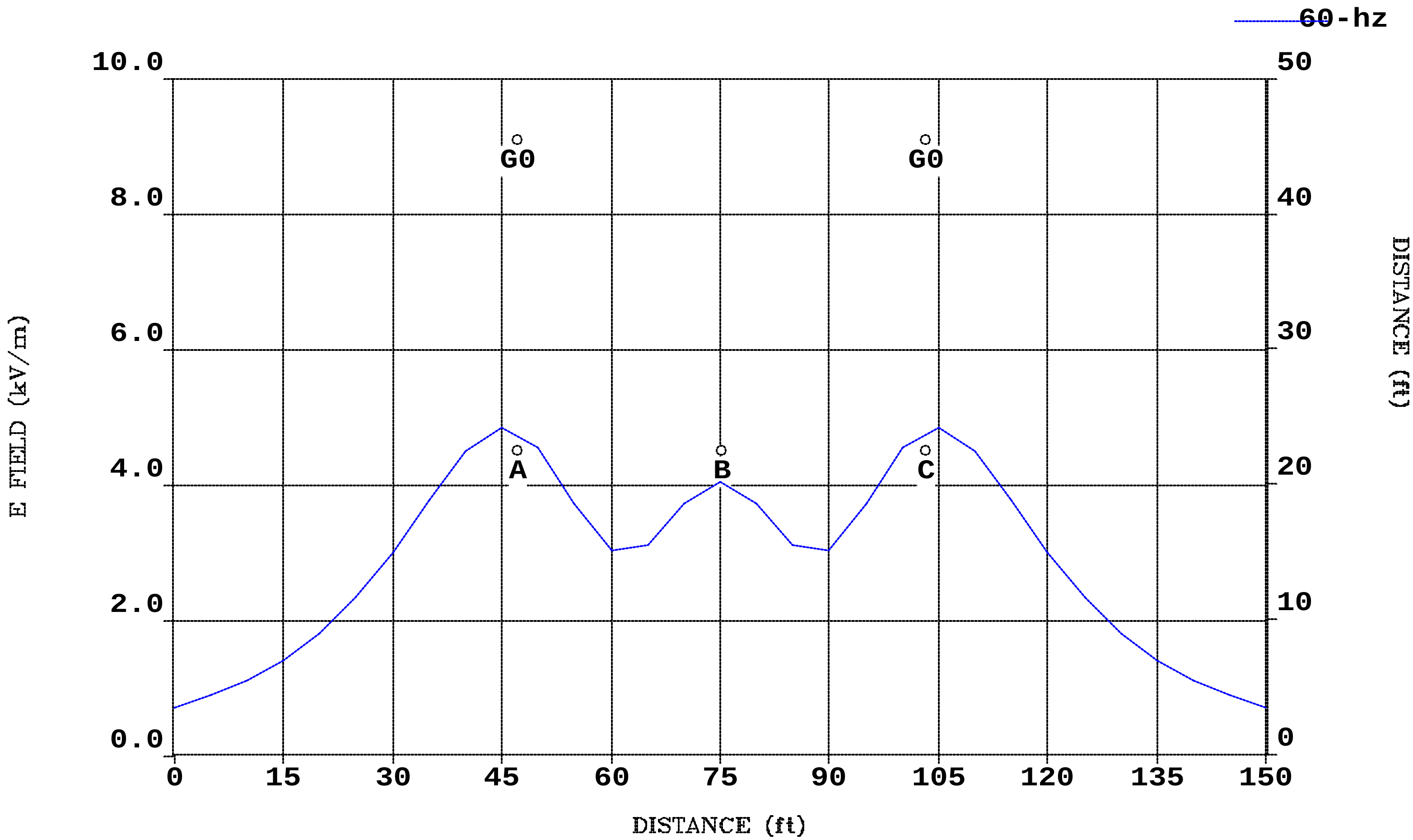
Radio Interference

None of the facility's proposed transmission corridors are near interstate, US, or state highways. If radio interference is above acceptable levels near interstate, US, or state highways, it can be reduced by the following practical methods:

- Use of Corona-Free fittings and connectors – this will increase material costs, but will have the least overall cost impact of RIV reducing measures; or
- Use of bundled conductors instead of single conductors – this will increase both material and construction costs, and will have the largest cost impact.

FLAT ROCK 230KV-3 POLE ANGLE

Electric Field Profile - (C:\DATA\PROJECTS\FLATROCK\ENVIRO\122002\FR2303WP.EMF)

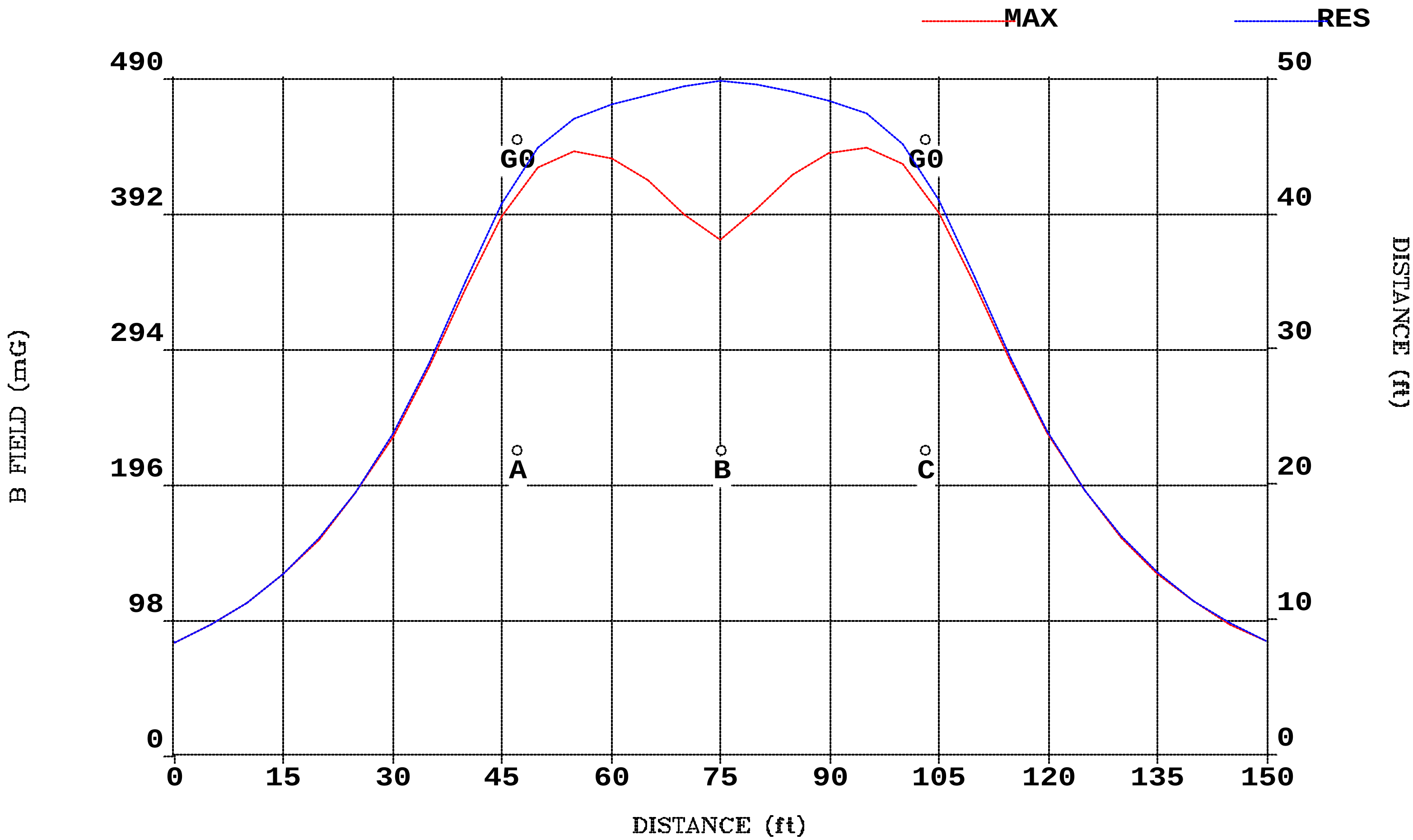


Min Value: 0.7 kV/m at 0.0 ft

Max Value: 4.9 kV/m at 45.0 ft

FLAT ROCK 230KV-3 POLE ANGLE

Magnetic Field Profile - (C:\DATA\PROJECTS\FLATROCK\ENVIRO\122002\FR2303WP.EMF)



Min RES: 82.2 mG at 0.0 ft

Max RES: 488.8 mG at 75.0 ft

Min MAX: 82.2 mG at 0.0 ft

Max MAX: 441.3 mG at 95.0 ft

RAI#3, AA1B: ELECTRIC TRANSMISSION LINE

(Follow-Up) Describe specific measures CSF would undertake to minimize electric and magnetic fields that could affect occupied residences located less than 200 feet from the centerline of any 230-kV overhead transmission line and the aboveground and underground segments of the 34.5-kV collector system. In addition, specifically address occupied residences located less than 200 feet from the centerline of any 230-kV overhead transmission line that would be "understrung" with 34.5-kV collector lines.

OCCUPIED RESIDENCES

No occupied residences are located less than 200 feet from the centerline of any 230 kV overhead line; aboveground or underground segments of the 34.5 kV collector system; or any 230 kV overhead transmission line understrung with 34.5 kV collector lines. Please see Applicant's response to RAI#3, AA1.

RAI#3, AA1: ELECTRIC TRANSMISSION LINE

(Follow-Up) CSF must provide evidence in support of a Council finding that the proposed SFWF can meet the applicable standards. Such evidence would include the distance in feet from the proposed center line of the transmission line for each residence located within 200 feet of the centerline, a graph of the predicted electric and magnetic fields levels from the proposed center line to 200 feet <u>on each side</u> *of the proposed center line, and the assumptions and methods used in the electric and magnetic field analysis, including the current in amperes on each proposed transmission line. The response should address a site layout that would enable CSF to satisfy the requirements of the applicable standards.*

APPLICABLE STANDARDS

Applicant proposes to satisfy the requirements of the applicable standards by siting the center line of no transmission line within 200 feet of any residence.

Applicant's response to RAI#2, AA1 identified one occupied residence within 200 feet of the center line of a proposed transmission line. This transmission line will be located on the north side of the road, assuring that the distance from the center line of the transmission line will be more than 200 feet from the residence. This location is already within the site boundary.

For the three residences within the site boundary, Applicant proposes that, by condition, no center line of any transmission line be located within 200 feet of any residence.

Applicant's Electrical and Magnetic Field Calculations are attached to this response.

Patricia Pilz

From: Patricia Pilz [Pat@PilzandCo.com]
Sent: Wednesday, November 07, 2007 2:43 PM
To: 'John White'; 'John Larson'
Subject: RE: electric and magnetic fields

ExAA Electrical.doc (38 KB)

EMF
ılations_10-31-07.p

Good day gentlemen,

Here is our response to your e-mail of 26 October, for the record. In addition to the attachments, I have inserted other answers and comments in the text below (>>):

Pat,
After reviewing the information you sent on Tuesday, it is apparent that there is confusion about what we need in regard to potential electric and magnetic fields. In part, the problem stems from the language of OAR 345-021-0010(1)(aa)(A), which appears to focus on whether there are "occupied structures" within 200 feet of the centerline of any transmission line. If it were merely a matter of avoiding placing transmission lines within 200 feet of a residence, applicants could simply agree by condition not to place transmission lines closer than 200 feet. It's not that simple.

There are two issues. The first is potential electric fields. For this, the Council has a very specific standard. OAR 345-024-0090 requires a Council finding that the applicant can design, construct and operate proposed transmission lines so that electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public.

The second issue is magnetic fields. There is no specific Council standard for this (we address it under the discussion of health and safety issues not addressed by specific standards). Over the last decade or so we have spent a great deal of time researching the issue of whether there are adverse health effects from magnetic fields and, if so, at what exposure level. Not coincidentally, much of the research that has found evidence of adverse health effects have been studies of residential or occupational exposure where transmission lines are located close to buildings where people live or work (within, say, 200 feet). While the conclusion adopted so far by the Council is that there is inconclusive credible evidence of a health risk from low exposure to magnetic fields, we nevertheless require a discussion of this issue and require certificate holders to take "prudent avoidance" steps to minimize the potential risk.

From your response to RAI AA1 (follow-up), it is my understanding that CSF will agree, by condition, to avoid placing the centerline of any transmission line within 200 feet of any residence.

>>Yes. This is easy.

I note that this is a change from your initial response to RAI AA1, which proposed a 100-foot setback.

>>Yes. That was my error as I did the (simple) math wrong. Carol should
>>have calculated it.

We will include, by condition, the general requirement that the certificate holder take reasonable steps to reduce human exposure to magnetic fields, for example by notifying landowners of the location of transmission lines (including collector lines) on their property and advising them of possible health risks (a simple hand-out describing the current research on this subject would suffice). We would be very interested in any other "prudent avoidance" measures an applicant might suggest.

>>Please see attachment ExAA Electrical.

The information that you have provided to date on electric fields is incomplete. To support a finding by the Council that each proposed transmission line would satisfy the applicable standard (OAR 345-024-0090), the record must contain information about each transmission line configuration. The proposed facility would incorporate four distinct transmission line configurations: (1) aboveground 230-kV transmission line; (2) aboveground 230-kV transmission line “understrung” with 34.5-kV transmission line; (3) aboveground 34.5-kV transmission line; and (4) underground 34.5-kV transmission line.

>>The reason for this is our reading of accessible to the public, which
>>I will discuss below.

The October 22, 2007, report from MSE Power Systems that you provided in response to RAI AA1 (follow-up) comes close to what we need for configuration-2 (230 kV with understrung 34.5 kV). In particular, the data table showing both magnetic and electric fields out to 100 feet on either side of the centerline is very helpful and provides good evidence that the potential electric field would not exceed the 9 kV per meter standard (a table out to 200 feet would be better, but this table is good enough for this one configuration). To make the data meaningful, however, we need to know the minimum ground clearances of the conductors for both the 230 and the 34.5 lines and whether the actual line would, in fact, be built to maintain those minimum clearances. We also need to know the input assumptions for both voltage and current and whether those assumptions are reasonably representative of actual field conditions for the transmission lines as they would be built and operated. You may offer condition language to assure the Council that the actual lines that get built will conform to the assumptions used in the analysis (or otherwise that the predicted field strength values are sufficiently conservative in the underlying assumptions). We need to know whether the transmission lines would be single-circuit or double-circuit lines and other pertinent background information. For configuration-2, for example, pertinenet information might address whether there would be any “canceling” effect as a result of mounting the two transmission lines on the same towers.

>>Please see attachment EMF calculations.

Please note that, for the electric field standard, a 200-foot setback from occupied structures is not relevant. The standard must be met in all areas accessible to the public. In this case, we would treat most, if not all, of the transmission lines proposed for the SFWF as accessible all the way to the centerline (the only line that would not be accessible might be a portion of a line that is within a fenced substation).

>>We did not consider the landlords to be the public, and now understand
>>that the Council does. For the rest, the land is posted against
>>trespass, there will be fences, gates, etc. But landlords and their
>>employees will clearly have access.

With respect to the underground 34.5-kV transmission line, other applicants have stated in their applications that there would be no measurable electric field at the surface of the ground above the underground transmission lines, because the electric field is contained within the insulation of the cable. Applicants have described the shielding properties of the insulation and the fact that the lines would be a minimum of three feet below ground. For the record on SFWF, assuming the same would be true for your underground lines, would you please include in your response an explanation why there would be no measurable electric field at one meter above ground surface directly above with the underground 34.5-kV transmission lines proposed for the SFWF.

>>Please see attachments.

We need to have data to support a conclusion that the electric field standard would be met for configurations 1, 3 and 4, similar to what you have provided for configuration-2. (Note that, while data on predicted magnetic field strength is not needed to meet the Council standard, we like to have it, because published research on magnetic fields will often discuss specific field strength values.)

Finally, the second part of OAR 345-024-0090 requires a finding that the applicant can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable. The application record should contain a discussion of the induced current phenomenon and what can and will be done to reduce induced current risks.

>>Please see attachments.

Regards,
John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us

EMF, Exhibit AA

Calculation assumptions

For electric and magnetic field strength, the minimum height above ground for 34.5 kV lines (on both low-voltage poles and where underbuilt on high-voltage poles) was 18.5 feet. The minimum height above ground for 230 kV lines was 22.4 feet. The maximum operating temperature was 100°C with an air temperature of 40°C and wind speed of 2 ft/sec.

The conductor size and manufacturer modeled were:
OHGW - 7#8 Alumoweld
230kV - 795 kCM 26/7 ACSR (Drake)
35kV - 795 kCM 26/7 ACSR (Drake)
Neutral - 4/0 AWG 6/1 ACSR (Penguin)

Electric field strength is directly proportional to the voltage of the line, and is lower when the distance to the conductors is greater. For calculation of electric fields, the voltages used for the 230 and 34.5 kV lines were 242 and 37 kV, respectively. Magnetic field strength is directly proportional to line amperage. Magnetic fields are lower when: the distance to the conductors is greater; the current in a conductor is matched by an opposing current in a nearby conductor; the distance between adjacent opposing conductors is reduced; and the conductor is shielded. For magnetic field strength calculations, when more than one circuit was on the same transmission structure circuits were phased and arranged to minimize magnetic field strength. At the temperatures and wind speed listed, above, the steady-state thermal rating for Drake ACSR is 983.5 amperes. This line load was used for calculation of magnetic field strength.

Electric and magnetic field strengths were calculated using the industry-accepted Electric Power Research Institute Red Book methodology.

Configuration of the SFWF typical layout

There are approximately 16.7 miles of transmission lines installed on high-voltage power poles. Four miles will carry double circuit 230 kV lines and the remainder of the 230 kV lines will be single circuit. Of the high-voltage power poles, 4.1 miles are configured (underbuilt) to carry 34.5 kV lines with two circuits and 5.6 miles are underbuilt and carry one circuit. There are 22.2 miles of single-circuit medium voltage power poles with 34.5 kV lines, and 64.3 miles of underground 34.5 kV lines.

Electric and magnetic field strengths

For underground 34.5 kV collector lines, no electric field will be measurable at 1 meter above ground surface. The insulation around the conductor and the presence and configuration of the grounded concentric neutral ensures no current passes from the conductors to the ground or between adjacent conductors. The soil above buried lines provides shielding for electric fields but does not eliminate magnetic fields. The insulation and concentric neutral provide some shielding of magnetic field.

Predicted field strength of aboveground installations one meter above ground surface

Configuration	Voltage	Magnetic Field (mG)			Electric Field (kV/m)		
		200 ft	Max.	-200 ft	200 ft	Max.	-200 ft
High voltage	230 kV	5.39	339.90	5.39	0.027	4.373	0.027
High voltage, underbuilt	230 and 34.5 kV	1.21	374.27	0.55	0.030	1.740	0.030
Low voltage	34.5 kV	1.38	128.85	1.38	0.002	0.191	0.002

Reduction of electric and magnetic fields

Applicant proposes to construct overhead lines 10% higher above ground than the height modeled. The minimum height above ground for 34.5 kV lines (on both low-voltage poles and where underbuilt on high-voltage poles) will be 20.4 feet and the minimum height above ground for 230 kV lines will be 24.6 feet. For multiple circuits on the same structure, circuit phasing will be arranged to reduce magnetic fields.

Induced voltage and current

Induced voltage and current effects caused by the field strengths calculated for the SFWF generally cause nuisance shocks rather than present a hazard. Effects would be highest for long objects that are parallel and close to the transmission line, such as fences, agricultural irrigation pipes, railroad tracks, fuel pipelines and other transmission lines.

Health effects

The primary health effect that has been associated with low-level magnetic field exposure is childhood leukemia, and there is an association between high-level job related exposure and adult chronic lymphocyte leukemia. Both of these associations are weak and not conclusive. Electric and magnetic field exposure may also increase the risk of adult brain cancer, Lou Gehrig's Disease, miscarriage and an increased risk of suicide, although the evidence is weaker than for leukemia. Common household appliances are generally the primary source of magnetic field exposure except to workers in some industries.

Mitigation of electric and magnetic field effects

Applicant will include magnetic field strength evaluation in selection of cable for underground 34.5 kV installation. Applicant proposes to avoid construction of transmission line within 200 feet of any residence. Owners of property on which transmission or collector lines are sited will be informed of potential nuisance and health effects from electric and magnetic fields.

There is one section of fencing in the south part of the north project area on the west side of Eightmile Canyon that parallels a proposed transmission line for approximately 2 miles. To minimize induced current and voltage impacts, Applicant proposes to ground this fence along this parallel section. No other features of concern are sufficiently close to proposed transmission lines to present a problem.

MSE Power Systems, Inc.

Shepherd's Flats Wind Project

230KV / 35kV Typical Electric and Magnetic Field Calculations

October 31, 2007

1. PURPOSE

The purpose of these calculations is to determine the electric and magnetic field strengths along the transmission rights-of-way**.**

2. GENERAL DESCRIPTION

The transmission line will operate at 230kV. The collector line will operate at 34.5kV. The conductors used in the analysis are:

OHGW - 7#8 Alumoweld
230kV - 795 kCM 26/7 ACSR (Drake)
35kV - 795 kCM 26/7 ACSR (Drake)
Neutral - 4/0 AWG 6/1 ACSR (Penguin)

Phase configurations are as shown on each structure sketch.

3. CRITERIA

Per Oregon Administration Rules (OAR) 345-024-0090, design, construct and operate the proposed transmission line configurations such that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public.

4. CALCULATION METHODOLOGY

The electric and magnetic field strengths are calculated utilizing the industry accepted Electric Power Research Institute (EPRI) Red Book methodology.

Minimum 230kV conductor to ground clearances of 22.4 feet are used in accordance with the NESC 2007 edition for the purposes of these calculations. This results in conservative (higher) values for electric and magnetic fields. Additional electrostatic clearances due to electric fields should be calculated and applied (if necessary) for the final 230kV line design. Good design practice specifies an additional buffer beyond the minimum conductor to ground clearance dictated in the NESC 2007.

Minimum 35kV conductor to ground clearances of 18.5 feet are used in accordance with the NESC 2007 edition. This results in conservative (higher) values for electric and magnetic fields. Good design practice specifies an additional buffer beyond the minimum conductor to ground clearance dictated in the NESC 2007.

Corridor width for evaluation is 200 feet offset from each side of the centerline of the right-of-way using 5 foot increments.

The maximum operating temperature is taken to be 100 deg C with an air temperature of 40 deg C and wind speed of 2 ft/s. Thus, the steady-state thermal rating for Drake ACSR is 983.5 amperes.

Electric field calculations were performed for 1.05pu overvoltage. Therefore, the electric field calculations are performed using 242kV and 37kV.

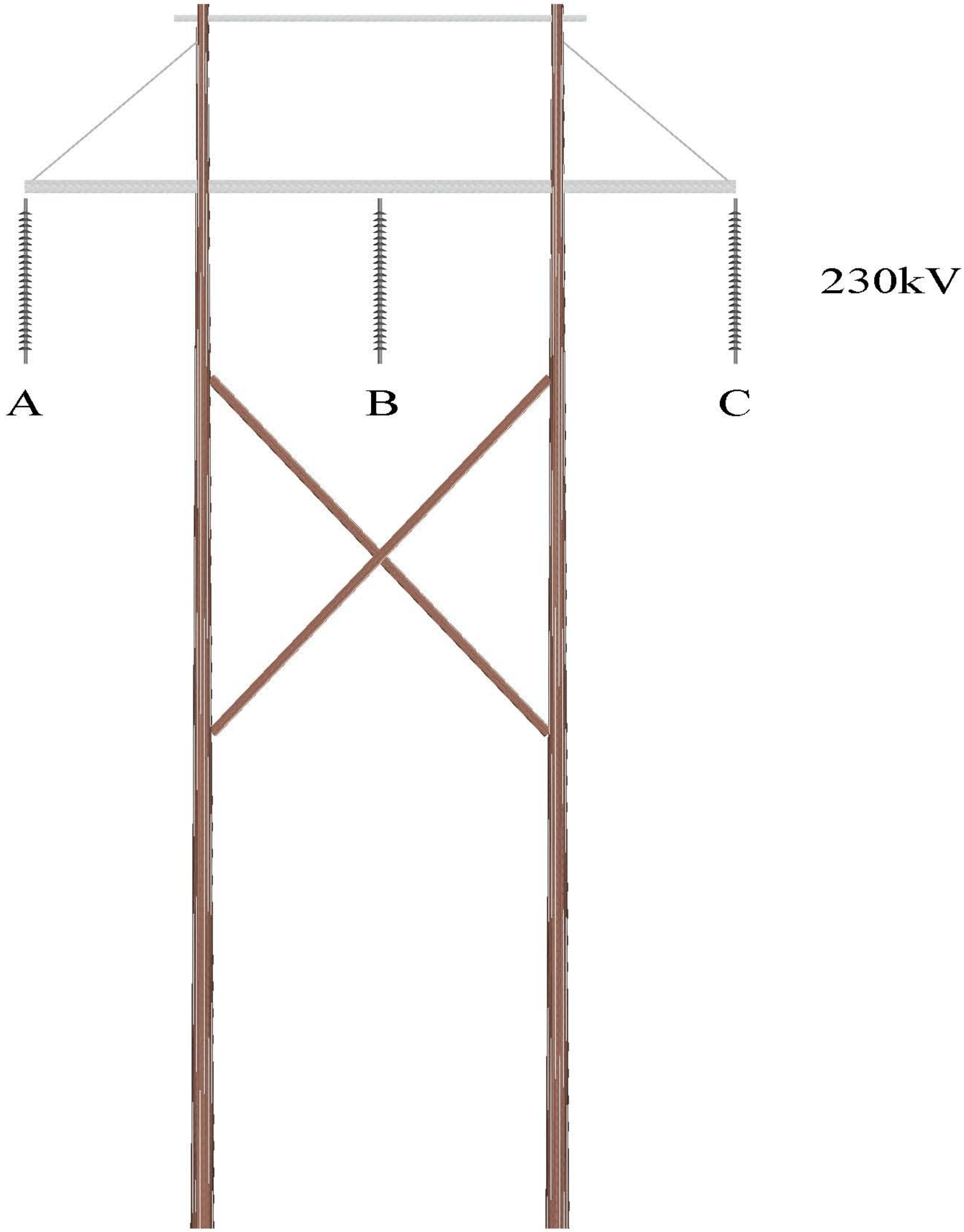
Where multiple circuits exist on the same transmission structure, the phasing of the circuits has been arranged to add a “canceling” effect on the magnetic fields.

Meter height is located at 1 meter above ground.

5. CONCLUSIONS

In all cases, the calculated maximum electric field within the ROW is less than the required 9.0kV/m at one meter above the ground surface.

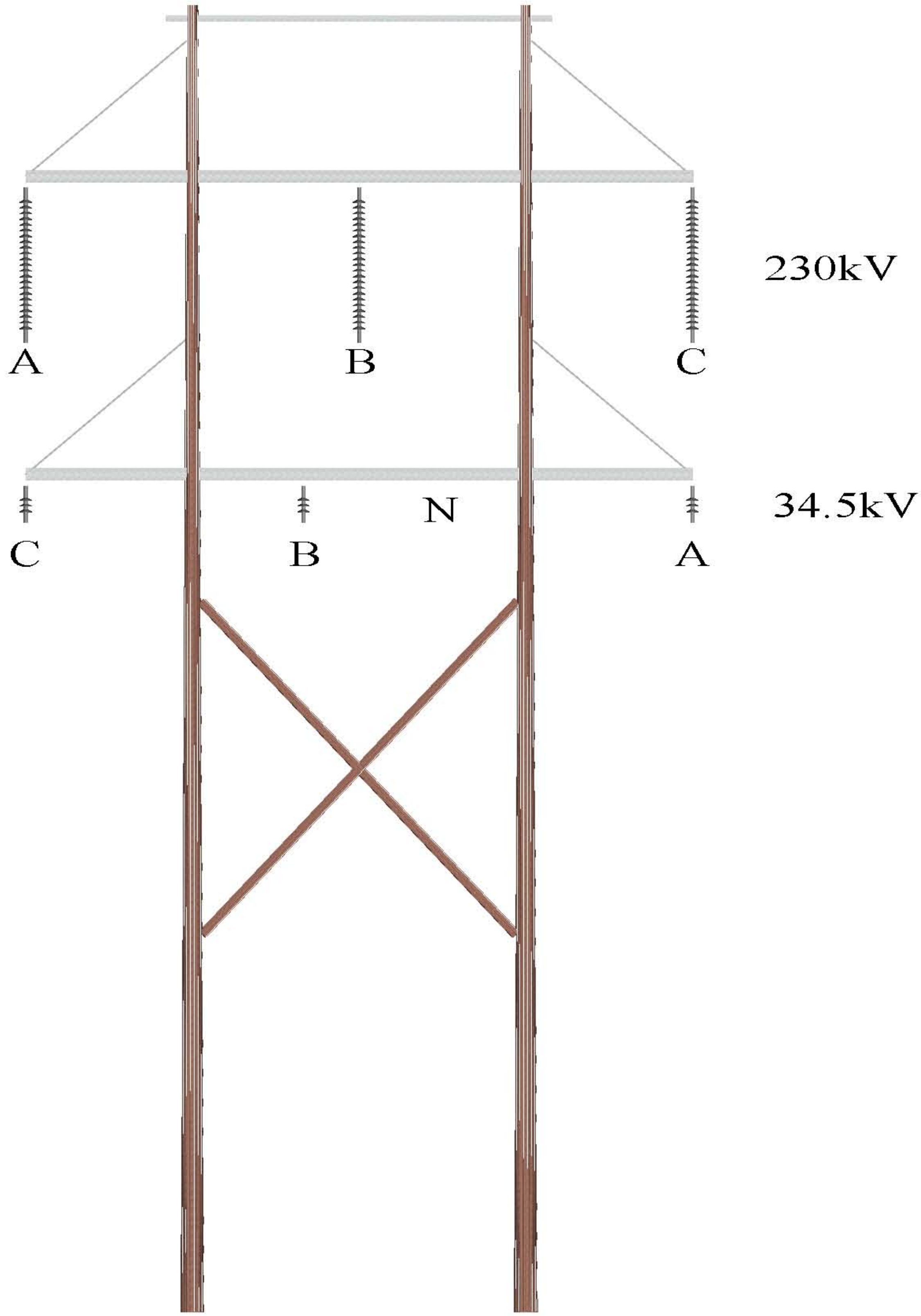
Typical 230kV Tangent Structure



Calculation Results - 230kV		
R.O.W Offset (ft)	**Magnetic Field B rms Res. (mG)**	**Electric Field E rms Res. (kV/m)**
-200	5.39	0.027
-195	5.67	0.029
-190	5.97	0.031
-185	6.30	0.034
-180	6.66	0.037
-175	7.04	0.040
-170	7.46	0.044
-165	7.92	0.048
-160	8.43	0.052
-155	8.98	0.057
-150	9.59	0.063
-145	10.27	0.070
-140	11.01	0.077
-135	11.85	0.086
-130	12.78	0.096
-125	13.82	0.108
-120	15.00	0.122
-115	16.34	0.138
-110	17.86	0.158
-105	19.60	0.181
-100	21.61	0.209
-95	23.95	0.243
-90	26.69	0.284
-85	29.92	0.336
-80	33.76	0.401
-75	38.39	0.482
-70	44.03	0.587
-65	50.97	0.723
-60	59.63	0.901
-55	70.59	1.136
-50	84.64	1.449
-45	102.87	1.864
-40	126.63	2.403
-35	157.31	3.063
-30	195.36	3.771
-25	238.29	4.313
-20	279.11	4.373
-15	309.70	3.820
-10	327.89	3.049
-5	337.04	2.815
0	339.90	2.909
5	337.04	2.815
10	327.89	3.049
15	309.70	3.819
20	279.11	4.373
25	238.29	4.313
30	195.36	3.771

Calculation Results - 230kV		
R.O.W Offset (ft)	**Magnetic Field B rms Res. (mG)**	**Electric Field E rms Res. (kV/m)**
35	157.31	3.063
40	126.63	2.403
45	102.87	1.864
50	84.64	1.449
55	70.59	1.136
60	59.63	0.900
65	50.97	0.723
70	44.03	0.587
75	38.39	0.482
80	33.76	0.401
85	29.92	0.336
90	26.69	0.284
95	23.95	0.243
100	21.61	0.209
105	19.60	0.181
110	17.86	0.158
115	16.34	0.138
120	15.00	0.122
125	13.82	0.108
130	12.78	0.096
135	11.85	0.086
140	11.01	0.077
145	10.27	0.070
150	9.59	0.063
155	8.98	0.057
160	8.43	0.052
165	7.92	0.048
170	7.46	0.044
175	7.04	0.040
180	6.66	0.037
185	6.30	0.034
190	5.97	0.031
195	5.67	0.029
200	5.39	0.027

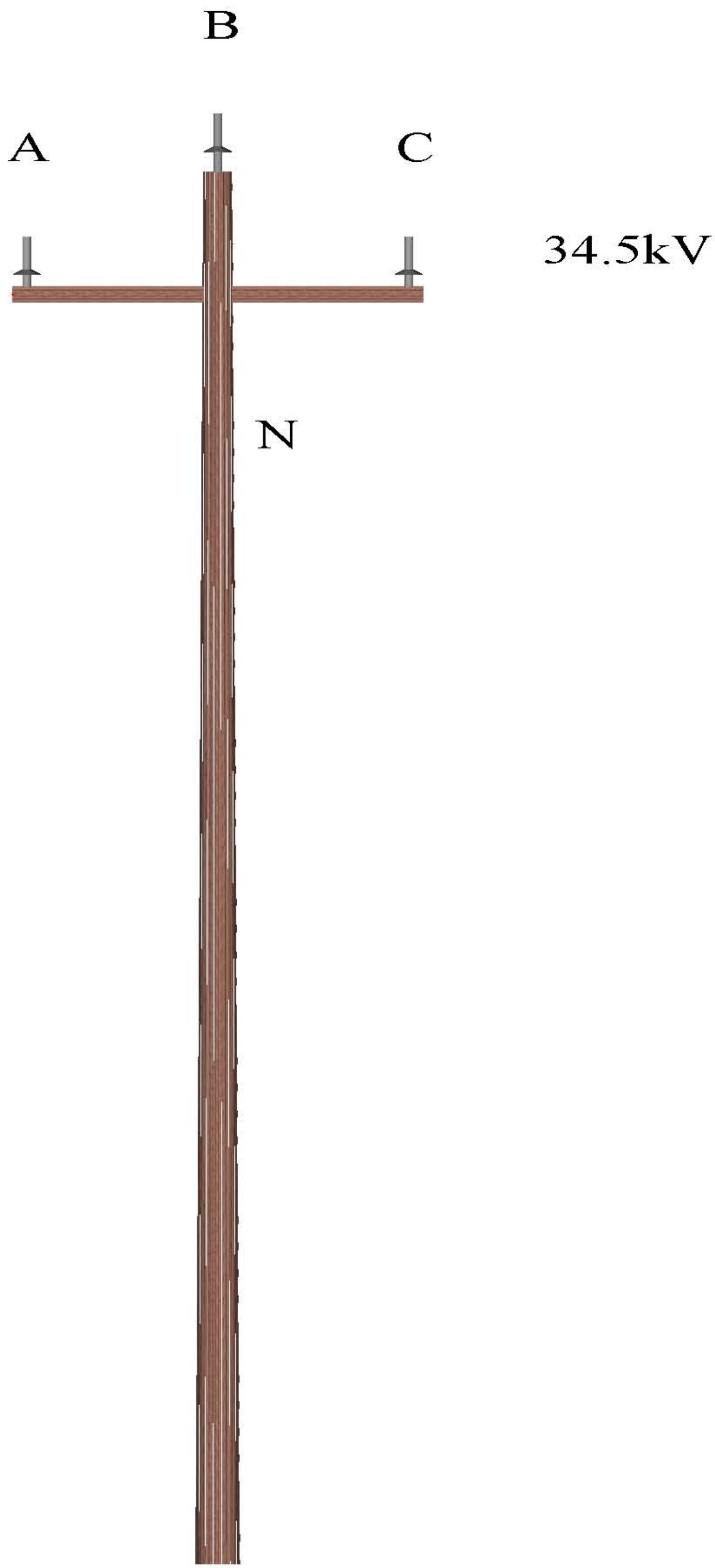
Typical 230kV Tangent Structure
with 34.5kV Underbuild



Calculation Results - 230kV with 34.5kV Underbuild		
R.O.W Offset (ft)	**Magnetic Field B rms Res. (mG)**	**Electric Field E rms Res. (kV/m)**
-200	0.55	0.030
-195	0.60	0.033
-190	0.65	0.035
-185	0.71	0.038
-180	0.77	0.041
-175	0.84	0.044
-170	0.92	0.048
-165	1.02	0.052
-160	1.12	0.057
-155	1.24	0.062
-150	1.38	0.068
-145	1.54	0.075
-140	1.73	0.083
-135	1.94	0.092
-130	2.19	0.102
-125	2.48	0.114
-120	2.83	0.128
-115	3.25	0.144
-110	3.74	0.163
-105	4.34	0.186
-100	5.07	0.212
-95	5.96	0.244
-90	7.06	0.282
-85	8.44	0.328
-80	10.20	0.385
-75	12.44	0.453
-70	15.36	0.537
-65	19.22	0.641
-60	24.40	0.767
-55	31.47	0.920
-50	41.30	1.099
-45	55.21	1.299
-40	75.13	1.500
-35	103.76	1.655
-30	144.00	1.695
-25	196.46	1.552
-20	254.65	1.235
-15	306.61	0.895
-10	346.47	0.921
-5	371.16	1.168
0	374.27	1.204
5	359.35	0.986
10	336.84	0.766
15	307.54	0.966
20	264.46	1.329
25	209.94	1.620
30	157.62	1.740

Calculation Results - 230kV with 34.5kV Underbuild		
R.O.W Offset (ft)	**Magnetic Field B rms Res. (mG)**	**Electric Field E rms Res. (kV/m)**
35	116.18	1.685
40	86.08	1.520
45	64.77	1.313
50	49.64	1.109
55	38.75	0.927
60	30.79	0.773
65	24.85	0.645
70	20.35	0.541
75	16.88	0.456
80	14.16	0.387
85	12.00	0.330
90	10.27	0.283
95	8.86	0.245
100	7.71	0.213
105	6.75	0.186
110	5.95	0.164
115	5.27	0.145
120	4.70	0.128
125	4.21	0.115
130	3.79	0.103
135	3.42	0.092
140	3.10	0.083
145	2.82	0.075
150	2.58	0.069
155	2.36	0.062
160	2.17	0.057
165	2.00	0.052
170	1.85	0.048
175	1.71	0.044
180	1.59	0.041
185	1.48	0.038
190	1.38	0.035
195	1.29	0.033
200	1.21	0.030

Typical 34.5kV Tangent Structure



Calculation Results - 34.5kV		
R.O.W Offset (ft)	**Magnetic Field B rms Res. (mG)**	**Electric Field E rms Res. (kV/m)**
-200	1.38	0.002
-195	1.45	0.002
-190	1.53	0.002
-185	1.61	0.002
-180	1.70	0.002
-175	1.79	0.002
-170	1.90	0.002
-165	2.02	0.003
-160	2.14	0.003
-155	2.28	0.003
-150	2.43	0.003
-145	2.60	0.004
-140	2.78	0.004
-135	2.99	0.004
-130	3.22	0.005
-125	3.47	0.005
-120	3.76	0.006
-115	4.09	0.007
-110	4.45	0.007
-105	4.87	0.008
-100	5.35	0.010
-95	5.91	0.011
-90	6.55	0.013
-85	7.30	0.015
-80	8.19	0.017
-75	9.24	0.020
-70	10.51	0.024
-65	12.04	0.029
-60	13.93	0.035
-55	16.27	0.043
-50	19.21	0.054
-45	22.97	0.069
-40	27.83	0.088
-35	34.22	0.114
-30	42.69	0.148
-25	53.94	0.191
-20	68.60	0.240
-15	86.69	0.279
-10	106.28	0.283
-5	122.45	0.226
0	128.85	0.148
5	122.45	0.225
10	106.28	0.282
15	86.69	0.279
20	68.60	0.239
25	53.94	0.191
30	42.69	0.148

Calculation Results - 34.5kV		
R.O.W Offset (ft)	**Magnetic Field B rms Res. (mG)**	**Electric Field E rms Res. (kV/m)**
35	34.22	0.114
40	27.83	0.088
45	22.97	0.069
50	19.21	0.054
55	16.27	0.043
60	13.93	0.035
65	12.04	0.029
70	10.51	0.024
75	9.24	0.020
80	8.19	0.017
85	7.30	0.015
90	6.55	0.013
95	5.91	0.011
100	5.35	0.010
105	4.87	0.008
110	4.45	0.007
115	4.09	0.007
120	3.76	0.006
125	3.47	0.005
130	3.22	0.005
135	2.99	0.004
140	2.78	0.004
145	2.60	0.004
150	2.43	0.003
155	2.28	0.003
160	2.14	0.003
165	2.02	0.003
170	1.90	0.002
175	1.79	0.002
180	1.70	0.002
185	1.61	0.002
190	1.53	0.002
195	1.45	0.002
200	1.38	0.002

BB1

Please address the requirements of OAR 345-024-0090. Note that we consider the 34.5-kV collector lines to be "high voltage" transmission lines for the purposes of this standard.

TRANSMISSION LINES

Limits on Electric Fields

Applicant's consultants and contractors have successfully designed and constructed transmission lines at voltages up to 345 kV with AC electric fields that do not exceed 9 kV per meter at one meter (3.28 feet) above the ground surface in areas accessible to the public. Figure RAI#2 AA1a is a copy of the Electric Field Strength plot for a 230 kV circuit line designed and constructed within these limits.

Limits on induced currents

Applicant's consultants and contractors have successfully designed and constructed several transmission lines so that induced currents resulting from the line and related or supporting facilities are as low as possible.

RAI#3, BB1: OTHER INFORMATION

(Follow-Up) Provide information to support a Council finding that alternating current electric fields would not exceed 9 kV per meter at one meter above ground surface in areas accessible to the public. OAR 345-024-0090. In addition, specifically address the overhead 230-kV overhead transmission line that would be "understrung" with 34.5-kV collector lines.

ALTERNATING ELECTRIC FIELDS

Applicant's report calculating electric and magnetic fields may be found in Applicant's response to RAI#3, AA1.

BB2

Please describe your discussions with appropriate authorities regarding any concerns about the nearby Boardman Military Operating Area.

BOARDMAN MILITARY OPERATING AREA

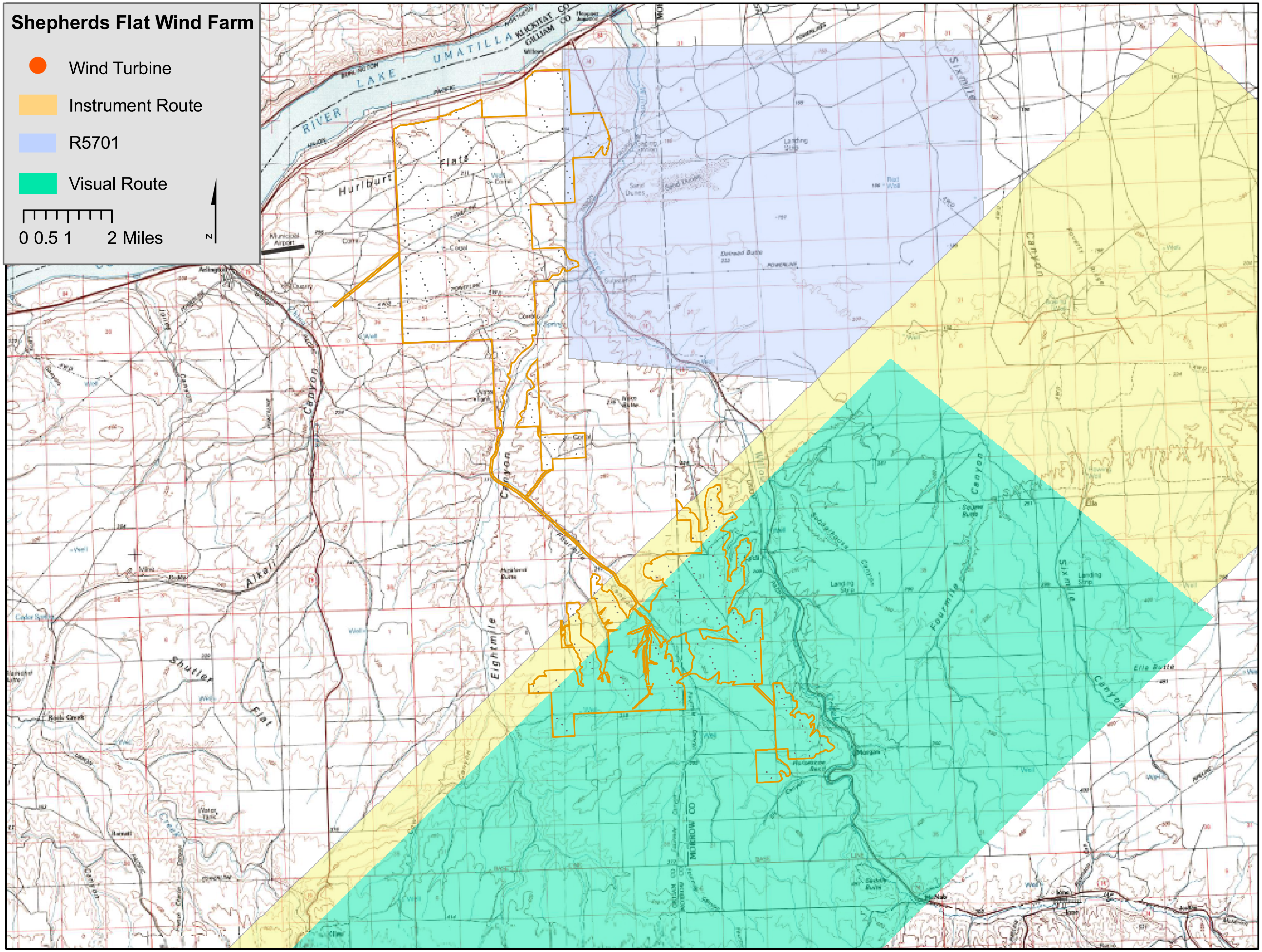
The Boardman Military Operating Area lies directly to the east of the proposed Shepherds Flat Wind Farm (SFWF). The Commanding Officer of the Naval Air Station Whidbey Island has assigned Mr. Richard Melaas, Community Planning Liaison Officer, to work with Applicant. In consultation with Mr. Melaas, Applicant developed the map shown at RAI#2 Figure BB2a. This map shows the areas of overlap between the SFWF and the military's Restricted Area 5701. The map also shows the military training routes used to enter restricted airspaces. According to Mr. Melaas, both training routes have a minimum flight altitude of 200 feet, thereby creating a conflict with wind turbines whose height might be as much as 420 feet.

The Federal Aviation Administration will determine whether facility installations are a hazard to navigable air space, considering, among other things, that navigable air space in the United States begins at 500 feet, and the frequency of use of the airspace in question.

Use of the training routes in question has diminished markedly over the past several years due to the retirement of the A-6 Intruder, which for many years dominated naval flight activity at Whidbey Island. While most of the Special Use Airspace previously used by the A-6 community still exists, neither the P-3C nor EP-3C aircraft currently based at Whidbey imposes the level of airspace impacts that were generated when Whidbey supported its full complement of Intruder squadrons.

Applicant has offered to meet with Mr. Melaas, and will continue to answer the Navy's questions and provide documents as appropriate.

Figure RAI #2 BB2a



RAI#3, BB2: OTHER INFORMATION

(Follow-Up) In your response, you indicate that there would be a conflict between proposed turbine locations and Restricted Area 5701 as well as the military training routed used to enter the restricted area. As shown on Figure BB2a, there appears to be a conflict with the eastern edge of the northern project area and with practically all proposed turbine locations in the southern project area. Please explain how this conflict can be resolved. What is the status of discussions with the Navy?

MILITARY USE OF FACILITY AIRSPACE

While the Navy would like to use portions of the project site for low altitude training flights, the project landowners, who own the airspace rights up to the 1,000 foot limit of navigable airspace, wish to have wind turbines installed.

RAC1

Please discuss your response to the ODFW comment letter from Rose Owens (March 26, 2007).

OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW) COMMENTS

Rose Owens, Habitat Special Projects Coordinator for the Oregon Department of Fish & Wildlife (ODFW), has asked for the following additional information in the application (ODFW comments are shown in italic type):

Exhibit J

This exhibit is incomplete since it does not contain documentation of field surveys determining whether or not jurisdictional wetlands and waters of the State occur within the analysis area of the project.

Please see RAI #2, responses J1 and J2.

Exhibit L

Information should be included in this section regarding the anticipated noise levels that would occur from blasting and what that noise level would be, after attenuation and when it reaches the Willow Creek Wildlife Area. Information should also be given as to wildlife species at the Willow Creek Wildlife Area that might be affected by this level of noise.

Any blasting occurring at the project site will be limited to turbine foundation excavation. How many foundations will require blasting, and the locations of those turbines will not be known until final turbine placement.

However, foundation excavation will not involve surface blasting. When required, low-impact charges will be placed in holes drilled around the perimeter and in the center of the foundation site. Because the explosion is absorbed by the rock, there is little or no air blast (noise). At the foundation site, the resulting noise is as loud as a slamming door. At 100 yards, the sound is barely audible.

In the worst case, foundations closest to the Willow Creek Wildlife Area will require blasting. At its closest point, the Willow Creek Wildlife Area is 1.2 miles from the facility site boundary, 260 feet below the site elevation, and well out of the range of any noise impact.

At its closest point to the Willow Creek Wildlife Area, the facility site habitat is classified as a long-billed curlew nesting area. Applicant has stated that "[c]onstruction activities will not proceed within 0.5 miles of long-billed curlew nesting areas during nesting season…" (please see Exhibit P page 26).

Most of the avian and mammalian wildlife species that may occur within the Willow Creek Wildlife Area breed in the spring and early summer when curlew nesting occurs. Disturbance protection for nesting curlews will also prevent disturbance and displacement of other wildlife species during breeding. For this reason, distance from the site, and protection by elevation change, Applicant anticipates no potential for adverse noise impacts on wildlife species within the Willow Creek Wildlife Area.

Applicant notes that hunting is permitted in the Willow Creek Wildlife Area. Gunshot noise measures approximately 140 dB(A).

Exhibit O

This exhibit is incomplete since it contains no supporting information as to specifically what commercial sources, and their water rights, will supply the construction and operation water supplies. More specific information is needed regarding the project's water needs and any water discharges for the project.

Please see RAI #2, responses O1 and O2.

Exhibit P

On pages P-4 to P-5, the Applicant describes the different habitat classifications as categorized by ODFW's Mitigation Policy on the project site. ODFW would like some additional background on the criteria the Applicant used to classify the different habitats.

Please see RAI#2, response P1.

On page P-6, the Applicant states that 27 point count plots were surveyed for a full year and seven were surveyed for the fall 2004 season. It is unclear why these seven plots were not surveyed for a full year, similar to the rest of the plots.

In 2003, Applicant became aware that an extensive evaluation of avian use data in wind facilities[1] provided statistically sound evidence for reduction of survey duration for sites that had already been well characterized. The seven point count plots surveyed for less than a year were of similar habitat (plowed wheat fields) and at similar elevations as eight of the plots surveyed for a full year. The Applicant's decision, based on scientific evidence, was that continuation of surveys beyond the fall season added nothing to the analysis of avian risk from the proposed facility. It should also be noted that the avian cumulative impact assessment commissioned by the Applicant did not rely on *any* of the point count data from the Shepherds Flat site. Avian use at facilities in the Columbia Basin ecoregion within both Washington and Oregon is sufficiently homogeneous to question the utility of additional point count surveys within this region.

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[1] 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.

On page P-7, the Applicant states that the survey data from the Willow Creek Valley site was not used to determine the avian use of the survey area. It is unclear why this site was excluded from the analysis.

Avian point count plots were established when the facility site included areas to the east of the Willow Creek Valley. Although no project facilities were contemplated within the Valley itself, a plot was established to provide continuity.

Areas to the east of the Valley are no longer within the facility site boundary. The Willow Creek Valley is not within the site boundary, and the Valley point count plot is approximately 0.75 miles from the current site boundary. The floor of the Willow Creek Valley is not representative of the arid upland habitat that characterizes the facility site. As an analogy, the Columbia River to the north of the site is also within 0.75 miles of the site boundary. Avian species observed in point counts (waterfowl never observed on the upland portions of the site) and incidental special status species wildlife observations (e.g. anadromous fish) are not representative of the species at risk from construction or operation of the proposed facility. Were point count plots to be established today, using today's facility site, no plot would be established in the Willow Creek Valley.

For these reasons, the plot was excluded from the analysis (although all data demonstrating regional avian species richness are presented).

On page P-18, the application states that 254 individual sightings of curlews were recorded. It would be beneficial to know if there were any nests or suspected nests located during the surveys and if so, where those locations were.

Applicant stipulates that the northern portion of the northern project area provides excellent nesting habitat for the long-billed curlew. Applicant stipulates that the area designated curlew nesting habitat supports the maximum nesting density possible.

The long-billed curlew is a ground-nesting bird. No attempt will be made to locate individual nests because such attempts invariably result in nest and egg destruction.

On page P-21, the application states that one sighting of a white-tailed jackrabbit was recorded outside of the project site boundary. It is unclear if the Applicant surveyed for white-tailed jackrabbits in the project analysis area and if so, what was the survey methodology used.

The sighting reported on page P-21 was a sighting incidental to the avian point count surveys. All such incidental sightings were reported. No separate survey for white-tailed jackrabbits was conducted.

Avian point counts are conducted in daylight, while standing still. Point count stations are accessed by roadway so far as possible. It is unlikely that the white-tailed jackrabbit, a nocturnal species, would be encountered during avian point counts.

It is unclear if any specific surveys were completed for any special status species such as grasshopper sparrows, burrowing owls, loggerhead shrikes, and sage sparrows, or if the survey information was all compiled using the avian point count methodology.

The survey information contained in Exhibit P was derived from the reports submitted as Attachments to Exhibit P. No specific surveys were completed for grasshopper sparrows, loggerhead shrikes and sage sparrows.

The temporary and permanent habitat loss discussions on pages 24 – 25 are incomplete due to a lack of breakdown of the acreages into habitat categories 1 - 6. Figures P-7 and P-8 have no scale or explanation of the acronyms used for habitat types. These figures are too gross in scale and need much more detail for habitat type and category breakdowns for the project.

Please see RAI#2, response P3.

On page P-25, the Applicant states that they intend to mitigate for permanent impacts by obtaining a mitigation site of Category 5 habitat and converting it to higher habitat categories. Much more specifics will need to be included as to the location of the proposed mitigation site, its habitat categorization and the proposed enhancement actions to be undertaken. Assurances will have to be made that the mitigation site contains adequate acres for mitigation and that the category 5 habitat can be adequately enhanced to mitigate for higher valued habitat that is impacted such that there is no net loss of habitat quality and quantity.

Please see RAI#2, response P6.

Page P-30 briefly describes the Applicant's Avian Monitoring program. ODFW would like to have more details about the proposed plan including how the Applicant intends to collect and analyze the data and what species they intend to use for monitoring purposes.

Please see RAI #2, response P10.

In Attachment P-3, the application states that the subject property is 7,750 acres. ODFW understands that the project site is 27,520 acres. It is unclear if the protocol that is described in the attachment was used to survey all or just a portion of the project site.

The protocol described in attachment P-3 was used to survey a portion of the project site. The protocol described in attachment P-1 was used to survey the whole of the project site plus several adjoining areas. The protocols are identical. Please see RAI#2, response P11.

Exhibit Q

In Exhibit Q, the applicant states that two years of Washington ground squirrel (WGS) surveys have been completed but it is unclear as to how and where these surveys were completed.

Please see Attachment P-3, page 3, *Other assessments*. Please see RAI#2, response Q2.

On page Q-11, the Applicant states that surveys will be completed for WGS in areas within 100 feet of ground disturbing activities where there is suitable soil of at least 0.6 meters in depth. ODFW understands that the applicant is surveying for WGS within 1,000 feet of ground disturbing activities in suitable soils regardless of soil depth. ODFW would like clarification on this issue.

None of applicant's proposed survey techniques were limited to "areas within 100 feet of ground disturbing activities." Applicant surveyed for Washington ground squirrels within 1,000 feet of any potential ground disturbing activities, in ODFW-recommended soils, without regard to soil depth. Please see RAI#2, response Q3.

RAC2

Please discuss your response to the WRD comments from Jerry Sauter (February 26, 2007).

WATER RESOURCES

Jerry Sauter of the Water Resources Department notes "[t]hat any commercial suppliers of water needed, have appropriate water rights that are issued for the uses intended, and that sufficient water is available within the limits of said water rights."

Please see Applicant's response to RAI #2, O2.

RAC3

Please discuss your response to the OHTAC comments from Keith May (February 26, 2007).

OREGON TRAIL

Keith F. May, Chair of the Oregon Historic Trails Advisory Council (OHTAC), has commented as follows:

- OHTAC would like to review an overlay map of the proposed access roads and tower placement showing the visible trail ruts and conjectural trail route for comparison;
- OHTAC is very pleased with Applicant's proposed fencing and informational posting plan; and
- OHTAC suggests a series of photographic evidence be filed with the State Historic Preservation Office.

The map requested by OHTAC may be found at Figure RAI #2 S-1. RAI #2 S3 explains that the Applicant has withdrawn its proposed fencing plan because the area where tradition places the visible Oregon Trail wagon ruts is well outside the Applicant's site boundary. RAI#2 S3 also provides additional information with respect to Applicant's informational posting plan.

Applicant will be pleased to provide photographs, prior to construction, of the conjectural trail route across the facility site.

RESPONSE TO AGENCY COMMENTS: OREGON DEPARTMENT OF FISH AND WILDLIFE

The Oregon Department of Fish and Wildlife (ODFW) comment letter received August 24, 2007 is included in its entirety as Attachment ODFW-1. Applicant's response to each, separate, comment (comments shown in *italics*) is presented below.

On August 30, 2007, representatives of Applicant, the Oregon Department of Energy, and ODFW participated in a teleconference. The purpose of the teleconference was to seek clarification of several of the ODFW comments. Where appropriate, Applicant's responses acknowledge this clarification.

While Applicant believes that its Application, and the issues addressed in this response, should be evaluated on their merits, all parties to the teleconference acknowledged that the siting process in Oregon is enhanced when Applicants, the content of Applications, proposed facilities, and data are treated with consistency.

Another proposed facility, the Leaning Juniper II Wind Power Facility (LJF) also has an Application for a Site Certificate before the Siting Council. The LJF Application was the most recent submission prior to the Shepherds Flat Wind Farm (SFWF) application, the facilities are within 5 miles of each other at their closest point, and the habitat types and wildlife species found within their site boundaries are similar. Issues discussed during the teleconference were often discussed within the context of comparisons between SFWF and LJF. Where appropriate, Applicant's responses do the same.

HABITAT MAPPING

ODFW has concerns with the mapping. All mapping legends should give the full name of the habitat and subtypes used. Figures P-2 through P-5's resource information (dots) should be layered onto maps that include habitat types to put that information into perspective. Figures P-6a through P-7b should include landscape features, as can be found on USGS maps, so that locations of the habitat and subtypes can be put into perspective. Figures P-8a and P8b, unless put into perspective with the narrative, relay no useful information as stand-alone mapping. Finally, all these maps are at such a gross scale that they are, again, not very helpful to put the habitat and resource information into perspective with the landscape and surrounding areas.

Applicant understands that it is difficult, due to the scale of the SFWF site, for map viewers to orient themselves to the surrounding area or to put the project into perspective. Attachment ODFW-2 contains a set of 12 map tiles prepared to address ODFW concerns. Applicant has included a separate legend key with the full name of the habitat subtypes next to their abbreviation, and corresponding habitat type and subtype as used in LJF maps.

Applicant notes with respect to the comment: *Finally, all these maps are at such a gross scale that they are, again, not very helpful to put the habitat and resource information into perspective with the landscape and surrounding areas.*

SFWF and LJF displayed habitat type, subtype and category at a scale of 1"=4,000'. Apparently, the scale was appropriate for LJF but not SFWF. Applicant has produced new maps, referenced above, showing the typical layout and category/subtype information at a scale of 1" = 1,250', a higher map resolution than any LJF comprehensive site habitat category, subtype or typical facility layout maps.

HABITAT SUBTYPING

Regarding the habitat typing, raptor nest, Washington ground squirrel, and curlew are not habitat types but could be descriptors added onto a habitat type (i.e. a subtype) to distinguish that these are sensitive resource locations within a certain habitat type. For example, the raptor nests would actually be listed as "deciduous tree stand" or "forested" or some such habitat type name with a subtype descriptor of "raptor nest". For Washington ground squirrels (WGS) and curlews, the same principles would apply. For WGS, the vegetative community, "grassland", would be the habitat type and perhaps some additional third level descriptor could be added to distinguish between the category 1 WGS habitat subtype and the category 2 WGS habitat subtype. For the curlews, the vegetative community, "grassland", would be the habitat type and then curlew could be used as the subtype descriptor to denote use by a sensitive species.

Applicant's primary purpose for habitat mapping was to evaluate (quantitatively) temporary and permanent disturbance to habitat categories caused by the typical and worst-case facility layout. OAR 635-415-0025 addresses habitat category only, and makes no distinction between types or subtypes within the same category. Applicant believes that the most informative presentation of a quantitative assessment of impact to habitat is to tabulate it by category and individual subtype, as was done in SFWF Exhibit P Table P-6a. The same approach was applied by LJF for all but raptor nests (LJF Tables P-10a and b and P-15a and b). Raptor Nest Structures were included in these tables, but LJF considered it to be a Primary Habitat Type and it contained both ESC and W-J subtypes if raptor nests were present (LJF Table P-1).

Applicant believes it is useful to distinguish (on maps and in calculations) habitats categorized because of sensitive species use separately from those categorized due to vegetative characteristics and general wildlife utility. LJF made this same distinction with raptor nests. It is appropriate to apply additional protective measures to habitats categorized because of sensitive species use (speed limits, disturbance buffers, avoidance of disturbance during critical times of the year, etc.). These additional protective measures do not apply to vegetation. Applicant believes this is an important difference, and named the WGS and CUR habitat subtypes to facilitate appropriate avoidance and mitigation.

The vegetative communities associated with the Washington ground squirrel and curlew habitat subtypes was described for each category and subtype. SFWF Category 2 Washington ground squirrel habitat, e.g., was described (SFWF Exhibit P, pages 5 and 6) as follows: "This category consists of grassland with a few scattered big sage (*Artemisia tridentata*) or rabbitbrush (predominantly *Ericameria nauseosa* but occasionally *Chrysothamnus viscidiflorus*), and is bounded by the 1 WGS habitat, a road, a cultivated wheat field, an area of soil unsuited for use by Washington ground squirrels, and the site boundary. The grassland vegetation has the same characteristics as category 4 grassland." An extensive analysis of the vegetation characteristics in the 3 CUR habitat is found on SFWF Exhibit P page 6.

Applicant is aware of no ODFW guidance with respect to naming of subtypes or selection of letter abbreviations for subtypes. SS-A (used by LJF for shrub-grass) is used for shrub-scrub in agriculture by the U.S. Geological Survey. The U.S. Forest service uses 8-digit abbreviations, and the California Native Plant Society uses Wld for woodland (LJF uses W) and VnPls for vernal pools (not mapped by LJF in Exhibit P as a separate habitat subtype). Applicant selected mnemonic abbreviations to minimize errors while recording subtypes in the field.

HABITAT CATEGORY

ODFW recommends that the applicant revise the grassland habitat category 3 in the north part of the project area, adjacent to the boundary with the Pebble Springs project, and re-categorize it as category 2 based on the level of grasshopper sparrows found during the surveys that were completed through portions of that area. This area has higher quality grasslands than most of the rest of the project area and appears to have higher populations of grasshopper sparrows than the rest of the project area based on the surveys that were completed.

Level of grasshopper sparrow usage

Of the five grasshopper sparrows located along the SFWF project boundary in question, one was heard and two were seen from within the Category 3 grassland (3 GL) habitat. The two visual identifications were both outside of the SFWF site boundary (Exhibit P Attachment P-5 Figure 2a and Attachment ODFW-3 Figure 1). Two audible and two visible grasshopper sparrows were located to the northeast in similar proximity (Attachment ODFW-3 Figure 2) in Category 4 grassland.

In the LJF surveys, 20 grasshopper sparrows appear to have been located inside of the north project boundary (LJF Figure P-6). When these locations are compared to LJF habitat categories (LJF Figure P-3), most of the sparrows were located in habitat designated Category 3, one location was in an area designated Category 4, and one appears to be in an area designated Category 6. Only four of the locations appear to be in areas designated Category 2. Applicant does not believe that LJF was required to revise its habitat categories for level of grasshopper sparrow usage.

Quality of grasslands

Following a discussion about grasshopper sparrow density on the SFWF and LJF sites during the teleconference, ODFW stated that grassland designated Category 3 by SFWF was treated as Category 2 by LJF. The description of the vegetation in SFWF Category 3 grassland was considered by ODFW to be identical to that of LJF Category 2 grassland. Based on vegetation alone, ODFW maintained that the SFWF grassland should be re-categorized to ensure the two facilities were treated consistently.

SFWF Category 3 grassland (3 GL) is described as follows (SFWF Exhibit P page 9):

This habitat has healthy grass stands and few areas of disturbed soil. Native species presence is significant. Six vegetation sample sites occurred in 3 GL habitat. One of these sites consisted entirely bare soil, with bare soil in the other sites providing less than 10% of the cover. In the remaining five sites, bare soil ranged from 0 to 15% of the cover and averaged 6% cover. Native species provided 18 to 75% of the plant cover and averaged 58% cover. Sandberg's bluegrass was found at all sites other than that with bare soil, providing 15 to 40% of the cover. Slender phlox was found at 4 sites, with 10 to 20% cover. Bluebunch wheatgrass (2 sites and 5 to 30% cover), tall willowherb (3 sites with a trace to 5% cover), longleaf phlox (Phlox longifolia, a trace at one site) broom snakeweed (1 site, 15% cover) and inland saltgrass (Distichlis spicata var. stricta, 1 site, 5% cover) were the other native species identified.

The most prevalent alien species were cheatgrass and spring-whitlow grass, both found at 4 sites providing up to 25% of the cover. Except at one site, the significant presence of one of the species was accompanied with no measurable cover from the other. Clasping pepperweed (Lepidium perfoliatum) was found at 4 locations, with 70% cover at one location, 10% at another, and traces at the two remaining locations. Redstem storksbill was found at 2 sites, with cover at one 15% and a trace at the other. Traces of jagged chickweed and prickly lettuce (Lactuca serriola) were found at two sites each.

Common ground-nesting grassland avian species are widespread in this habitat, and several grasshopper sparrows were found. Long-billed curlews use the habitat, but in much lower numbers than are found in the CUR subtype. Badgers and other burrowing mammals and foraging deer are found. This habitat is essential to grassland species, but is not limited on the site or within the ecoregion.

LJF describes G-A grassland as follows (LJF Tables P-1 and 2):

Annual grass and weeds with residual bunchgrass. *Primarily non-native grassland with weeds resulting from past wildfires or land use practices. Patches of native perennial bunchgrass and forbs. Soil depth variable.*

No G-A grassland was designated Category 2 by LJF.

LJF Category 2 grassland (Category 2 G-B) is described as follows (LJF Tables P-1 and 2):

Perennial bunchgrass. *Native bunchgrass. Primarily bluebunch wheatgrass and Sandberg's bluegrass. Shrubs, if present, are an inconspicuous component. Soils generally medium to deep. Native bunchgrass sites in good condition that are in deep soils are limited in the general area.*

[E]ssential habitat to sensitive species. Areas show less grazing pressure and more native plant diversity than Category 3 or 4.

Note that LJF Category 2 grassland is reserved for native bunchgrass, generally in medium to deep soils.

The soil in the whole of the SFWF north project area is very shallow. The 3-GL habitat in the north project was sampled at five locations, one of which consisted entirely of bare ground. The sum of native bunchgrass cover at the remaining four was 45%, 15%, 60% and 40%. Alien species cover was 35%, 70%, 25% and 40%. The average percent of vegetation cover provided by native species is 55%, and by alien species 45%.

Applicant agrees that the SFWF category 3 grassland (including that designated as 3 CUR) is of higher quality than found in most of the rest of the north project area (which is largely categorized 4 GL). Applicant does not agree that it is of Category 2 quality.

The difference in habitat quality of adjacent sites, as close as across a fenceline, can be seen in Attachment ODFW-3 Figures 2 and 3, taken from the SFWF site looking over the fence to the Pebble Springs site referenced.

ODFW does not consider weedy, previously cultivated land to be category 6 habitat but instead category 5. Due to the fact that previously cultivated land has higher potential for restoration, ODFW recommends that these lands be re-categorized as category 5 habitat.

Applicant does not consider weedy, previously cultivated land to be Category 6 habitat, nor Category 5 habitat for that matter. Applicant has classified previously cultivated land based on its habitat value as required under OAR 635-415-0025.

Forty three percent (43%) of SFWF previously cultivated land is designated Category 4, 49% is designated Category 5 and only 8% is designated Category 6. Applicant does not agree that either the Category 4 or Category 6 habitat should be re-categorized to Category 5 habitat.

Applicant also notes that LJF designates 96% of its dryland wheat Category 6, while Applicant designates 100% of its dryland wheat Category 5.

WILDLIFE AND HABITAT IMPACTS

On page P-41, the applicant states that no construction will occur within 1300 to 1700 feet of the WGS site during the active squirrel period. ODFW recommends that the applicant clarify what this means (i.e. does the applicant intend to have construction activities closer to the site or in the site during the time period the squirrels are inactive?). ODFW has these same questions for the category 2 WGS habitat.

At no time will ground-disturbing activities (including construction) take place within Category 1 or Category 2 Washington ground squirrel habitat. Please see SFWF Exhibit P, page 40.

Imposition of a 1,000-foot buffer around the perimeter of the 2 WGS habitat while the species is active generates the seasonal 1,300 to 1,700 foot restriction on temporary disturbance (Attachment ODFW-4 Figure 1).

The applicant states that by trying to minimize the amount of temporary disturbance that there will not be any temporary disturbance to any of the habitat categories. However, Table P-7 lists temporary disturbance caused by components amounting to 151 to 176 acres. ODFW recommends that the applicant determine the total number of acres by habitat category that will be temporarily disturbed (driven over, sagebrush clipped etc.) and mitigate for that temporary disturbance by implementing their minimization and revegetation measures as well as with additional acres in their Habitat Replacement Parcel.

Applicant did not state that there will be no temporary disturbance to any of the habitat categories. Such an assertion is at odds with SFWF Exhibit P Table P-7. Applicant has proposed to replace habitat impacted by temporary and permanent disturbance (draft Habitat Replacement Plan). The proposed replacement parcel contains one replacement acre for every acre of sage shrub step temporarily disturbed, and 0.3 replacement acres for all other Category 3 - 5 acres temporarily disturbed. LJF replaced 0.5 acres for every acre of Category 2 or 3 SSA and SSE shrub steppe temporarily disturbed, and made no provision for temporary disturbance of other habitat. Please see Applicant's response to RAI #3 P-14 (Attachment ODFW-5) for further clarification.

The revegetation plan for the project is unclear and needs to be more concise on where, when and how many acres of temporarily disturbed habitat will be revegetated and what the success criteria will be for those revegetated areas.

ODOE intends to reformat and circulate Applicant's revegetation plan. Applicant will respond to any ODFW comments at that time.

The applicant proposes to use primarily overhead transmission lines throughout the project area. ODFW recommends that, where appropriate, the applicant use underground transmission lines adjacent to roads to reduce the impact of the project on avian species.

Applicant does not propose to use primarily overhead transmission lines throughout the project area. In the SFWF typical layout, approximately 26% of the 34.5 kV collector system is aboveground. All of the 230 kV transmission line is aboveground. Aboveground 230 kV and 34.5 kV lines together constitute approximately 38% of the SFWF total, leaving 62% of electrical conductors installed underground. Applicant has discussed siting provisions and avian impact reduction measures for aboveground lines (SFWF Exhibit P pages 51 and 54).

According to the LJF Proposed Order (page 11) the facility would have not more than 30% of the collector system installed above ground.

MONITORING AND IMPACT ASSESSMENT

ODFW recommends that, as a part of the Wildlife Monitoring and Mitigation Plan, the applicant monitor all known active raptor nests within the search boundary for the life of the project. ODFW also recommends that the applicant monitor the WGS site within the site boundary for the life of the project. Both of these monitoring efforts would help ODFW, Oregon Department of Energy (ODOE) and other applicants understand the long-term effects of these types of projects on some of the wildlife species of most concern.

Monitoring active raptor nests

SFWF has not proposed to monitor raptor nesting. LJF has proposed such monitoring.

LJF, in its Wildlife Monitoring and Mitigation Plan, has proposed to conduct raptor nest surveys in the first and fourth years after facility construction is complete, and to conduct further surveys at five-year intervals for the life of the project. Applicant believes, due to nest occupancy variability observed on and near the SFWF site, that the LJF monitoring schedule will not provide data that can be statistically evaluated much earlier than 20 years post-construction (when 1 pre-construction and 5 post-construction surveys have been completed). Applicant also considers there is not sufficient pre-construction data available for the LJF site to attribute detected impacts to the presence of the facility rather than to regional influences unconnected to LJF, such as climate change or unrelated habitat loss.

Because Applicant does not believe statistical significance of any SFWF impact to raptor nesting activity can be assessed using this approach, Applicant does not propose any monitoring of raptor nesting in the SFWF wildlife monitoring and mitigation program.

Washington ground squirrels

Applicant has proposed to monitor the single Washington ground squirrel burrow entrance within the site boundary annually, from issuance of the site certificate through the second year after commencement of commercial operation. This monitoring would thus last a minimum of 4 years. The expansion of the burrow complex further into the site is unlikely due to the constraints described in SFWF Exhibit P Attachment P-5: "The 2 WGS habitat is bordered to the west by an area of Gravden very gravely loam, which (aside from a high rock content) has a cemented pan at 10 – 20 inches. An existing farm road (6 RP) and the site boundary circumscribes the remainder of the WGS habitat. A dryland wheat field (5 DW) is directly to the north. The 1 WGS habitat is approximately 100 feet lower than, and 300 feet away from, the closest part of the rocky soil. At its closest, the 1 WGS area is approximately 400 feet from the road and 700 feet from the wheat field." Please see ODFW Attachment 4 Figure 1. Habitat more suitable for use by the species lies to the west rather than towards the site, and includes an extensive area of sage shrub steppe in very good condition.

LJF has proposed Washington ground squirrel monitoring at three-year intervals commencing the year following construction through the life of the project. LJF, as compared with SFWF, has a very large on-site Washington ground squirrel density. Applicant considers the low Washington ground squirrel presence on the SFWF site, and the measures proposed to safeguard those Washington ground squirrels that are present, will adequately protect the species without additional monitoring.

ODFW requests that the applicant provide further information on the location of the inactive nests throughout the project area. ODFW is aware of possibly two inactive ferruginous hawk nests adjacent to or within the project boundary. ODFW recommends that all of the inactive nests be monitored prior to construction to determine the use of the nest and, if found to be active, consider micrositing of turbines to avoid impact, implement impact avoidance measures during construction, and implement monitoring post-construction, as might be applicable.

Focused searches for raptor nests occurred in spring 2003 and 2004. During 2007 surveys, four burrowing owl burrows were located as well as incidental observation of three new active raptor nests. Several of the raptor nests that had been active in 2003 or 2004 were inactive in 2007. All of these nests, including an active ferruginous hawk nest, are included in SFWF Exhibit P Figures P-10a and b. Applicant did not ask for a tabulation of inactive nest locations from the field biologists and does not have this information.

Applicant has proposed (SFWF Exhibit P page 50) to resurvey for raptor nests near (at least 0.5 miles beyond) areas scheduled for construction activity during the breeding season. This would include searches of suitable nesting structures for nests, and nest observations to identify those that are active. Applicant has proposed a 0.5-mile construction buffer around active raptor nests during nesting season. Applicant has also excluded several active raptor nests from within the current site boundary as compared to the site boundary submitted in its Notice of Intent, and adjusted turbine positions in the current typical layout to increase their distance from identified nests.

ODFW recommends that, as part of the cumulative impact study, the applicant consider the amount of native habitat in the Columbia Basin as compared to the amount of native habitat that has been affected by the installation of turbines. The applicant should consider that more native habitat is affected than just the actual footprint of the project and that the impacts to the species that use those habitats extend beyond the footprint of the projects.

Applicant is aware of no Siting Council standard requiring the production of a cumulative impacts study, and none was submitted for LJF. Applicant is aware of no ODFW guidance on the contents of a cumulative impacts study when, as is the case with SFWF, an applicant chooses to undertake such a study. Applicant commissioned an avian and bat cumulative impacts analysis to inform its own understanding of the issue, and has included the analysis in its Application in the hope that others will be informed as well.

Applicant does not propose to undertake a cumulative impacts study of native habitat in the Columbia Basin.

ODFW further recommends that the applicant consider the cumulative effects of wind power projects in the Columbia Basin on the raptors that are considered sensitive by the State of Oregon and what the impacts are and will continue to be to those populations in the Basin.

A discussion of use, by raptors, of areas near wind power facilities, as well as carcasses found near wind power facilities, is found on pages 8 and 9 of Applicant's cumulative impacts analysis. An evaluation of the significance of impacts to raptor populations is included on page 16 of the same report.

Applicant does not propose to undertake an additional avian cumulative impacts study.

The applicant states that as a worst case scenario the project would result in 0.14 raptor deaths per year per megawatt for the life of the project. This would result in 42 dead raptors per year from this project. As part of the mitigation for the project, ODFW recommends that the applicant contribute $3,500 per year for the life of the project to a local bird rehabilitation center to help offset the loss of raptors due to the proposed project.

Applicant has never stated that the construction or operation of SFWF would result in *any* avian deaths. Applicant has never stated, and Applicant does not believe, "that as a worst case scenario the project would result in 0.14 raptor deaths per year per megawatt for the life of the project."

Applicant has expressed its concern about standard avian mortality estimation methods as applied to wind power facilities (RAI#2 P10). These concerns are based upon the complete absence of background (control) mortality data, attribution of avian death to facility causes without adequate evaluation of carcasses (i.e. no forensic examination) and the use of positive bias corrections (scavenger removal and searcher efficiency) without negative bias corrections (scavenger addition and carcass multiplication through dismemberment). Applicant is aware of no wind facility-associated avian mortality studies in the Pacific Northwest that correct for these biases.

However, Applicant will be required to commission a standard avian mortality study when SFWF becomes operational. Applicant, therefore, provided results of regional carcass search studies for comparison to the results that might be expected from similar carcass surveys of the SFWF site. In its draft Wildlife Mitigation and Monitoring plan, Applicant tabulated the maximum and average mortality estimates reported for carcass search studies at seven wind power projects in the Columbia Plateau Ecoregion as shown in its cumulative impacts analysis. The table was used to define SFWF mitigation criteria: "If the total or species group mortality at the SFWF does not exceed the maximum levels experienced by other facilities in the ecoregion, one can conclude the adopted mitigation measures for facility siting and construction (SFWF Exhibits P and Q and Applicant's responses to RAI#2 P7, P8 and P9) were effective. At the end of two years of carcass searches, SFWF average annual mortality will be compared to ecoregion mortality. Should SFWF mortality for any group exceed the ecoregion maximum, or should mortality for any one species exceed the ecoregion mean for the group, additional mitigation may be appropriate." (SFWF Exhibit P Attachment P-8).

Raptor use of the SFWF site is 0.46 (SFWF Exhibit P Table P-5), comparable to raptor use rates for the Klondike OR, Vansycle OR and Stateline WA/OR facilities (Table 2 of the cumulative impact analysis). Because mortality estimated from carcass search studies is often well correlated to use rates, Applicant anticipates that estimates of raptor mortality calculated from carcass searches at SFWF will be similar to those estimated at the three facilities with similar raptor use rates – 0 to 0.09 fatalities per megawatt per year. Applicant believes in mitigating for actual rather than theoretical impacts, and prefers to address mitigation requirements, other than those Applicant has already proposed (SFWF Exhibit P pages 51 through 54 and the burrowing owl constructed nest boxes proposed in Attachment P-7), after any impacts are demonstrated.

At that time Applicant will consider support for local raptor rehabilitation facilities, along with sponsorship of research or protection of critical nesting habitat for the species or group affected as described in Exhibit P Attachment P-7.

HABITAT MITIGATION

ODFW has serious concerns about the applicant's proposed habitat mitigation plan and its adequacy to mitigate for the habitat impacts from the proposed project. ODFW suggests future conference calls with ODOE and the applicant to discuss and hopefully resolve these issues.

ODOE intends to reformat and circulate Applicant's proposed Habitat Mitigation Plan. Applicant will respond to any ODFW comments at that time.

August 24, 2007

Mr. John White
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97301-3737

RE: Oregon Department of Fish and Wildlife's Comments on the Additional Information Provided on the Shepherds Flat Wind Project

Dear John:

Oregon Department of Fish and Wildlife (ODFW) has reviewed the additional/revised materials provided by Caithness Shepherds Flat, LLC for their Shepherds Flat Wind Farm project and is providing the following comments.

ODFW has concerns with the mapping. All mapping legends should give the full name of the habitat and subtypes used. Figures P-2 through P-5's resource information (dots) should be layered onto maps that include habitat types to put that information into perspective. Figures P-6a through P-7b should include landscape features, as can be found on USGS maps, so that locations of the habitat and subtypes can be put into perspective. Figures P-8a and P8b, unless put into perspective with the narrative, relay no useful information as stand-alone mapping. Finally, all these maps are at such a gross scale that they are, again, not very helpful to put the habitat and resource information into perspective with the landscape and surrounding areas.

Regarding the habitat typing, raptor nest, Washington ground squirrel, and curlew are not habitat types but could be descriptors added onto a habitat type (i.e. a subtype) to distinguish that these are sensitive resource locations within a certain habitat type. For example, the raptor nests would actually be listed as "deciduous tree stand" or "forested" or some such habitat type name with a subtype descriptor of "raptor nest". For Washington ground squirrels (WGS) and curlews, the same principles would apply. For WGS, the vegetative community, “grassland”, would be the habitat type and perhaps some additional third level descriptor could be added to distinguish between the category 1 WGS habitat subtype and the category 2 WGS habitat subtype. For the curlews, the vegetative community, “grassland”, would be the habitat type and then curlew could be used as the subtype descriptor to denote use by a sensitive species.

ODFW recommends that the applicant revise the grassland habitat category 3 in the north part of the project area, adjacent to the boundary with the Pebble Springs project, and re-categorize it as category 2 based on the level of grasshopper sparrows found during the surveys that were completed through portions of that area. This area has higher quality grasslands than most of the rest of the project area and appears to have higher populations of grasshopper sparrows than the rest of the project area based on the surveys that were completed.

ODFW does not consider weedy, previously cultivated land to be category 6 habitat but instead category 5. Due to the fact that previously cultivated land has higher potential for restoration, ODFW recommends that these lands be re-categorized as category 5 habitat.

On page P-41, the applicant states that no construction will occur within 1300 to 1700 feet of the WGS site during the active squirrel period. ODFW recommends that the applicant clarify what this means (i.e. does the applicant intend to have construction activities closer to the site or in the site during the time period the squirrels are inactive?). ODFW has these same questions for the category 2 WGS habitat.

The applicant states that by trying to minimize the amount of temporary disturbance that there will not be any temporary disturbance to any of the habitat categories. However, Table P-7 lists temporary disturbance caused by components amounting to 151 to 176 acres. ODFW recommends that the applicant determine the total number of acres by habitat category that will be temporarily disturbed (driven over, sagebrush clipped etc.) and mitigate for that temporary disturbance by implementing their minimization and revegetation measures as well as with additional acres in their Habitat Replacement Parcel.

The revegetation plan for the project is unclear and needs to be more concise on where, when and how many acres of temporarily disturbed habitat will be revegetated and what the success criteria will be for those revegetated areas.

The applicant proposes to use primarily overhead transmission lines throughout the project area. ODFW recommends that, where appropriate, the applicant use underground transmission lines adjacent to roads to reduce the impact of the project on avian species.

ODFW recommends that, as a part of the Wildlife Monitoring and Mitigation Plan, the applicant monitor all known active raptor nests within the search boundary for the life of the project. ODFW also recommends that the applicant monitor the WGS site within the site boundary for the life of the project. Both of these monitoring efforts would help ODFW, Oregon Department of Energy (ODOE) and other applicants understand the long-term effects of these types of projects on some of the wildlife species of most concern.

ODFW requests that the applicant provide further information on the location of the inactive nests throughout the project area. ODFW is aware of possibly two inactive ferruginous hawk nests adjacent to or within the project boundary. ODFW recommends that all of the inactive nests be monitored prior to construction to determine the use of the nest and, if found to be active, consider micrositing of turbines to avoid impact, implement impact avoidance measures during construction, and implement monitoring post-construction, as might be applicable.

ODFW recommends that, as part of the cumulative impact study, the applicant consider the amount of native habitat in the Columbia Basin as compared to the amount of native habitat that has been affected by the installation of turbines. The applicant should consider that more native habitat is affected than just the actual footprint of the project and that the impacts to the species that use those habitats extend beyond the footprint of the projects.

ODFW further recommends that the applicant consider the cumulative effects of wind power projects in the Columbia Basin on the raptors that are considered sensitive by the State of Oregon and what the impacts are and will continue to be to those populations in the Basin.

The applicant states that as a worst case scenario the project would result in 0.14 raptor deaths per year per megawatt for the life of the project. This would result in 42 dead raptors per year from this project. As part of the mitigation for the project, ODFW recommends that the applicant contribute $3,500 per year for the life of the project to a local bird rehabilitation center to help offset the loss of raptors due to the proposed project.

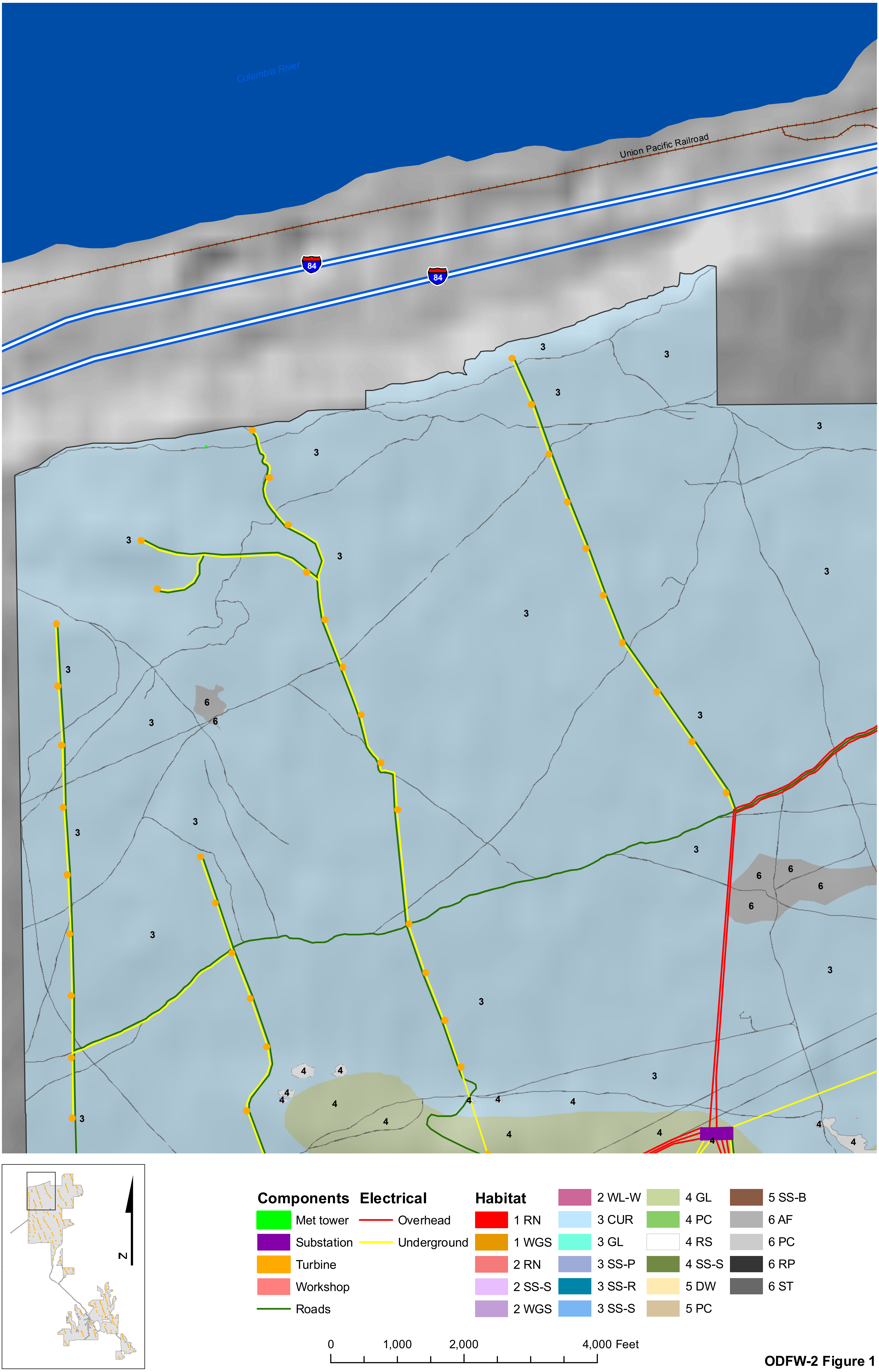
ODFW has serious concerns about the applicant’s proposed habitat mitigation plan and its adequacy to mitigate for the habitat impacts from the proposed project. ODFW suggests future conference calls with ODOE and the applicant to discuss and hopefully resolve these issues.

Thank you for the opportunity to comment on the additional/revised information for the Shepherds Flat Wind Farm project. Please feel free to contact me at (503) 947-6085 if you have questions about these comments.

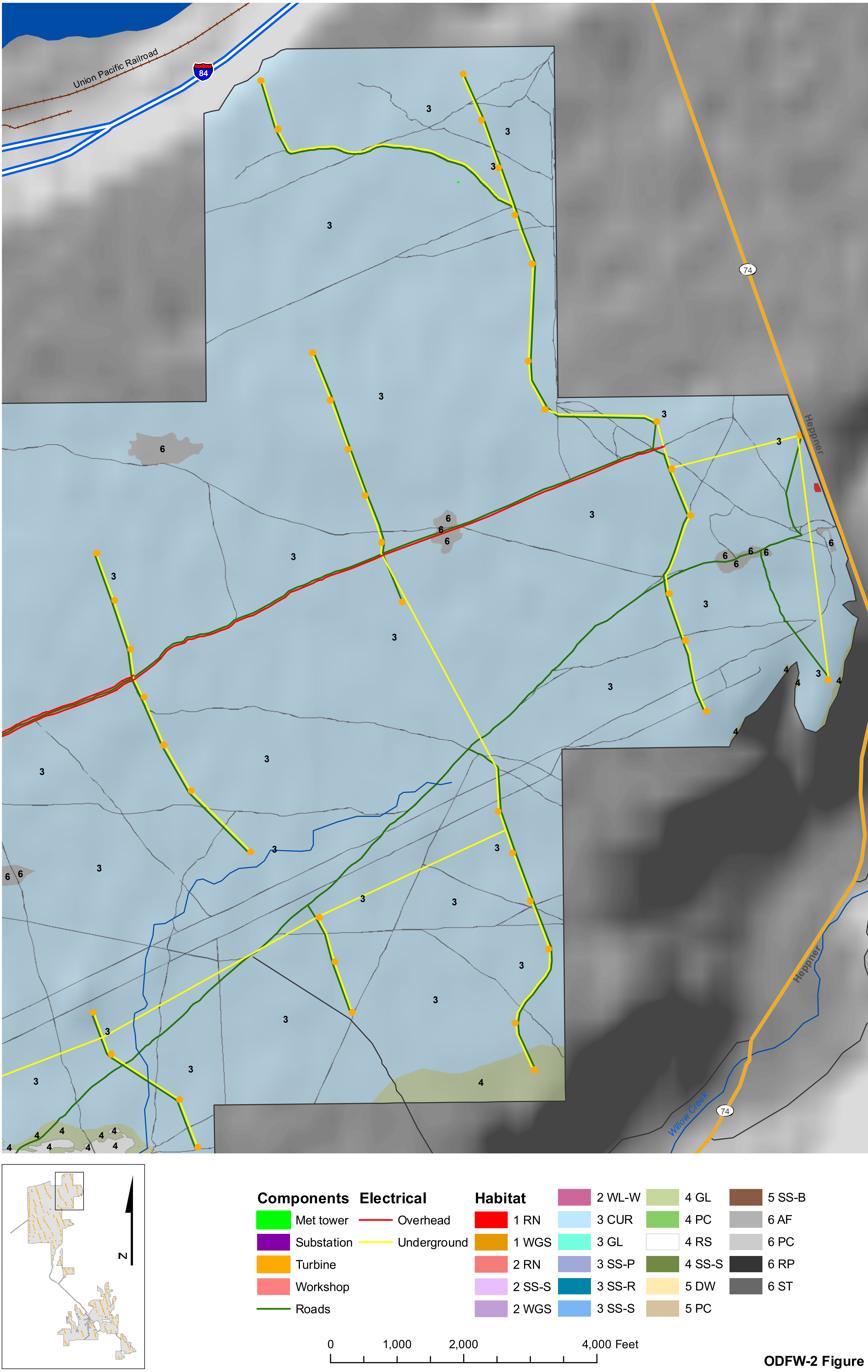
Sincerely,

Rose Owens
Habitat Special Projects Coordinator

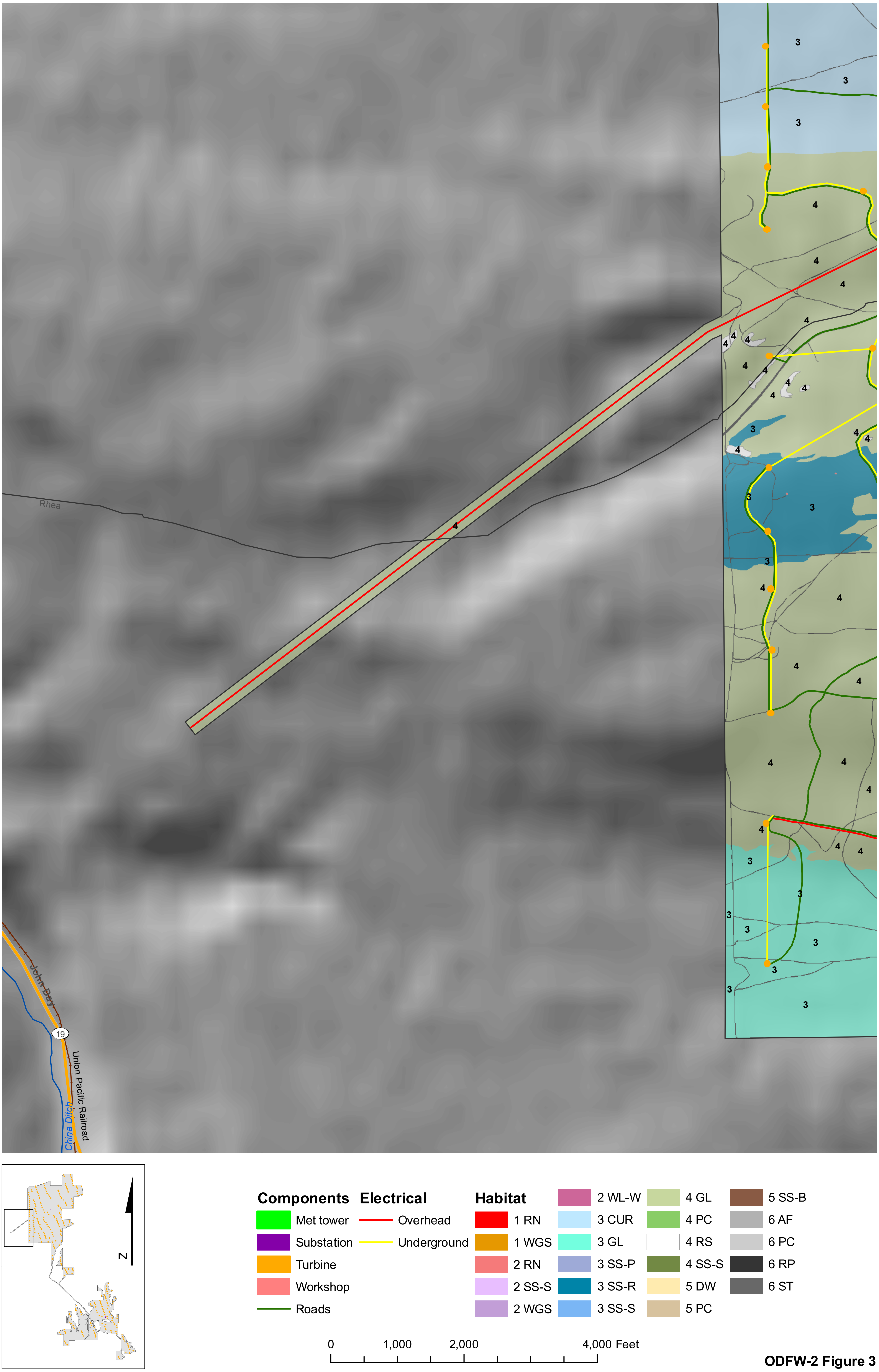
cc: Steve Cherry, Heppner
Jerry Cordova, USFWS - Bend



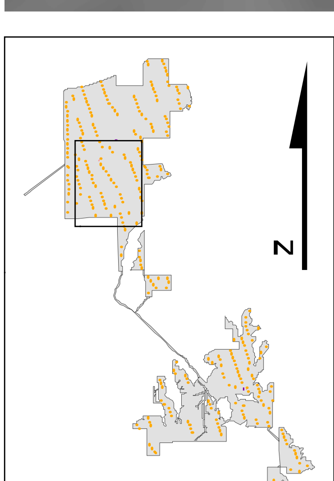
ODFW-2 Figure 1



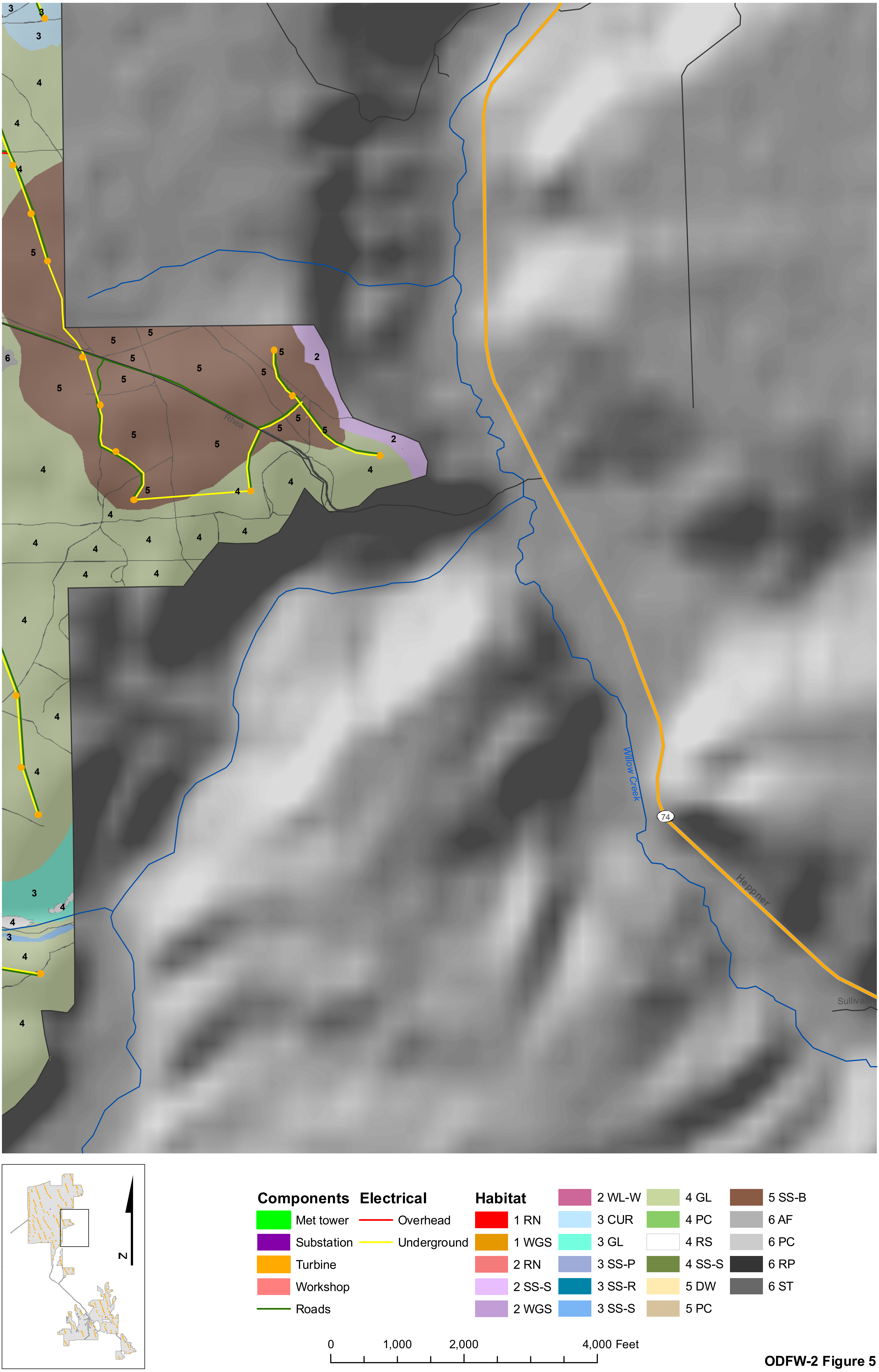
ODFW-2 Figure 2



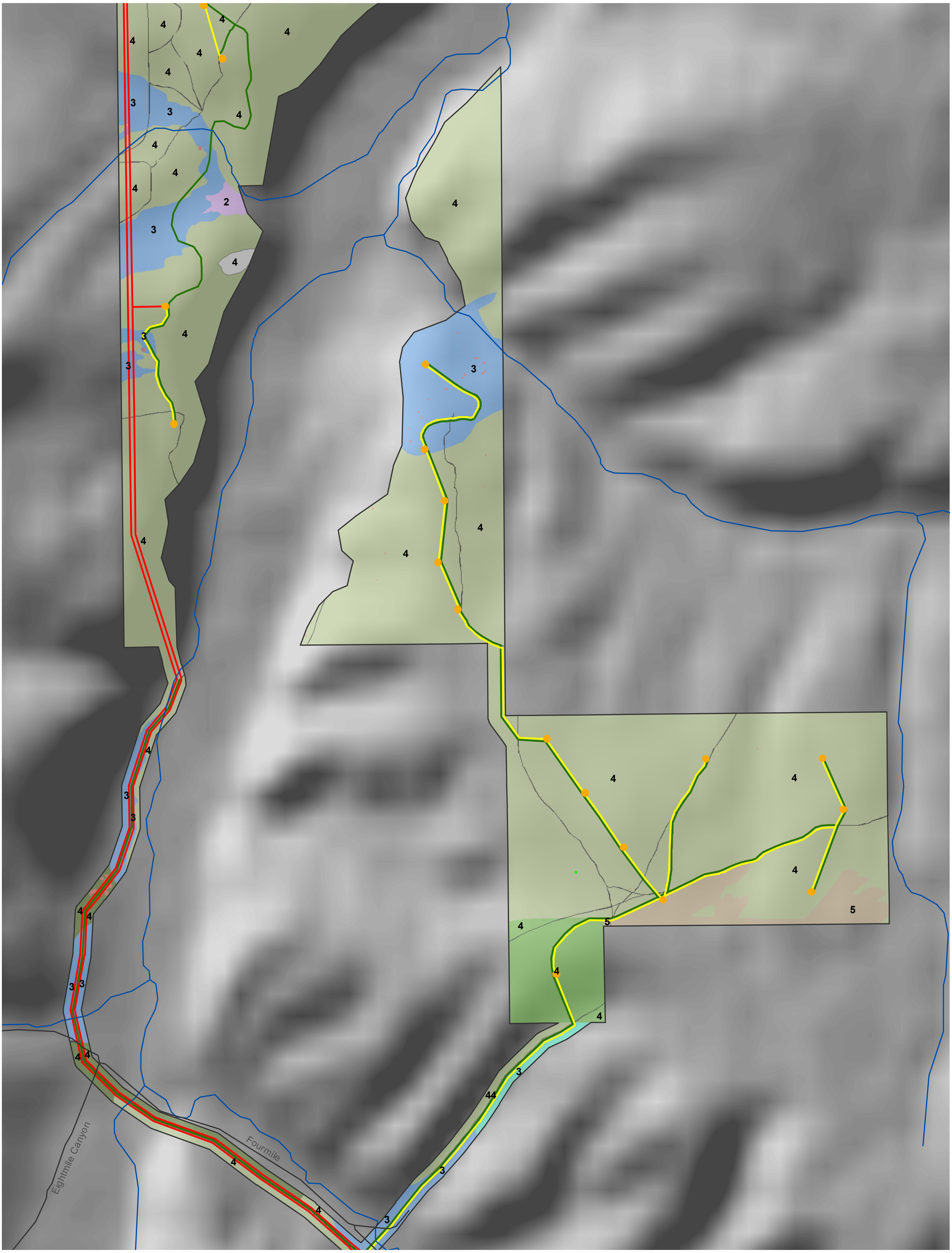
ODFW-2 Figure 3

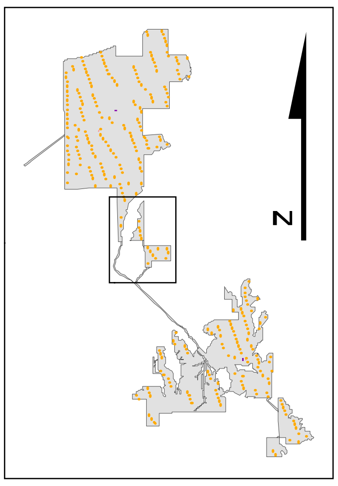


ODFW-2 Figure 4



ODFW-2 Figure 5

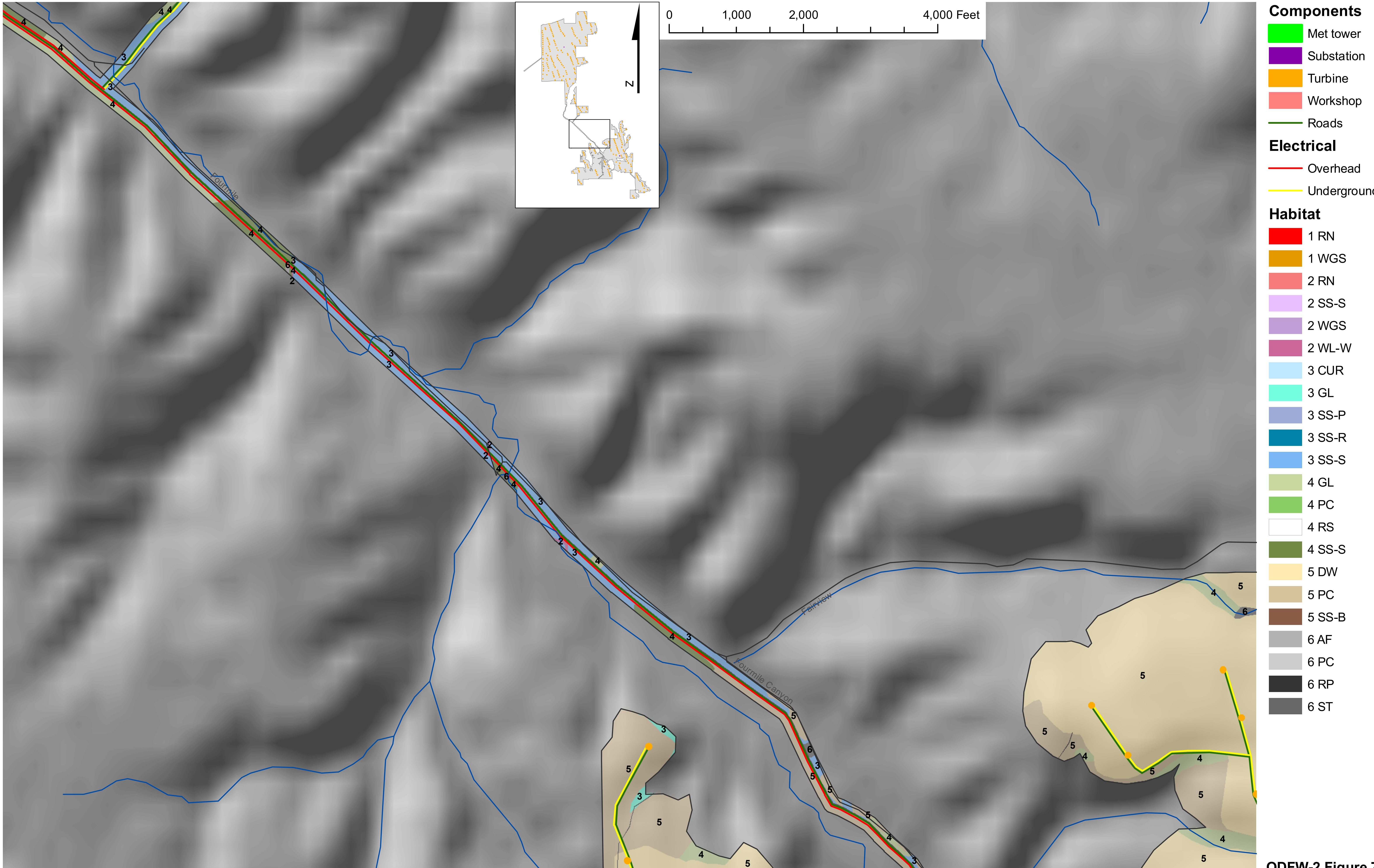




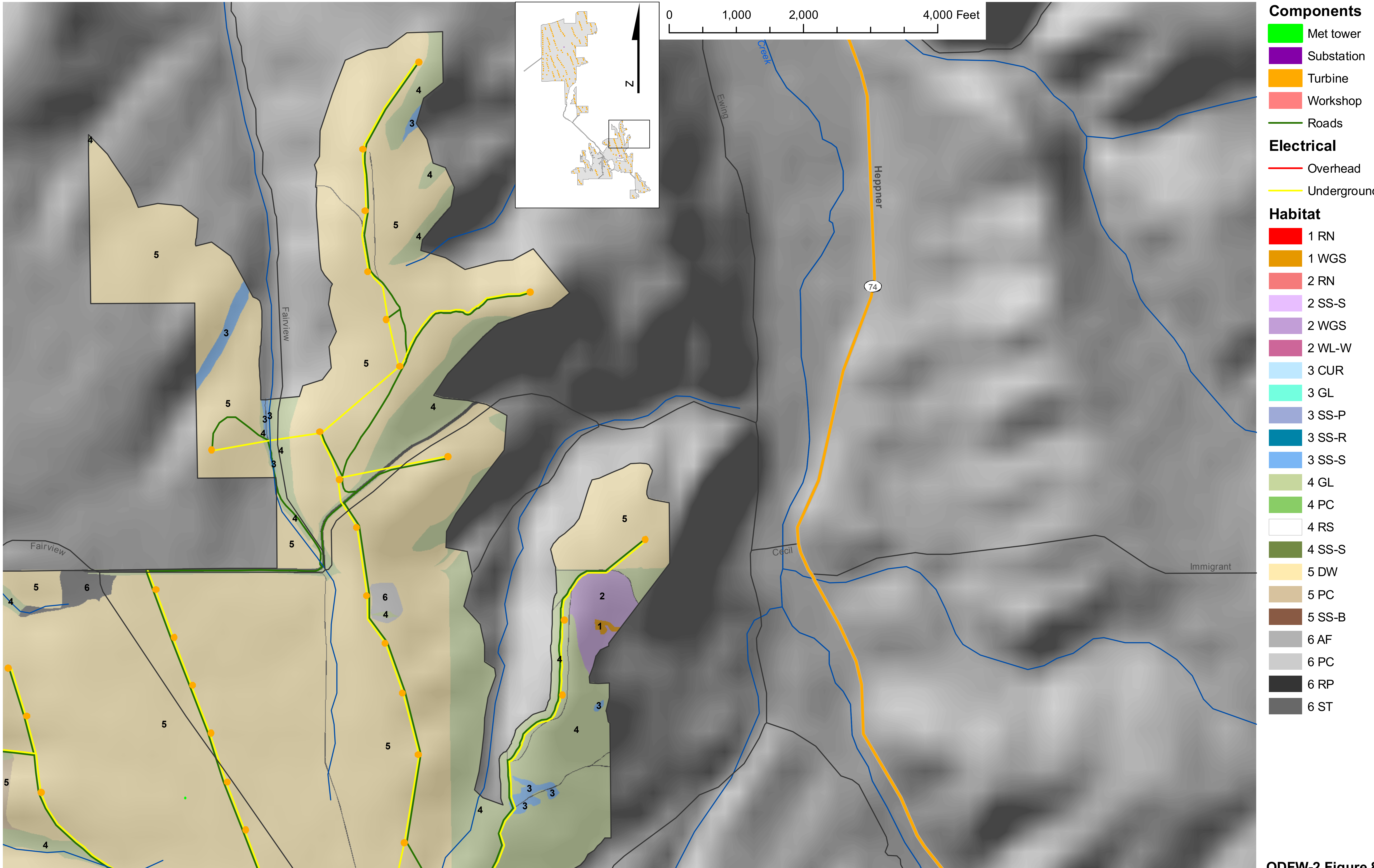
Components	Electrical	Habitat			
Met tower	Overhead	1 RN	2 WL-W	4 GL	5 SS-B
Substation	Underground	1 WGS	3 CUR	4 PC	6 AF
Turbine		2 RN	3 GL	4 RS	6 PC
Workshop		2 SS-S	3 SS-P	4 SS-S	6 RP
Roads		2 WGS	3 SS-R	5 DW	6 ST
			3 SS-S	5 PC	

0 1,000 2,000 4,000 Feet

ODFW-2 Figure 6

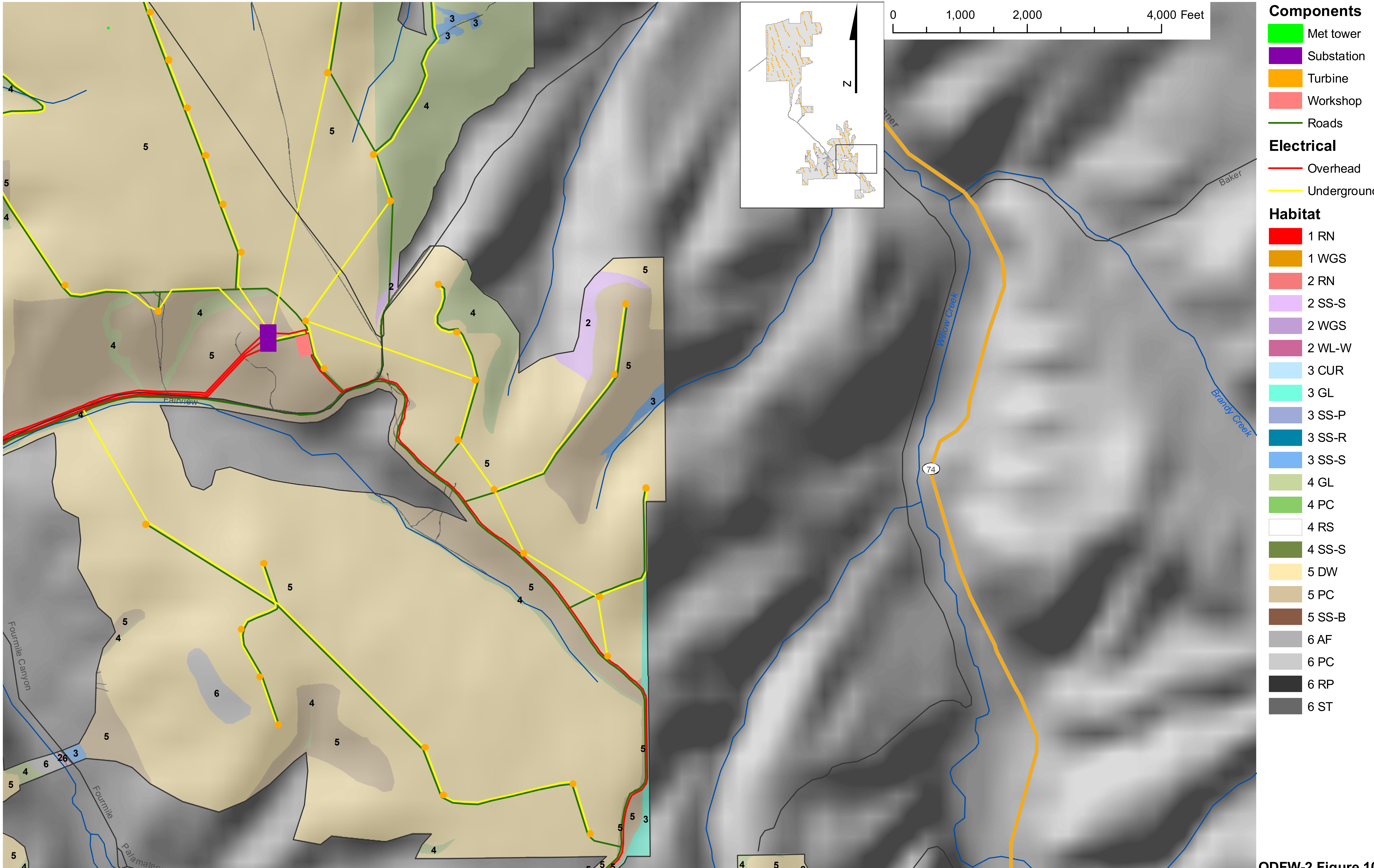


ODFW-2 Figure 7

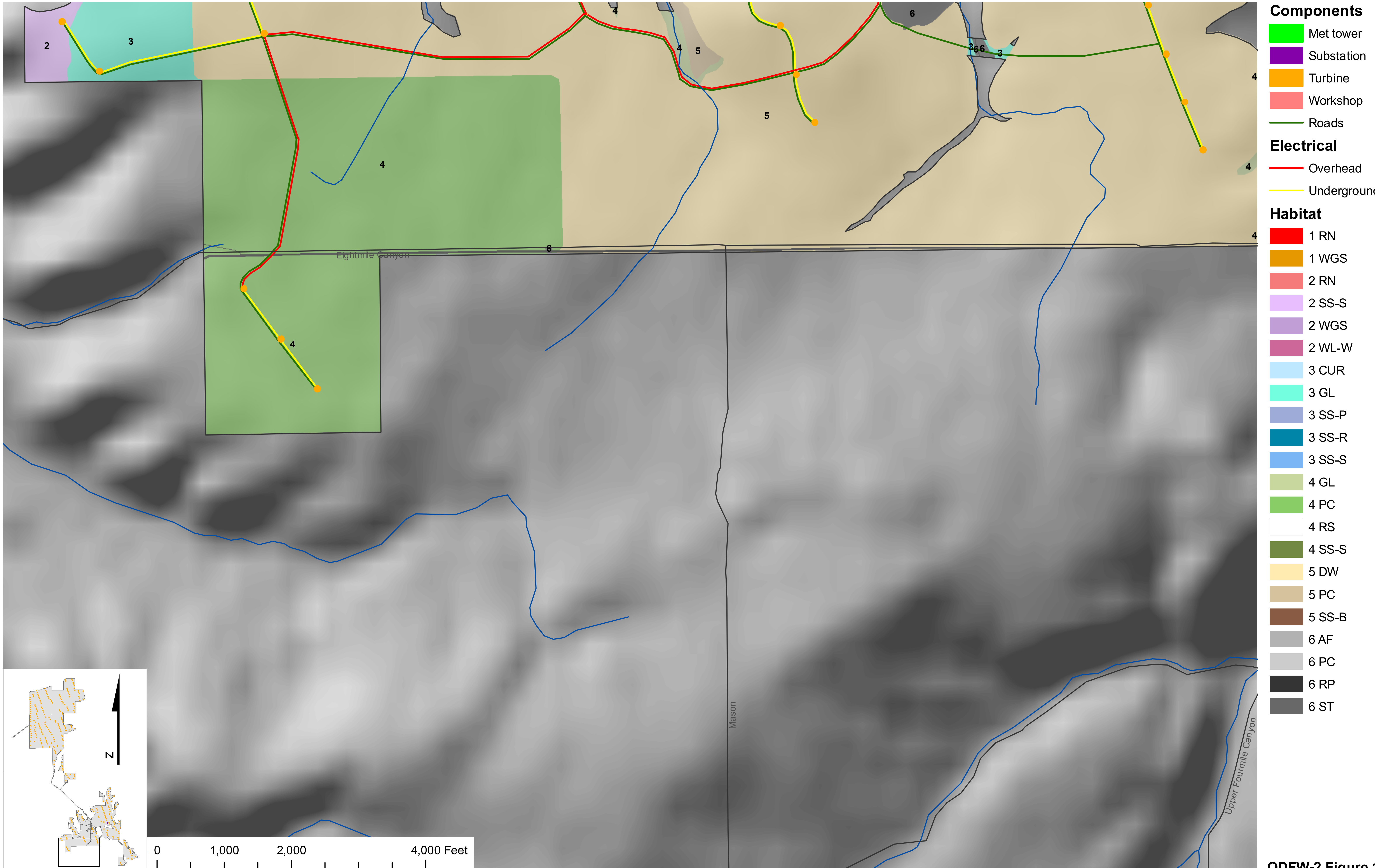


ODFW-2 Figure 8

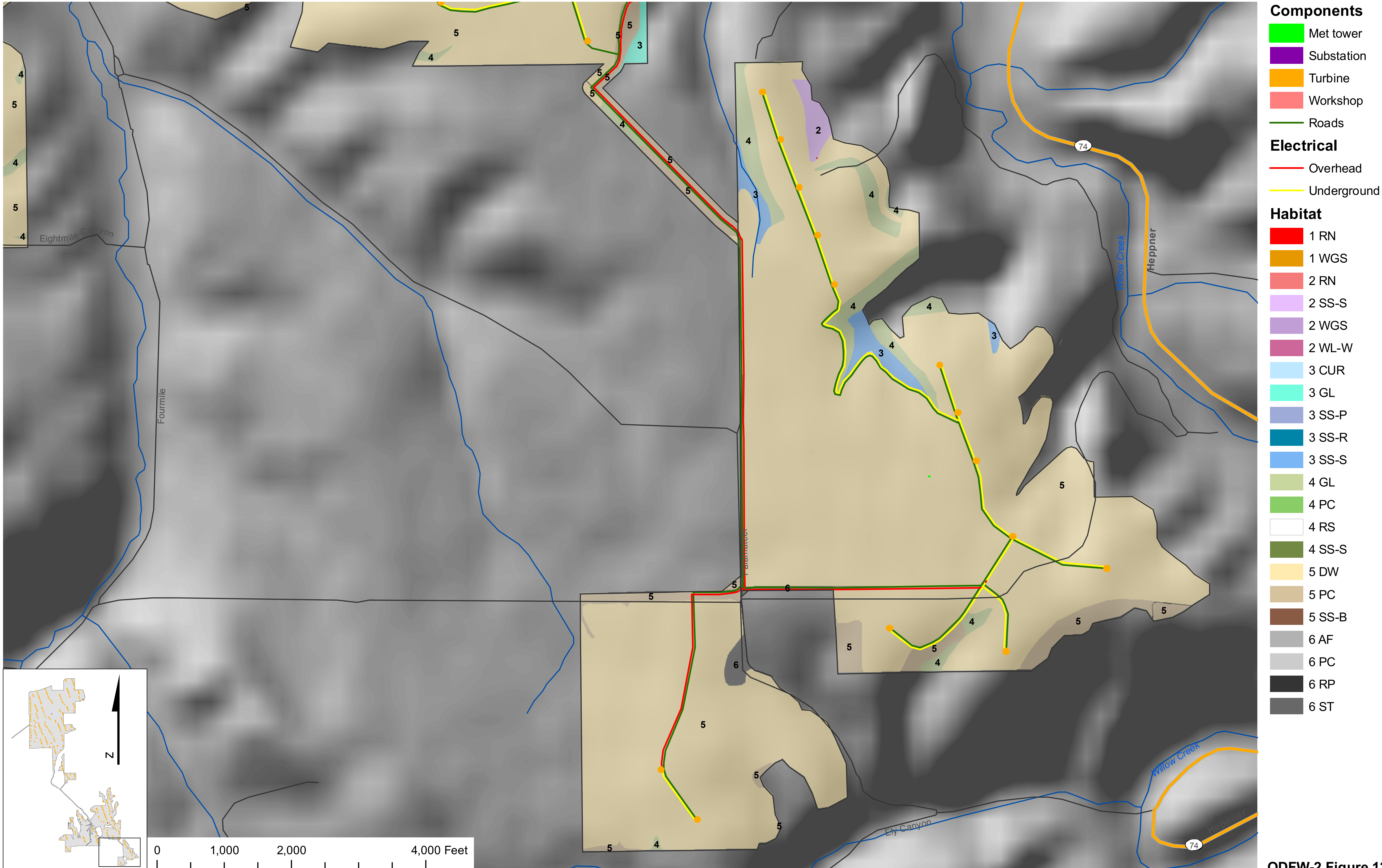
ODFW-2 Figure 9



ODFW-2 Figure 10



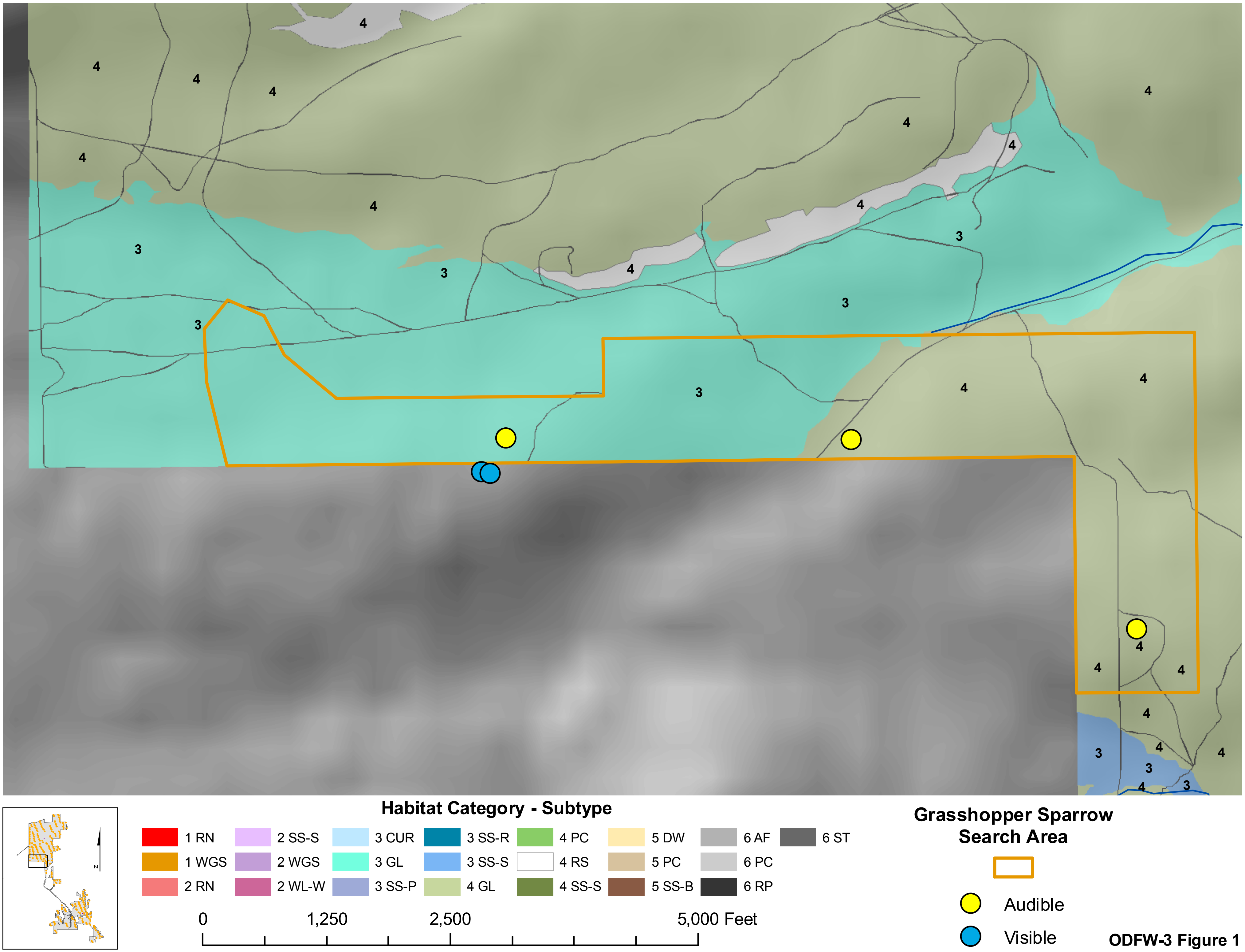
ODFW-2 Figure 11



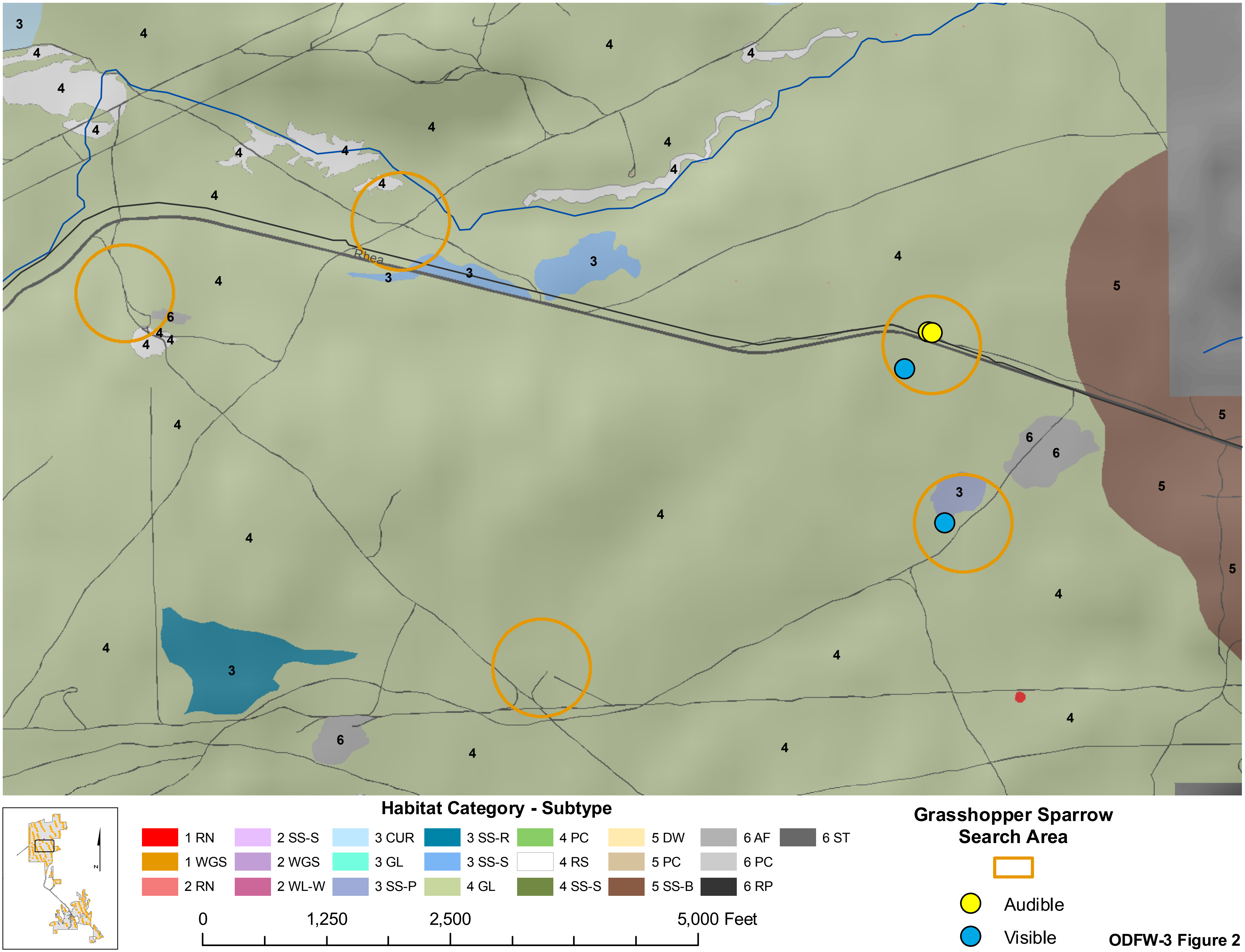
ODFW-2 Figure 12

SFWF legend key

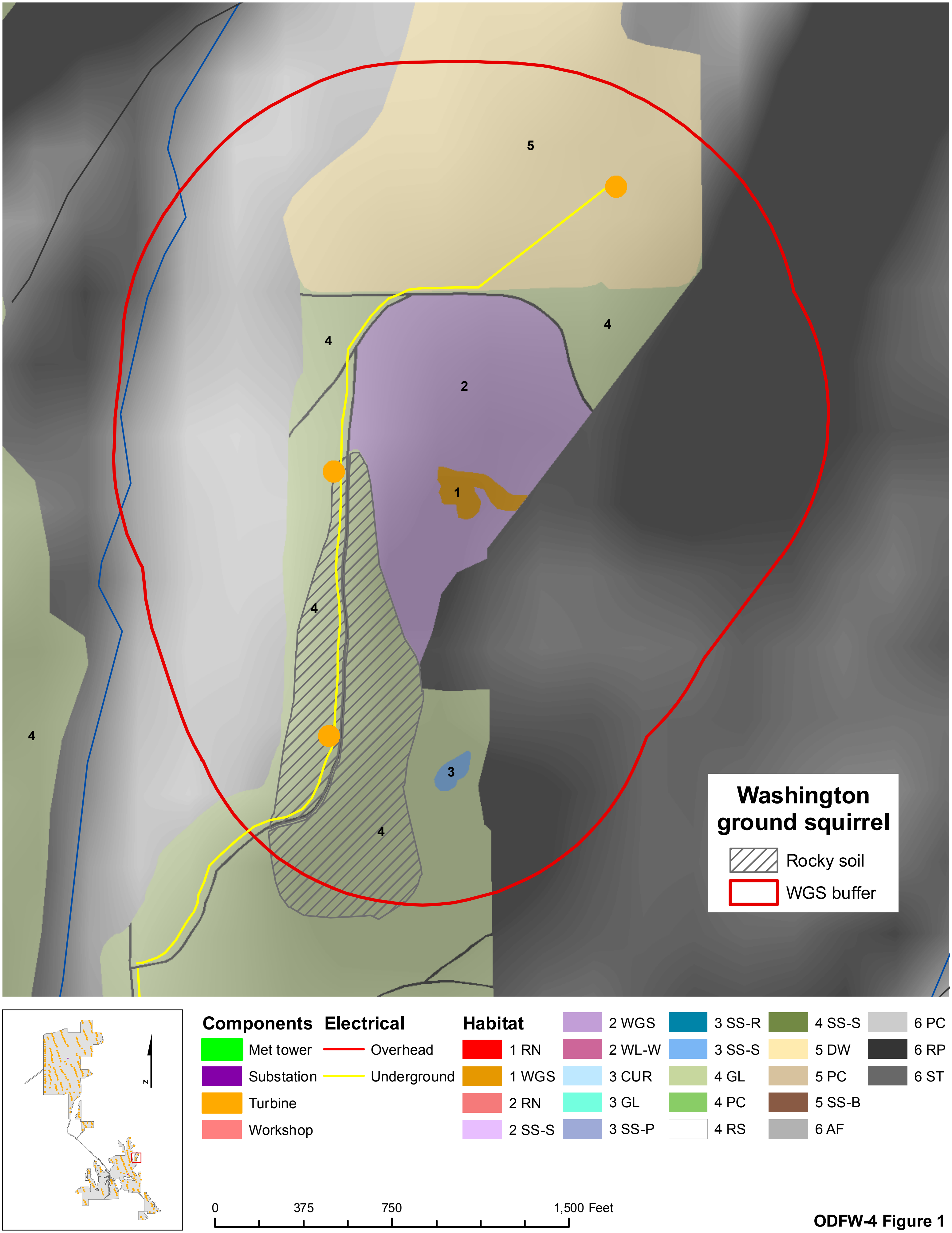
SFWF			LJF Equivalents		
Map code	**Habitat type**	**Habitat subtype**	**Map code**	**Habitat type**	**Habitat subtype**
1 RN	Escarpment	Raptor nest	Raptor nest	Raptor nest	Escarpment
	Tree	Raptor nest	Raptor nest	Raptor nest (LJ north)	Woodland-juniper
			Raptor nest	Woodland (LJ south)	Woodland-juniper
	Developed	Raptor nest	None	Developed	Structure
	Developed	Raptor nest	None	Developed	Old field
1 WGS	Shrub steppe	Washington ground squirrel	None	Shrub steppe	Shrub-grass
2 RN	Tree	Raptor nest	W-J	Woodland	Woodland-juniper
			W-L	Woodland	Woodlot
2 SS-S	Shrub steppe	Shrub steppe-sage	SS-A	Shrub steppe	Shrub-grass
2 WGS	Grassland	Washington ground squirrel	None	Grassland	Annual grass and weeds
2 WL-W	Exposed basalt	Wetland-dry wash	None	Exposed basalt rock	Exposed basalt
	Exposed sand and soil	Wetland-dry wash	None	None	None
3 CUR	Grassland	Long-billed curlew	None	Grassland	Annual grass and weeds
3 GL	Grassland	Grassland	G-A	Grassland	Annual grass and weeds
3 SS-P	Shrub steppe	Shrub steppe-purshia	SS-E	Shrub steppe	Bitterbrush/buckwheat
3 SS-R	Shrub steppe	Shrub steppe-rabbitbrush	SS-B	Shrub steppe	Open low shrub
3 SS-S	Shrub steppe	Shrub steppe-sage	SS-A	Shrub steppe	Shrub-grass
4 GL	Grassland	Grassland	G-A	Grassland	Annual grass and weeds
4 PC	Developed	Previously cultivated	D-B	Developed	Old field
4 RS	Exposed basalt	Rock, soil and sand	EB	Exposed basalt rock	Exposed basalt
	Exposed sand	Rock, soil and sand	None	Exposed	None
	Developed (road cuts)	Rock, soil and sand	None	Developed	None
4 SS-S	Shrub steppe	Shrub steppe-sage	SS-A	Shrub steppe	Shrub-grass
5 DW	Developed	Dryland wheat	D-W	Developed	Dryland wheat
5 PC	Developed	Previously cultivated	D-B	Developed	Old field
5 SS-B	Shrub steppe	Shrub steppe-broom snakeweed	None	None	None
6 AF	Developed	Animal facility	None	Developed	None
6 PC	Developed	Previously cultivated	D-X	Developed	Other disturbed
6 RP	Developed	Roads and parking	None	Developed	None
6 ST	Developed	Structures	D-F	Developed	Farmyard



ODFW-3 Figure 1



ODFW-3 Figure 2



ODFW-4 Figure 1

RAI#3, P14: FISH AND WILDLIFE HABITAT

Please expand on the paragraph at the top of page 43. Explain how you calculated that "the maximum number of turbines that can be sited per acre is estimated at 0.036." This figure would equate to 1 turbine per 28 acres. Explain how you calculated that "the temporary disturbance associated with this density of turbines, new roads to service them, and associated met towers and substations, is 1.4% of the habitat." In this calculation, what is the total area of habitat?

Explain your statement that "temporary disturbance for the submitted typical layout of the SFWF is 0.8% of the total area." Show your calculation to arrive at this percentage.

You appear to be saying that, were there no restoration of temporary disturbance areas, "a 1.4% increase in bare ground and/or alien plant species is not sufficient to change the categorization of this habitat, and no loss of category quantity is expected from temporary disturbance." Does this mean that you do not believe that restoration of the disturbed areas is necessary?

TEMPORARY CONSTRUCTION DISTURBANCE

Computation of Turbines per Acre

For the worst-case facility layout, the closest spacing between turbines within a string was determined, using the typical layout, to be approximately 750 feet. The closest spacing between two turbine strings in the typical layout was determined to be approximately 1,700 feet. These distances generate arrays 750 by 1,700 feet centered at each turbine.

750 ft × 1,700 ft = 1,275,000 sq ft per turbine
1,275,000 sq ft per turbine ÷ 43,560 sq ft/acre = 29.26 acres per turbine
1 turbine ÷ 29.26 acres per turbine = 0.034 turbine per acre

The total area of 3 CUR habitat within the site boundary is 6,444 acres. In the worst-case layout, the maximum number of facility components that could fit were sited in 3 CUR habitat, resulting in 226 turbines.

226 turbines ÷ 6444 acres = 0.035 turbines per acre

The maximum number of turbines that could be sited per acre was given as 0.036 in Exhibit P to avoid underestimation.

Temporary Disturbance Percentage and Impacts

In the worst-case layout, 1 meteorological tower, 1 substation and associated access roads and transmission were also placed in the 3 CUR habitat along with the 226 turbines. The total temporary disturbance for these is 88 acres (Exhibit P Table P-6a). The percent of 3 CUR acreage temporarily disturbed is:

88 acres disturbed ÷ 6444 acres 3 CUR = 1.366% disturbed = 1.4% (rounded)

In considering temporary impacts strictly to vegetation from construction, the 3 CUR habitat was considered to be part of the 3 GL habitat.

88 acres disturbed 3 CUR + 16 acres disturbed 3 GL = 104 acres disturbed 3 GL
6444 acres 3 CUR + 736 acres 3 GL = 7180 3 GL acres within the site boundary
104 acres disturbed ÷ 7180 acres 3 GL = 1.448% disturbed = 1.4% (rounded)

The same type of calculation (disturbed acres ÷ total acres), using the acreage for the worst-case layout in Table P6a, produces temporary disturbance of 3.0% of the 3 SS-R habitat and 3.3% of the 3 SS-S habitat. In all other category/subtypes, 1.4% or less is temporarily disturbed. In the typical layout, the only habitat with more than 1.4% temporarily disturbed is 3 SS-S at 1.7%. The next highest temporary disturbance is of the 4 PC habitat at 1.3% and the 3 SS-R and 5 SS-B habitats at 1.2% each.

The maximum worst-case temporary disturbance to vegetation in all habitat category and subtype combinations other than 3 SS-S was considered to be 1.4%, so this maximum expected disturbance was used in describing impacts to habitats other than to 3 SS-S. In Exhibit P, the use of 1.4% maximum temporary disturbance impact to 3 SS-R habitat was in error. The percentage used should have been 3.0%.

Under OAR 635-415-0025, it is necessary to address net loss of quantity for habitat Categories 1 through 4. Replacement of permanently lost habitat acreage from within the site boundary is addressed by category in the Habitat Mitigation Plan, as well as provision for replacement, for the duration of the predicted impact, of habitat acreage lost from temporary disturbance. This insures there will be no net loss of category within the temporary disturbance footprint.

Calculation of the maximum probable percentage of temporary disturbance in each category and subtype was intended to put temporary disturbance impacts into perspective. Applicant wished to determine whether the level of temporary disturbance was sufficient to cause a change *in category* for the surrounding undisturbed habitat category/subtype patch in which temporary disturbance occurred. Applicant believed that there might be scenarios which would result in reclassification of undisturbed habitat to a lower-quality category.

If a significant portion (e.g. greater than 25%) of a small parcel of Category 3 habitat were to be disturbed, re-categorization of the remaining undisturbed habitat to Category 4 or 5 might be appropriate, and there would be a net loss of Category 3 quantity in addition to that lost directly from temporary and permanent disturbance.

A specific example may be produced by assuming that the crane tread path traveled through a small patch shrub steppe. Loss of most shrubs in small stand of sage could sufficiently change the vegetative characteristics and alter the undisturbed habitat's category and subtype. Large facility components (field workshops and substations) could impact small adjacent habitat patches in the same manner. Applicant proposes, in addition to restrictions already described in Exhibit P, to restrict construction of field workshops and substations to habitat categories 4 through 6. Temporary and permanent disturbance from turbines, roads and electrical lines are distributed over larger areas, and are likely to cause significant change in habitat category or subtype of undisturbed areas in small habitat patches. To reduce this possibility, Applicant has already proposed to exclude several category/subtype patches that are small in area (typically smaller than 10 acres) from component siting and disturbance.

For Category 6 habitats (animal facilities, roads and parking, and ranch yards), even large areas of temporary disturbance will either cause no change or result in an improvement in quality (the case with some stands of previously cultivated land). Disturbance impacts should not result in a change of category for Category 6 disturbed or undisturbed areas.

Category 5 habitats include plowed wheat fields (DW) as well as previously cultivated areas. The presence of bare or disturbed ground will not change categorization of the undisturbed habitat, even if most of the area were to be disturbed. A patch of Category 5 previously cultivated (PC) habitat may be sufficiently disturbed to change the subtype of the undisturbed area, but the category would remain the same. Disturbance of Category 4 rock and soil habitats which are not vegetated would not produce a change in category.

Loss of a significant number of shrubs through temporary disturbance of Category 4 sage shrub steppe (SS-S) might change the undisturbed habitat subtype from 4 SS-S to 4 grasssland (GL), but the maximum anticipated temporary disturbance of 1.4% (as calculated above) is unlikely to result in a change in the undisturbed habitat to Category 5. Therefore, no net loss of category quantity is expected.

4 GL and 4 PC habitats are characterized by areas of bare soil which occupy, on average, 11% of the habitat. Some 4 GL habitat has bare soil covering up to 41% of the area surveyed. These habitats usually cover large contiguous areas. The anticipated worst-case temporary disturbance to 4 GL and 4 PC habitats is unlikely to result in a change in the categorization of the undisturbed areas to Category 5, and no net loss of category quantity is expected.

The smallest discrete area of Category 3 rabbitbrush shrub steppe (SS-R) is less than 3 acres. Disturbance within this area could change the rating of the remaining undisturbed habitat to 3 GL or 4 GL, depending on the quality of the understory vegetation and the proportion of shrubs removed. Applicant has proposed to avoid this area. Neither the worst-case nor the typical layout sites a workshop or substation within rabbitbrush shrub steppe, and Applicant proposed, above, to avoid such siting. Applicant believes that damage to or loss of 3.0% (as calculated above) of the rabbitbrush or understory in larger patches is not sufficient to change categorization of the remaining undisturbed habitat to Category 4, and no net loss of category quantity is expected.

Applicant has proposed avoidance of the one area of Category 3 purshia shrub steppe within the site boundary. For 3 SS-S habitat, Applicant has proposed avoidance of any disturbance in habitats of less than 5 acres, and proposed, above, to avoid siting of field workshops or substations in any 3 SS-S habitat. Applicant has proposed to avoid, whenever practical, removal of sage shrubs, and believes avoidance measures will result in a loss of less than 2% of sage shrubs within these habitats. Applicant believes this level of temporary disturbance in larger patches is not sufficient to change categorization of the undisturbed habitat to Category 4, and no net loss of category quantity is expected.

Category 3 grasslands and Category 3 curlew habitat patches are generally fairly large. Applicant proposed, above, to avoid siting of field workshops or substations within these areas. Applicant believes a worst-case temporary disturbance impact to 1.4% of the habitat is not sufficient to change categorization of the undisturbed habitat to Category 4, and no net loss of category quantity is expected.

Applicant has proposed no disturbance of Category 1 and 2 habitats.

Total Temporary Impact to the Project Site

The maximum acreage of estimated temporary disturbance is for the typical site layout, at 175.79 acres (Exhibit P Table P-7). The area within the site boundary is estimated as 22,390 acres.

175.79 acres disturbed ¸ 22,390 acres = 0.785% disturbed = 0.8% (rounded)

Revegation of Temporarily Disturbed Areas

Applicant believes that temporary disturbance will cause net loss of category quality for the contiguous habitat category/subtype in which disturbance occurs. Applicant believes the loss of quality and extent of disturbance, with the mitigation measures Applicant has proposed, will not be sufficient to cause net loss of habitat category. Applicant believes that revegation of disturbed areas is necessary – to replace habitat category in the disturbed area, restore habitat quality to the contiguous area, reduce noxious weed infestation, prevent degradation of landscape esthetics, and preserve good landlord relations.

Patricia Pilz

From: Patricia Pilz [pat@pilzandco.com]
Sent: Thursday, September 20, 2007 12:46 PM
To: 'John White'
Cc: 'jflarson@PacificEnergySystems.com'; Carol
Subject: RE: SFWF cultural resources

ODFW
ddendum.doc (29 KI

AIN is working hard to make this happen, as we speak.

On the grassland, we will have the site visit if you think it is important. But we don't want to waste your time. If ODFW thinks that grassland with 45% cover by alien species is Category 2, then so be it...seeing the land will not change their minds.

But, as we have discussed before, the rules for Shepherds Flat seem to be different. We prepared the attached at the time we responded to ODFW, but did not include it as I thought it was overkill. Carol was right, I was wrong.

Our typical layout has maybe 5 turbines on that land, and our HRP parcel can accommodate the change in classification.

-----Original Message-----
From: John White [mailto:John.White@state.or.us]
Sent: Thursday, September 20, 2007 12:23 PM
To: pat@pilzandco.com
Cc: jflarson@PacificEnergySystems.com
Subject: Re: SFWF cultural resources

Pat,
I got your message before heading out to KFalls. I look forward to seeing AINW's proposal. I guess the question for us is whether some or all of the work can be completed before we are ready to find the application complete.

On another issue, Rose Owens has suggested a site visit to try to resolve the disagreement over the grassland area category. She will be in the Arlington area on October 17 and wondered if a visit to the area in question could be arranged for that afternoon. John L and I would probably also try to get there. If that date does not work for you, is there a better time during the following week?

Regards,
John

John G. White
Oregon Department of Energy
625 Marion St., NE
Salem, Oregon 97301-3742
john.white@state.or.us
>>> "Patricia Pilz" <pat@pilzandco.com> 09/19/07 6:33 PM >>>
Hi John,

I am mindful of the fact that you are on your way to Klamath Falls. But AIN seems to have come through for us today, and have promised us a (not-silly-layout) proposal that will fit my, yours, and SHPO's needs by tomorrow morning. If so, I will pass it on to you and beg for your approval. I have told them that if it passes muster I will deploy them to the field immediately.

But, then, I have been disappointed before. And, yet again, they are a fine firm and maybe just had a rough spot at the same time as we needed their full attention.

Thanks for your ear today.

Regards,
Pat

Patricia Pilz
Pilz & Co, LLC
656 San Miguel Way
Sacramento, CA 95819
(T) 916-456-7651
(M) 916-803-0602

Addendum to response to agency comments: Oregon Department of Fish and Wildlife

In addressing the ODFW statement that the SFWF description of grassland quality matched that for habitat designated as Category 2 by LJF (response pages 3 and 4), Grassland containing perennial bunchgrass on shallow soil is not present on the LJF site, in contrast to all grassland in the SFWF north project area. Applicant subsequently noticed such grassland is found on the mitigation parcel proposed for LJF, and it is described in the LJF Project Order. According to the Project Order, ODFW staff has visited the site.

Alien plant species occupation of the site is described, on page 99 of the LJF Project Order, as follows:

> *Although non-native cheatgrass is found within the parcel (as in most areas in the Columbia Basin), native vegetation persists and out-competes undesirable plants and grasses, setting the area apart from most rangeland sites that the certificate holder considered in the region. The protective soil surface biotic crust (cryptogam) is in excellent condition and offers opportunities for ecology studies to further the knowledge of this under-studied, but important, unique biotic feature.*

Beginning on page 100, the Project Order discusses the two types of perennial bunchgrass habitat within the parcel, and the habitat categories to which they have been assigned, as follows:

> *In addition, the proposed mitigation area contains Category 3 perennial bunchgrass habitat and, to a lesser extent, Category 2 perennial bunchgrass. The perennial bunchgrass habitat type is present on deeper soils near the big sagebrush/perennial bunchgrass habitat. The perennial bunchgrass areas are relatively healthy and, although field surveys are limited, appear to have a diverse composition of native forbs. The ecological condition is primarily good with undisturbed late seral conditions dominant (soil mosses and lichens are very well developed). Exotic species, although present, are a minor component of the vegetation in all locations investigated. Perennial bunchgrass habitat provides forage and cover for wildlife and a high diversity of forbs, which is particularly attractive to vertebrates.*
>
> *Perennial bunchgrass is limited in the physiographic province and is important to wildlife. Based on the vegetative quality, the habitat was rated as Category 3. Based on the presence grasshopper sparrows (State Sensitive: Vulnerable), there are three areas of Category 2 deep-soil perennial grassland in good condition.*
>
> *The mitigation area also includes perennial bunchgrass on shallow soils, with a preliminary habitat rating of Category 4. The shallow-soil perennial bunchgrass (bluebunch wheatgrass and Sandberg's bluegrass) is relatively*

healthy. Like the perennial bunchgrass present on deeper soil sites, the bunchgrass areas on shallow soils appear to have a diverse composition of native forbs; many are not found on the deeper soil sites. The ecological condition is primarily good with undisturbed late seral conditions dominant (soil mosses and lichens are very well developed). This habitat type provides forage for wildlife and a high diversity of forbs, which is particularly attractive to invertebrates. The forb layer is most strongly characterized by members of the genera Eriogonum (the buckwheats) and Lomatium (the desert parsley group). The forb layer is not limited in the physiographic province but is important to wildlife. Until further field investigations document the full ecological condition and value, the shallow soil perennial bunchgrass was rated as Category 4.

RESPONSE TO AGENCY COMMENTS: OREGON DEPARTMENT OF FISH AND WILDLIFE

The Oregon Department of Fish and Wildlife (ODFW) comment letter received October 9, 2007 is included in its entirety as Attachment ODFW-1. Applicant's response to each, separate, comment (comments shown in *italics*) is presented below.

COMMENTS ON THE WILDLIFE MONITORING AND MITIGATION PLAN

1. On page 1, line 22, Comment 1, ODFW believes that the standardized fatality monitoring continues to be worthwhile for reasons mentioned by John White. Also, the monitoring information from the Stateline and adjacent projects or the Klondike and adjacent projects may not necessarily prove to be representative of the fatality monitoring results that will be obtained on this project and those close to it. For these reasons, ODFW believes that utilization of standardized fatality monitoring methods with reporting of fatalities of bird and bat groupings that were used on previous wind projects will prove beneficial.

Applicant has agreed to a monitoring program conforming to that of the Leaning Juniper Facility (LJF).

2. On page 2, in the Schedule section, the text states "The first monitoring year will begin one month after the beginning of commercial operation of the SFWF". Discussion of monitoring continues in the Sample Size section on pages 2 and 3. ODFW is unclear if the discussions mean that monitoring will commence after the first turbines become operational or if it means after the entire project is operational. If the project is built in phases and the fatality monitoring lasts for two years then there is potential for some portions of the project to not have any surveys completed. ODFW would like some clarification on this point and recommends that the monitoring be structured according to phases of construction so that surveys can be completed on all phases of the project with monitoring stations located in all represented habitat types. Also, discussions of percent of installed turbines being monitored and "a minimum of 50 turbines" monitored would make more sense if put in the context of how many total turbines will be constructed in certain years or in certain phases.

Applicant proposed that each year approximately 30% of operating turbines be monitored, that these include a statistically representative subpopulation of the final layout, and include monitoring of turbines in all representative habitats. As each portion of the project achieves commercial operation, Applicant understands that monitoring for the portion in commercial operation will survey each year a minimum of 50 turbines (or all turbines in commercial operation if there are fewer than 50) and a maximum of 30% of turbines in commercial operation if there are more than 167 turbines. Applicant understands these criteria would apply to *each* phase entering commercial operation if construction is phased.

3. On page 6, Comment 3, ODFW recommends keeping with the categories in the text of the plan. Keeping with the same fatality categories as other wind projects will make it much easier to compare numbers across projects and to spot fatality numbers in certain groupings that may be high or low on this particular project in comparison to other projects. Grassland birds, raptors, State sensitive species, nocturnal migrants and bats are all *categories of interest for ODFW for this project and therefore ODFW recommends that these categories be used for fatality reporting purposes along with the three other avian catch-all categories. Also, these categories correspond to the Mitigation section on page 9 which lists thresholds of concern for raptors, grassland bird species, State sensitive bird species and bats so these thresholds would only have significance if the fatality numbers are gathered and calculated for these particular groups.*

Applicant originally proposed different fatality categories and significance thresholds that would facilitate comparing fatalities to avian use rates, but has agreed to categories and thresholds conforming to those of LJF.

4. On pages 10 and 11, the text mentions that raptor nest surveys will be conducted each monitoring season with a minimum of one helicopter survey. The applicant has stated that they are proposing to conduct these raptor nest surveys from the ground. ODFW agrees that ground surveys are acceptable as long as they are thorough enough to detect any new nest sites and to determine the status of recently active nests. There are so few nesting structures in the project area that it would be fairly easy to cover them all on the ground.

Applicant agrees.

5. On page 10, lines 21 through 25, the text refers to Washington ground squirrel (WGS) surveys stating that "This assessment will take place when the squirrels are active (approximately mid March through May) beginning in the first active period after the effective date of the site certificate for the SFWF. The colony will be assessed annually thereafter through the second year after the facility becomes commercially operational." As mentioned in comment 1. above, it is unclear if this wording means that monitoring will commence after a portion of the turbines are commercially operational or if it refers to the entire project being operational. ODFW recommends that surveys be completed through the second year after the turbines closest to the WGS colony are commercially operational.

Applicant intends to begin monitoring the first year after issuance of the Site Certificate, which may be a year or more before turbines are constructed in the vicinity of the WGS colony. This is intended to provide additional pre-construction colony size and condition data to which post-construction results can be compared. Applicant agrees that initial annual monitoring should continue through the second year after turbines closest to the WGS colony enter commercial operation.

COMMENTS ON THE REVEGETATION PLAN

1. On page 2, lines 37 – 38, the text states that disturbed areas will be evaluated to determine whether restoration seeding is needed. No evaluation criteria are given as to when restoration seeding will be undertaken or not. ODFW recommends that the evaluation criteria be listed in this document.

Lines 38 – 41 give several situations in which restoration seeding would not be necessary. Applicant prefers that the evaluating botanist have responsibility for that determination, rather than to attempt to prepare a list of criteria covering all contingencies.

2. On page 3, lines 1 – 2, the text states that narrow areas of soil disturbance due to off-road trenching, off-road crane paths and other limited disturbance may be seeded and left without mulch. What are the evaluation criteria that will be used to determine whether or not these areas will be seeded? ODFW recommends that the evaluation criteria be listed in this document.

Applicant intended that the statement be "will be seeded but may be left without mulch." Again, Applicant prefers that the need for mulching be determined by the evaluating botanist.

COMMENTS ON THE HABITAT MITIGATION PLAN

1. On page 1, line 13, the text lists 173 acres as the area covered by permanent facility components but on page 2 in the table under line 2, the total area impacted amounts to 170.9 acres. Is this discrepancy because the table does not include category 6 habitat areas?

Yes.

2. On page 1, lines 26 – 27 and in the table on page 2, the text states that there will not be any temporary or permanent impacts to category 2 habitat. However, on ODFW-2 Figure 9 and Figure 10, a turbine and a road are shown as being sited in category 2 habitat.

These Category 2 habitats are shown as impacted in this set of maps because initial component siting occurred prior to final determination of habitat categories. Applicant has proposed to avoid all identified Category 2 habitats in the final layout, and has proposed conditions to assure avoidance. The layout continues to be adjusted to avoid habitats, comply with noise restrictions and avoid cultural resource findings. For calculation of habitat disturbance impact from the typical footprint, the turbine and road segment shown in Category 2 habitat in Figure 9 were moved to the east, and the road in Figure 10 moved to the west. Although we can provide ODFW with new maps showing avoidance of these Category 2 habitats, we suggest that waiting for maps showing the actual layout would be more useful than receiving a series of maps as each adjustment is made.

3. On page 3, lines 8 – 10, the text states that an improved road and three overhead transmission lines will cross the mitigation site. ODFW suggests that the mitigation site would provide more benefit (higher quality) for wildlife if the area is not bisected by transmission lines and an improved road which have the potential for disturbance and fatality impacts to wildlife. Consistent with this recommendation, page 4, lines 26 through 28 of the text states that "the certificate holder shall restrict uses of the mitigation area that are inconsistent with achieving the habitat mitigation goals…"

The footprints of these facilities will not be included in the acreage of the mitigation site. Applicant is also willing to exclude an appropriate buffer beyond these footprints from the acreage of the mitigation site to reduce the potential for adverse impacts. Applicant notes that the road currently exists and is used by the landowner, and that all project vehicles will be restricted to speed limits protective of wildlife. Applicant also notes the facility site (and thus the habitat the mitigation site is intended to replace) is crossed by many roads and transmission lines.

4. On page 5, lines 26 through 36, cattle grazing is discussed. Lines 28 through 30 state that a livestock feeding and watering site will be on the mitigation site. ODFW recommends that grazing on the mitigation site be allowed only for a limited duration and only if it can be *shown that the grazing will help improve the vegetation on the site and help move the area towards a higher quality habitat category (e.g., move a category 4 site to a category 3 site). Having a feeding and watering site on the mitigation area would most likely not be required if the grazing is of a short duration during a specific time of the year (January through April).*

Applicant believes the livestock feed and water stations will be of benefit to wildlife. Water, in particular, is scarce in the vicinity, needs to be supplied to livestock even during late winter and spring, and the livestock water supply is used by a variety of wildlife species. The majority of the facility site, and therefore the wildlife habitat to be replaced, is grazed by sheep in the north project area and by cattle in the south project area. Applicant believes that stocking levels, the duration of grazing, and the extent of the mitigation area in which grazing is allowed, should be based on actual habitat conditions in the mitigation area rather than specified beforehand.

5. On page 6, lines 8 through 18 and lines 33 through 36, the text describes a total of fifteen artificial nesting "boxes" (perhaps a misleading term since the artificial nests would be underground) to be constructed and installed for burrowing owls. ODFW requests to be consulted on the design and location of these proposed artificial nesting burrows. ODFW also refers the applicant to pages 40 – 42 of the document, An Adaptive Management Plan For The Burrowing Owl Population At Naval Air Station Lemoore, Lemoore, California (August 1998). Here is a link to this document for information on design, construction and location of burrowing owl artificial burrows:

http://oregonstate.edu/~rosenbed/articles/OwlPlan.pdf.

Applicant agrees to consult with ODFW on the design and location of the artificial burrows. Applicant has reviewed several designs, including that used in Arizona by Partners in Flight. It includes a design that would be particularly useful for protecting burrow entrances from coyotes: http://mirror-pole.com/burr_owl/bur_hard/bur_hard1.htm

6. On page 8, lines 14 through 16, the text states that WGS surveys of the mitigation site will be implemented beginning in year ten after completion of SFWS and at five-year intervals thereafter. ODFW is unclear why surveys would not be started until year ten and recommends that surveys be conducted periodically starting at year one and continue for the life of the mitigation site. ODFW recommends that surveys be conducted every three years and that this survey timing would be sufficient to determine any changes in WGS use on the mitigation site.

The mitigation area was surveyed in 2007 for WGS burrows. No WGS burrows now occur on the mitigation site, nor are any burrows in its vicinity. The habitat is currently unsuitable for use by WGS due to vegetation height, alien plant species presence, and previous cultivation of the soil. The first proposed formal WGS reconnaissance is in year 10 when it is possible that conditions within the mitigation area may be suitable and migration into the area may have occurred. Although earlier surveys are not proposed, it is unlikely WGS presence would be missed during burrowing owl surveys, and WGS would be reported as incidental sightings. Proposed management of the mitigation area and assessment of habitat improvement are not based on the presence or absence of WGS, but on vegetation quality and on use by burrowing owls and other avian species. Applicant prefers to devote initial resources to these species, which are more likely than WGS to benefit from early enhancement activities. Please note (page 10 lines 13 – 18) that wildlife use of the site will be reevaluated in Year 4, and includes the provision for collection of use data for other species (including WGS) if indicated.

> *7. On page 9, lines 10 through 17, the text states that the success criteria for category 3 habitat is achieved if less than 25 percent of the area is bare ground while in category 4 habitat, the success criteria is achieved if less than 15 percent of the area is bare ground. ODFW is unclear why more bare ground would be allowed in a category 3 site than in a category 4 site. Perhaps these numbers should be reversed?*

Applicant has noted that the presence of bare ground is inversely correlated with native species presence, particularly when cheatgrass (or other annual alien grass species) is a substantial component of the grass cover. High-quality sage habitat in the facility vicinity is accompanied by substantial bare ground. The best quality vegetation in a survey plot on the site was comprised of needle and thread grass, Sandberg's bluegrass, six-week fescue and bluebunch wheatgrass with more than 10% cover each, accompanied by other native grasses and forbs. Alien species provided only 10% of the cover, and bare ground comprised 20% of the cover. In areas with the worst vegetation quality, PC-5 and -6 sites, no bare ground was present. Habitats characterized as 3 were found to have more bare ground than those categorized as 4, which in turn had more bare ground than categories 5 and 6. The criteria by habitat category for allowed bare ground in the mitigation area is based on observations of the habitat characteristics of the facility site.

> *8. When comparing the table on page 2 which lists the footprint impacts according to habitat category and table 2 on page 9 which lists the mitigation site's anticipated habitat condition by habitat category in year 4, there are 125.3 impacted acres of category 3 habitat but only about 70 mitigation site acres listed in categories 1 through 3. ODFW's Mitigation Policy states that for category 3 habitat impacts, mitigation should consist of "reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality". The applicant's mitigation site proposal is lacking approximately 55.3 acres of category 3 habitat to be able to meet the "no net loss" criteria.*

Applicant acknowledges that if facility components are sited to conform to the worst-case layout, at Year 4 there will be a substantial shortfall in development of Category 3 habitat. Applicant also notes that if siting conforms to the typical layout there will be no shortfall in habitat categories by Year 4. As the habitat mitigation plan discusses (page 1 lines 28 – 34) mitigation goals will be based on actual rather than possible siting of components. At that point, it will be possible to determine if additional acreage is needed for the mitigation area in order to prevent net loss of habitat categories.

> *9. On page 10, lines 1 through 4, the text states that "Based on the evaluation in Year 4, if the Department concludes that the mitigation goals will not be met within a reasonable period, the certificate holder will locate and lease additional HMA acreage." ODFW recommends that the phrase "within a reasonable period" be specifically defined so that the applicant, Oregon Department of Energy, the EFSC and ODFW all know at what point the certificate holder will be expected to locate and lease additional HMA acreage.*

Applicant agrees, but was unable to discover a definition of "a reasonable period" in the LJF plan or in OAR 365-515-000 through 635-415-0025.

Oregon Department of Fish and Wildlife

Wildlife Division

3406 Cherry Avenue NE

Salem, OR 97303

DATE: October 10, 2007

TO: John White, Oregon Department of Energy

FROM: Rose Owens and Steve Cherry, Oregon Department of Fish and Wildlife

SUBJECT: Comments on Shepherds Flat Wind Project's Wildlife Monitoring and Mitigation Plan, Revegetation Plan and Habitat Mitigation Plan

Comments on the Wildlife Monitoring and Mitigation Plan

1. On page 1, line 22, Comment 1, ODFW believes that the standardized fatality monitoring continues to be worthwhile for reasons mentioned by John White. Also, the monitoring information from the Stateline and adjacent projects or the Klondike and adjacent projects may not necessarily prove to be representative of the fatality monitoring results that will be obtained on this project and those close to it. For these reasons, ODFW believes that utilization of standardized fatality monitoring methods with reporting of fatalities of bird and bat groupings that were used on previous wind projects will prove beneficial.

2. On page 2, in the Schedule section, the text states "The first monitoring year will begin one month after the beginning of commercial operation of the SFWF". Discussion of monitoring continues in the Sample Size section on pages 2 and 3. ODFW is unclear if the discussions mean that monitoring will commence after the first turbines become operational or if it means after the entire project is operational. If the project is built in phases and the fatality monitoring lasts for two years then there is potential for some portions of the project to not have any surveys completed. ODFW would like some clarification on this point and recommends that the monitoring be structured according to phases of construction so that surveys can be completed on all phases of the project with monitoring stations located in all represented habitat types. Also, discussions of percent of installed turbines being monitored and "a minimum of 50 turbines" monitored would make more sense if put in the context of how many total turbines will be constructed in certain years or in certain phases.

3. On page 6, Comment 3, ODFW recommends keeping with the categories in the text of the plan. Keeping with the same fatality categories as other wind projects will make it much easier to compare numbers across projects and to spot fatality numbers in certain groupings that may be high or low on this particular project in comparison to other projects. Grassland birds, raptors, State sensitive species, nocturnal migrants and bats are all categories of interest for ODFW for this project and therefore

ODFW recommends that these categories be used for fatality reporting purposes along with the three other avian catch-all categories. Also, these categories correspond to the Mitigation section on page 9 which lists thresholds of concern for raptors, grassland bird species, State sensitive bird species and bats so these thresholds would only have significance if the fatality numbers are gathered and calculated for these particular groups.

4. On pages 10 and 11, the text mentions that raptor nest surveys will be conducted each monitoring season with a minimum of one helicopter survey. The applicant has stated that they are proposing to conduct these raptor nest surveys from the ground. ODFW agrees that ground surveys are acceptable as long as they are thorough enough to detect any new nest sites and to determine the status of recently active nests. There are so few nesting structures in the project area that it would be fairly easy to cover them all on the ground.

5. On page 10, lines 21 through 25, the text refers to Washington ground squirrel (WGS) surveys stating that "This assessment will take place when the squirrels are active (approximately mid March through May) beginning in the first active period after the effective date of the site certificate for the SFWF. The colony will be assessed annually thereafter through the second year after the facility becomes commercially operational." As mentioned in comment 1. above, it is unclear if this wording means that monitoring will commence after a portion of the turbines are commercially operational or if it refers to the entire project being operational. ODFW recommends that surveys be completed through the second year after the turbines closest to the WGS colony are commercially operational.

Comments on the Revegetation Plan

1. On page 2, lines 37 – 38, the text states that disturbed areas will be evaluated to determine whether restoration seeding is needed. No evaluation criteria are given as to when restoration seeding will be undertaken or not. ODFW recommends that the evaluation criteria be listed in this document.

2. On page 3, lines 1 – 2, the text states that narrow areas of soil disturbance due to off-road trenching, off-road crane paths and other limited disturbance *may* be seeded and left without mulch. What are the evaluation criteria that will be used to determine whether or not these areas will be seeded? ODFW recommends that the evaluation criteria be listed in this document.

Comments on the Habitat Mitigation Plan

1. On page 1, line 13, the text lists 173 acres as the area covered by permanent facility components but on page 2 in the table under line 2, the total area impacted amounts to 170.9 acres. Is this discrepancy because the table does not include category 6 habitat areas?

2. On page 1, lines 26 – 27 and in the table on page 2, the text states that there will not be any temporary or permanent impacts to category 2 habitat. However, on ODFW-2 Figure 9 and Figure 10, a turbine and a road are shown as being sited in category 2 habitat.

3. On page 3, lines 8 – 10, the text states that an improved road and three overhead transmission lines will cross the mitigation site. ODFW suggests that the mitigation site would provide more benefit (higher quality) for wildlife if the area is not bisected by transmission lines and an improved road which have the potential for disturbance and fatality impacts to wildlife. Consistent with this recommendation, page 4, lines 26 through 28 of the text states that "the certificate holder shall restrict uses of the mitigation area that are inconsistent with achieving the habitat mitigation goals…"

4. On page 5, lines 26 through 36, cattle grazing is discussed. Lines 28 through 30 state that a livestock feeding and watering site will be on the mitigation site. ODFW recommends that grazing on the mitigation site be allowed only for a limited duration and only if it can be shown that the grazing will help improve the vegetation on the site and help move the area towards a higher quality habitat category (e.g., move a category 4 site to a category 3 site). Having a feeding and watering site on the mitigation area would most likely not be required if the grazing is of a short duration during a specific time of the year (January through April).

5. On page 6, lines 8 through 18 and lines 33 through 36, the text describes a total of fifteen artificial nesting "boxes" (perhaps a misleading term since the artificial nests would be underground) to be constructed and installed for burrowing owls. ODFW requests to be consulted on the design and location of these proposed artificial nesting burrows. ODFW also refers the applicant to pages 40 – 42 of the document, *An Adaptive Management Plan For The Burrowing Owl Population At Naval Air Station Lemoore, Lemoore, California* (August 1998). Here is a link to this document for information on design, construction and location of burrowing owl artificial burrows: http://oregonstate.edu/~rosenbed/articles/OwlPlan.pdf.

6. On page 8, lines 14 through 16, the text states that WGS surveys of the mitigation site will be implemented beginning in year ten after completion of SFWS and at five-year intervals thereafter. ODFW is unclear why surveys would not be started until year ten and recommends that surveys be conducted periodically starting at year one and continue for the life of the mitigation site. ODFW recommends that surveys be conducted every three years and that this survey timing would be sufficient to determine any changes in WGS use on the mitigation site.

7. On page 9, lines 10 through 17, the text states that the success criteria for category 3 habitat is achieved if less than 25 percent of the area is bare ground while in category 4 habitat, the success criteria is achieved if less than 15 percent of the area is bare ground. ODFW is unclear why more bare ground would be allowed in a category 3 site than in a category 4 site. Perhaps these numbers should be reversed?

8. When comparing the table on page 2 which lists the footprint impacts according to habitat category and table 2 on page 9 which lists the mitigation site's anticipated habitat condition by habitat category in year 4, there are 125.3 impacted acres of category 3 habitat but only about 70 mitigation site acres listed in categories 1 through 3. ODFW's Mitigation Policy states that for category 3 habitat impacts, mitigation should consist of "reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality". The applicant's mitigation site proposal is lacking approximately 55.3 acres of category 3 habitat to be able to meet the "no net loss" criteria.

9. On page 10, lines 1 through 4, the text states that "Based on the evaluation in Year 4, if the Department concludes that the mitigation goals will not be met *within a reasonable period*, the certificate holder will locate and lease additional HMA acreage." ODFW recommends that the phrase "*within a reasonable period"* be specifically defined so that the applicant, Oregon Department of Energy, the EFSC and ODFW all know at what point the certificate holder will be expected to locate and lease additional HMA acreage.

Patricia Pilz

From: John White [John.White@state.or.us]
Sent: Tuesday, October 23, 2007 9:06 AM
To: Rose M Owens; Steve P Cherry
Cc: John Larson; Carol Weisskopf; Pat Pilz
Subject: mitigation area proposals

HRPHAP.pdf HAP description.pdf HAP.pdf

Rose and Steve,

As a result of ODFW comments during our site visit, Pat and Carol have put together an alternative habitat mitigation proposal. They continue to believe that their original proposal (the site that we visited) has merit, but they understand that ODOE would need ODFW's endorsement of the plan to support a recommendation to the Siting Council to adopt it. They have provided a discussion document that compares the advantages of each proposal (HRPHAP.pdf).

Also attached to this e-mail are a detailed description of the alternative site (HAP description.pdf) and a draft Habitat Mitigation Plan based on the alternative site (HAP.pdf). Not surprisingly, the draft plan is almost identical to the language of the Habitat Mitigation Plan that ODFW endorsed and the Siting Council approved last month for Leaning Juniper II.

It is critical, I think, for Steve to get a look at the proposed alternative mitigation area as soon as possible. After you have had time to consider the pros and cons, please let me know which plan is preferred by ODFW. I would still anticipate that we will have some dialog over the final language of the Habitat Mitigation Plan, but having conceptual endorsement from ODFW for one or the other proposed mitigation area, will allow us to move forward.

I am sure that Pat and Carol are available this week to answer any questions that you might have about either the original proposal or the new alternative.

Regards,
John

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THE ADVANTAGES AND DISADVANTAGES OF THE ORIGINAL HABITAT MITIGATION PLAN AND THE ALTERNATE HABITAT MITIGATION PLAN

ADVANTAGES OF THE ORIGINAL HABITAT MITIGATION PLAN

Offers educational opportunities: The Habitat Replacement Parcel (HRP) is linear and lies along Fourmile Canyon Road. It is therefore accessible to view for educational and informational purposes. Conversion of an agricultural site to more native conditions can serve as an example of habitat restoration. Postings can provide information about the vegetation and constructed burrowing owl nest boxes. A visit to the mitigation site can be included in public and school tours of the wind facility.

Reduces habitat fragmentation: Fourmile Canyon extends another 4 miles south of the HRP. The canyon floor south of the HRP has not been cultivated and provides native habitat. The north end of the HRP contains native grass transitioning to sage steppe and grassland to the north. These habitats extend into Eightmile Canyon, and from there to the Willow Creek Valley and the north project site to the Columbia River. The condition of the south portion of the HRP reduces connectivity between these areas.

> **Rebuttal:** Corridors can allow for transmission of disease and weed species between isolated habitats.[1]

Provides for true "no net loss" of habitat: Enhancement of acreage sufficient to replace that lost to the permanent facility footprint and to temporal disruption meets the "no net loss" requirement of OAR 635-415-0025.

Enhancement will benefit wildlife currently using the site: Deer and elk, burrowing owls, red-tailed hawks and other raptors, loggerhead shrike and common grassland birds have been sighted in the HRP and in its immediate vicinity. Grazing, seeding and the removal of the tumbleweed will improve raptor prey availability, increase shelter and food resources, and enable the HRP to support more wildlife species in higher numbers.

Benefits from presence of the Fourmile Creek dry wash: This wash provides habitat diversity, serves as a wildlife refuge and a sheltered travel corridor, and may contain microhabitats and specialized plant communities. The wash and its banks currently contain scattered sage, rabbitbrush and at least one small juniper. The HRP has not been grazed recently, and the wash and banks have not been cultivated. Removal of tumbleweed and debris from the wash may allow emergence of a wide variety of native vegetation from its seed bank. Species that may not grow in the surrounding soil may be found within the wash due to moisture retention.

A portion will be grazed by cattle: Provision of water and winter feed for livestock will benefit many wildlife species. Proper grazing will also provide for a diversity of grass heights, and can

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[1] United States Department of Agriculture, Natural Resources Conservation Service (2004). *Conservation Corridor Planning at the Landscape Level – Managing for Wildlife Habitat*, National Biology Handbook, Subpart B – Conservation Planning.

improve grassland quality and reduce annual weed species presence. The alternative to cattle grazing for grass maintenance to encourage use by grassland birds is mowing or burning.[2] The USDA National Resources Conservation Service states "Occasionally, grazing livestock may disturb nests or young but generally grazing livestock and grassland wildlife are compatible."[3]

> **Rebuttal:** ODFW recommends that grazing be allowed only for a limited duration and only if it can be shown that it will help improve vegetation on the site and help move the area towards a higher habitat category.

Conditions tailored to attract and support target species: At 220 acres the HRP is not particularly large, and target species requiring relatively modest ranges were selected. The burrowing owl is the primary target species. An Oregon species of concern categorized as critical, it has been displaced from much of the deep soil habitat in the region by agricultural cultivation. Two burrows were found within the HRP, although it is likely one was abandoned due to the presence of tumble mustard and tumbleweed. The HRP is eminently suitable for development as a burrowing owl refuge. Through management of grassland height and installation of constructed nest boxes, it should be possible to attract as many owls as the food resources and HRP size can support. General grassland avian species are also targeted, and management of the site conforms to the Wildlife Habitat Management Institute's recommendations for management of habitat for grassland birds.[4]

Although not specifically a target species, management of the HPR is also designed to conform to conditions found at the six sites at which Washington ground squirrels were observed in 2007 surveys: a combination of short grass, cattle grazing, uncultivated hillsides and deep silt loam or sandy loam soil. Such conditions will exist in the HRP, and it may eventually be colonized by the species. The Washington ground squirrel is listed as endangered in Oregon and is a candidate for federal listing.

The HRP is larger: Due to uncertainties in the speed of revegetation success, the HRP is 45 acres larger than the acreage required by the calculations used for previously sited facilities. Due to Applicant's assessment of dryland wheat as habitat Category 5 rather than 6 (the assessment used for all previously sited facilities), the HRP is larger by 18 acres. The HRP is 63 acres (40%) larger than the 157 acres produced using the standards applied to recently sited facilities.

The HRP was sited to provide maximum benefit to wildlife: Agricultural land available for enhancement of habitat is widespread in the project's vicinity. A large number of sites were considered and rejected before wildlife biologists selected the HRP.

The plan has buy-in: The biologists, the Applicant, and the project's landowners are all enthusiastic about the potential of the site and the positive impact enhancement would make.

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[2] United States Department of Agriculture, Natural Resources Conservation Service (1999). Grassland Birds, Fish and Wildlife Habitat Management Leaflet Number 8.
[3] Dunne, T. (2004). *Establishing Grassland Habitat in Working Agricultural Landscape*, in: Proceedings of the New Jersey Grassland Habitat Symposium, pp 8 – 10.
[4] United States Department of Agriculture, Natural Resources Conservation Service (1999). *Ibid*.

Rebuttal: ODFW would prefer protection and slight enhancement of a parcel with higher initial habitat conditions.

DISADVANTAGES OF THE ORIGINAL HABITAT MITIGATION PLAN

ODFW has stated that the site is too narrow

Rebuttal: Extremely narrow linear habitats, such as hedgerows and field-edge grass buffers, have not been found to impact small mammal diversity or abundance compared to non-linear habitat blocks. The field boundary was found to be the most species-rich habitat surveyed.[5] When agricultural fields and roads were the edge habitat, patch size or width did not have a significant impact on passerine habitat use, nest survival or productivity.[6]

The boundary of the HRP should not be considered as the functional wildlife use width, as there is uncultivated native grassland habitat on adjacent slopes. These are too steep for cultivation and already provide wildlife habitat. A 220-acre square parcel would have a 0.6-mile width. While the average HRP width is 0.2 miles, the functional width for wildlife use is 0.3 – 0.5 miles. Protection or enhancement of the hillsides is unnecessary, and not including them in the HRP allows establishment of a long corridor of approximately 1.25 miles.

Recommendations for minimum width of habitat patches or corridors range from 660 feet[7] to 1,000 feet[8]. Applicant's consultants have worked with habitat corridors established by the U.S. Bureau of Land Management in the Bell Rapids are of Idaho that are 330 feet wide. The HRP is generally 845 feet in width, and has a functional width available for wildlife use of more than 1,000 feet.

ODFW has stated that transmission line crossings reduce habitat value

Rebuttal: The acreage disturbed by transmission lines was not included in the HRP size. In-kind habitat mitigation is described as "habitat mitigation measures which recreate similar habitat structure and function to that existing prior to the development action." (OAR 635-415-0005 (12)). The habitat on the facility site is crossed by a number of transmission lines. The habitat lost due to the construction of the facility, therefore, is equivalent to habitat crossed by transmission lines. HRP habitat represents in-kind replacement. In any event, the transmission towers are used for raptor nesting.

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[5] Tattersall F.H., D.W. MacDonald, B.J. Hart, P. Johnson, W. Manley and R. Feber (2002). *Is Habitat Linearity Important for Small Mammal Communities on Farmland?* Journal of Applied Ecology, **39:** 643 – 652.
[6] Davis, S.K. (2006). *Mixed-grass Prairie Passerines Exhibit Weak and Variable Responses to Patch Size*, The Auk, July 2006.
[7] Sample, D.W. and M.J. Mossman (1997). *Managing Habitat for Grassland Birds – A Guide for Wisconsin*. Wisconsin Department of Natural Resources.
[8] Bond, M (2003). *Principles of Wildlife Corridor Design*, Center for Biological Diversity.

ODFW has stated that bisection of the HRP by a project road, and the HRP position adjacent to a county road, reduces habitat value

> **Rebuttal:** The acreage of the road was not included in the HRP size. The habitat on the facility site is crossed by a many ranch roads and several county roads. The habitat lost due to the construction of the facility, therefore, is equivalent to habitat crossed by roads. HRP habitat represents in-kind replacement. In addition, the county road has limited traffic (perhaps two vehicles per hour), and both burrowing owl nests and Washington ground squirrel colonies have been found in close proximity to roadways during Applicant's wildlife surveys.

ODFW has stated that for the worst-case layout, habitat enhancement would not advance to the quality necessary for full replacement within a reasonable time

> **Rebuttal:** The Leaning Juniper II Habitat Mitigation Plan estimates that Category 2 and 3 grasslands can be restored to pre-disturbance condition within five to seven years. The Audubon's experience with two 55-acre plots formerly used for agriculture in Massachusetts showed that savannah sparrows, bobolinks, Eastern meadowlark and red-winged blackbirds nested in the fields, and short-eared owls and Northern harriers wintered at the sites two to four years after native grass seeding.[9]
>
> Applicant has included a contingency to obtain, in year 4, habitat of sufficient existing quality to replace, on a 1:1 acreage basis, any habitat categories that are deficient. We note 73% of the habitat Leaning Juniper II is disturbing is Category 2; the habitat replacement parcel accepted by ODFW is largely Category 3 and 4 habitat.
>
> ODFW has stated "ODFW does not consider weedy, previously cultivated land to be category 6 habitat but instead category 5. Due to the fact that previously cultivated land has higher potential for restoration, ODFW recommends that these lands be re-categorized as category 5 habitat.[10]" As the HRP contains weedy, previously cultivated land, the potential for restoration should be high.

ODFW has stated that they would prefer protection and slight enhancement of a parcel with higher initial habitat conditions: It is important to preserve native habitat because other causes of habitat loss, such as housing developments, could take place in the next 20 years and destroy more native habitat. Most of the native habitat in the ecoregion has already been lost.

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[9] Jones, A (2004). *Conservation of Native and Agricultural Grasslands*, in: Proceedings of the New Jersey Grassland Habitat Symposium, pp 8 – 10.

[10] ODFW (2007). Oregon Department of Fish and Wildlife's Comments on the Additional Information Provided on the Shepherds Flat Wind Project. Comments received August 24, 2007, Application Supplement Exhibit BB.

> **Rebuttal:** Each development activity that destroys native habitat should mitigate its own habitat loss, rather than relying on pre-mitigation by the Shepherds Flat Wind Farm for a hypothetical developer's disturbance.

Enhancement of the HRP is more expensive than the alternate plan: Native seeds are costly. The proposed seeding and weed control, and the installation and maintenance of burrowing owl constructed nest boxes, will require more effort. This plan includes more wildlife monitoring, monitoring of more wildlife species, and quantitative vegetation assessment, all more costly than that proposed in the alternate.

ADVANTAGES OF THE ALTERNATE HABITAT MITIGATION PLAN

ODFW prefers securing higher quality habitat to be slightly enhanced, similar to the Leaning Juniper II plan: This plan complies.

> **Rebuttal:** The standard for "no net loss" of specific habitat categories is not met. The alternate plan does not conform to OAR 635-415-0020(2): "The Department shall require mitigation consistent with the goals and standards of OAR 635-415-0025" because the plan does not prevent net loss (as defined in OAR 635-415-0005(22)) for the habitat Categories specified in OAR 635-415-0025.

There is sufficient acreage of each habitat category in the HAP to meet the acreage of habitat categories lost due to construction of the facility: There is a large Washington ground squirrel colony within the Habitat Alternate Parcel (HAP), and Category 1 and 2 habitat totals 85 acres. During a preliminary assessment of the HAP, acreage of Category 3 and 4 habitat were estimated at 165 and 135 acres, respectively. The remaining 50 acres of the 435-acre HAP are Category 5 or 6 habitat. There are no uncertainties in meeting habitat replacement goals.

> **Rebuttal:** Although the quality of habitat in the HAP meets the habitat quality that will be lost to development of the facility, the plan will not meet replacement goals. There will be an actual net loss of acreage for all habitat categories lost due to development of the facility.

ODFW prefers that grazing be limited or eliminated, and feed and water stations not be placed on the HAP: This plan complies, as it allows no grazing. By prohibiting feed and water stations, grazing cannot occur.

> **Rebuttal:** Elimination of cattle grazing could cause relocation of the Washington ground squirrel colony.

Fencing and posting the HAP will provide increased protection for the Washington ground squirrel colony: The flat ground containing the portion of the colony directly north of Ely Canyon Road is occasionally used as a road pullout and parking area. This has damaged the vegetation and caused some compaction of the soil. Fencing at the edge of the road right-of-way will prevent further damage of the area. Postings prohibiting trespass and hunting will also help protect the colony.

Implementation is be relatively cheap: By conforming to the Leaning Juniper II mitigation plan, the parcel is smaller, little effort needs to be expended for slight enhancement, only qualitative vegetation evaluation will occur, birds are the only wildlife to be annually monitored, and special-status species are only monitored every five years.

> **Rebuttal:** Washington ground squirrels, because they are known to occur within the HAP, should be monitored more frequently.

The HAP benefits from presence of the Ely Canyon dry wash leading into Willow Creek: This wash provides habitat diversity, serves as a wildlife refuge and a sheltered travel corridor, and may contain microhabitats and specialized plant communities. The wash and its banks currently contain sage and rabbitbrush. The wash and banks have not been cultivated. Species that may not grow in the surrounding soil may be found within the wash due to moisture retention.

> **Rebuttal:** The dry wash is in close proximity to a county road, which reduces its habitat value.

The plan is acceptable to the Siting Council and to ODFW: The alternate plan is virtually identical to that accepted for Leaning Juniper II.

DISADVANTAGES OF THE ALTERNATE HABITAT MITIGATION PLAN

No educational opportunities will be provided: Posting of informational signs indicating the presence of the Washington ground squirrel colony may be detrimental to colony survival. Most of the site is not visible from the roadway or easily accessed.

The HAP is bisected by a county road: ODFW has stated this reduces habitat value.

> **Rebuttal:** The Washington ground squirrel colony is immediately adjacent to the road, providing Category 1 and 2 habitat next to the roadway. Away from the road, the site increases sharply in elevation reducing the road's influence. To the south of the road, there is a substantial amount of more remote land in which the HAP can be placed if the squirrel colony is not included.
>
> The habitat on the facility site is crossed by a many ranch roads and several county roads. The habitat lost due to the construction of the facility, therefore, is equivalent to habitat crossed by roads. HAP habitat represents in-kind replacement. In addition, the county road has limited traffic (perhaps one vehicle per hour), and burrowing owl nests have also been found in close proximity to roadways during Applicant's wildlife surveys.

The HAP is crossed by a transmission line: ODFW has stated that transmission lines reduce habitat value.

> **Rebuttal:** The habitat on the facility site is crossed by a number of transmission lines. The habitat lost due to the construction of the facility, therefore, is equivalent to habitat crossed by transmission lines. HAP habitat represents in-kind replacement. In any event, the transmission towers are used for raptor nesting.

The HAP is adjacent to the facility site

> **Rebuttal:** Many portions of the HAP are remote from the facility, and those portions of the HAP adjacent to the facility drop sharply in elevation away from the facility site. The closest components in the worst-case layout are quite remote from the HAP. In the typical layout, the two closest turbines are at the end of strings and 300 and 650 feet from the boundary of the HAP.

No water will be provided

The HAP is 63 acres smaller than the HRP: Calculation of parcel size is identical to the calculation used for Leaning Juniper II. Dryland wheat was changed to Category 6 habitat to conform to Leaning Juniper II and previously sited facilities.

No burrowing owl nest boxes will be constructed

The plan will not provide "no net loss" of habitat: The acreage of native habitat in the region will be reduced and will not be replaced. No replacement habitat for use by displaced wildlife will be created, and there will be no replacement of lost prey species or other food resources. Preservation of existing native habitat does not replace lost native habitat.

DESCRIPTION OF THE HABITAT ALTERNATE PARCEL

Location of the mitigation area

The habitat alternate parcel (HAP) is approximately 435 acres in size, and is directly to the south of the southernmost portion of the Shepherds Flat Wind Farm site (Figure 1). It rises in elevation on either side of Ely Canyon and is bisected by Ely Canyon road. It is entirely within Morrow County.

Current condition of the HAP

The HAP is not currently in cultivation, although some portions have been used for dryland wheat in the past. Some grazing of the site by cattle currently occurs. The condition of the vegetation indicates that grazing is infrequent, the stocking level has been low, and there is little evidence of grazing activity beyond the bottom of Ely Canyon.

Approximately 60% of the soil within the HAP is very stony loam with a small area of riverwash. The remainder is deep silt loam soil (Figure 2). A preliminary assessment of HAP habitat occurred during a reconnaissance visit to the site in October 2007. Willow Creek and the riparian area in its vicinity pass through the easternmost portion of the HAP (Figure 3). Willow Creek has been designated as Category 1 habitat (1 W) due to the scarcity of water in the region, and the riparian area is assessed as Category 2 (2 WL-W). The dry wash associated with Ely Canyon Creek has also been designated as Category 2 habitat (2 WL-W), except where it intersects habitat categorized due to the presence of Washington ground squirrels.

An extensive Washington ground squirrel colony exists in the HAP north of Ely Canyon Road. The area occupied by burrow entrances has been designated as Category 1 habitat (1 WGS). Nearby sage areas south of Ely Canyon Road were also assessed as Category 1 habitat (1 WGS) as the habitat may be used by the squirrels. The deep soils surrounding the colony along the canyon bottom, which may contain undetected colonies and could support colonies in the future, were designated as Category 2 habitat (2 WGS). The Category 2 habitat to the north of the colony extends into stony soil and is unlikely to be used for burrows, but may be used as a source for food.

The vegetation north of the road is largely grassland with a few minor shrubs (Photographs 1 and 2). Where not part of the WGS habitat, it is preliminarily classified as Category 3 grassland (3 GL) due to the presence of native bunchgrasses and the relatively low level of weeds and alien species present. Some small areas of this grassland may be of Category 2 quality, and some may be more properly assigned to Category 4. Portions of the ravines leading into Ely Canyon may contain a sufficient number of shrubs to be categorized as shrub steppe, but the ravines were not thoroughly explored during the preliminary assessment. They have been initially categorized as part of the surrounding grassland.

The north part of the HAP contains two areas, previously used for dryland wheat, that were assessed as Category 5 habitat (5 PC). These areas do not appear to have been cultivated recently (within the last four or five years), and are not particularly weedy. There is also one area that shows minor evidence of previous cultivation assessed as Category 4 habitat (4 PC).

The Ely Canyon Creek wash contains a large number of sage shrubs in good condition (Photographs 3 and 4). Most of this habitat lies within the 2 WGS habitat. Above the wash to the south are areas of native grassland habitat similar in characteristic to that of the north, and these areas have also been assessed as Category 3 grassland. In the south of the HAP (south of the road and adjacent to the 2 WGS habitat) is a large previously cultivated area that was seeded at least 5 years ago. This area contains a mixture of native and alien perennial grasses and very few weeds, although cheatgrass is ubiquitous (Photograph 5). Tumble mustard is present, but it is a minor component of the vegetation. Tumbleweed is obvious only adjacent to the dryland wheat fields to the south of the HAP. Due to the time of year in which HAP reconnaissance occurred, forb identity and coverage was difficult to assess. The southern previously cultivated area has been assessed as Category 4 (4 PC), although a substantial portion may be more appropriately assigned to Category 3 habitat.

A small area of dryland wheat currently in cultivation (6 DW) is present in the south portion of the HAP. Two rustic and partially overgrown ranch roads lead north and south from Ely Canyon Road (a county road) near the Willow Creek Valley, and these are mapped as 6 RP. A possible old road cut is present to the south of Ely Canyon Road (towards the bottom of the grassland in Photograph 4). It is entirely overgrown and in places is occupied by sage. It is mapped as part of the WGS habitat in which it occurs. The HAP is not fenced, although old fence posts still remain indicating that portions have been fenced in the past (Photograph 3). A transmission line (Figure 3 and Photograph 2) passes across the HAP north of Ely Canyon Road.

Fifty-eight percent of the habitat within the HAP, as currently assessed, is category 3 or higher (250 acres). Category 4 habitat occupies 31% of the HAP (125 acres), Category 5 habitat occupies 9% (39 acres) and Category 6 habitat occupies 3% (11 acres).

Figure 1: HAP Location

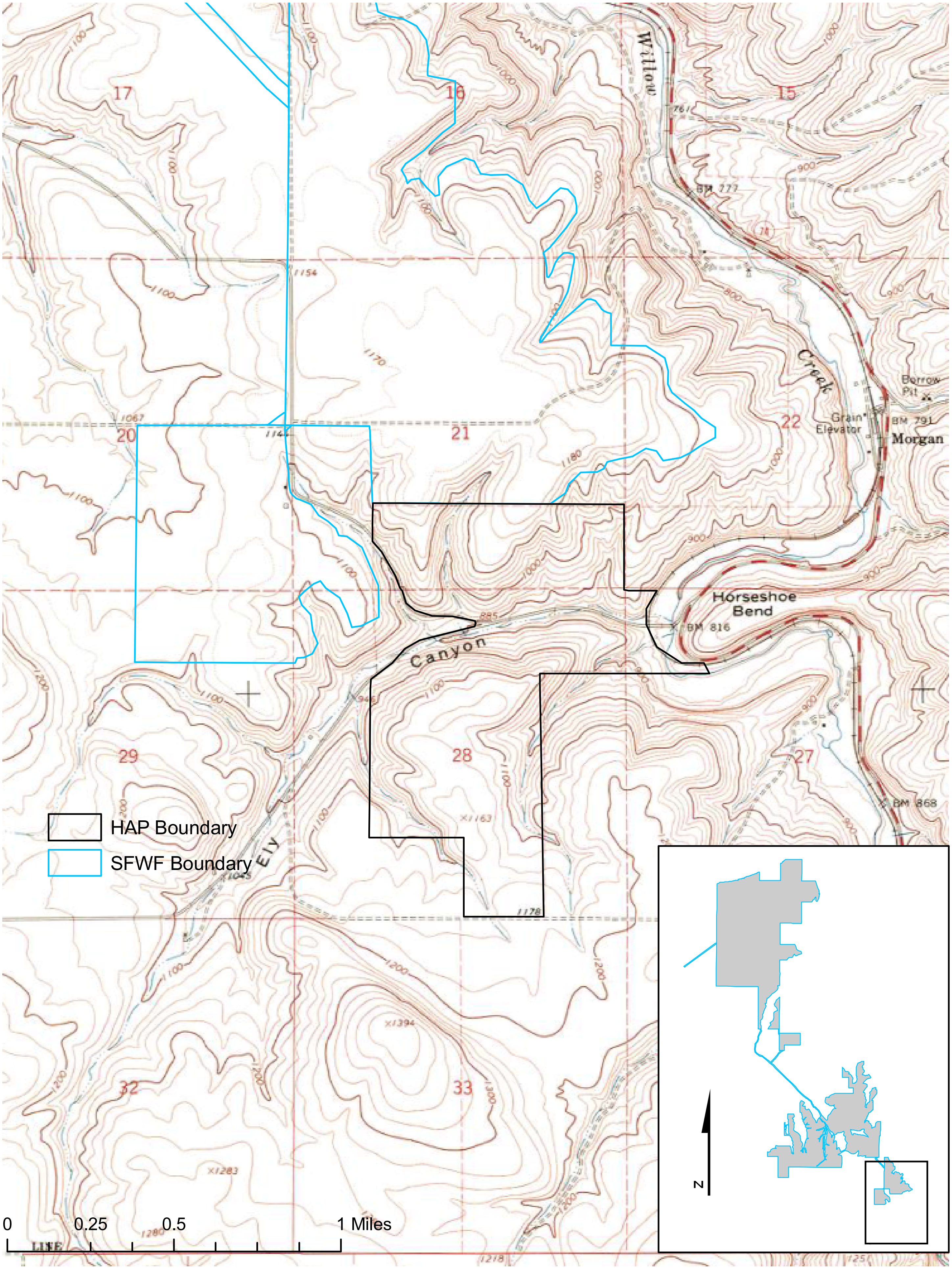


Figure 2: HAP Soil

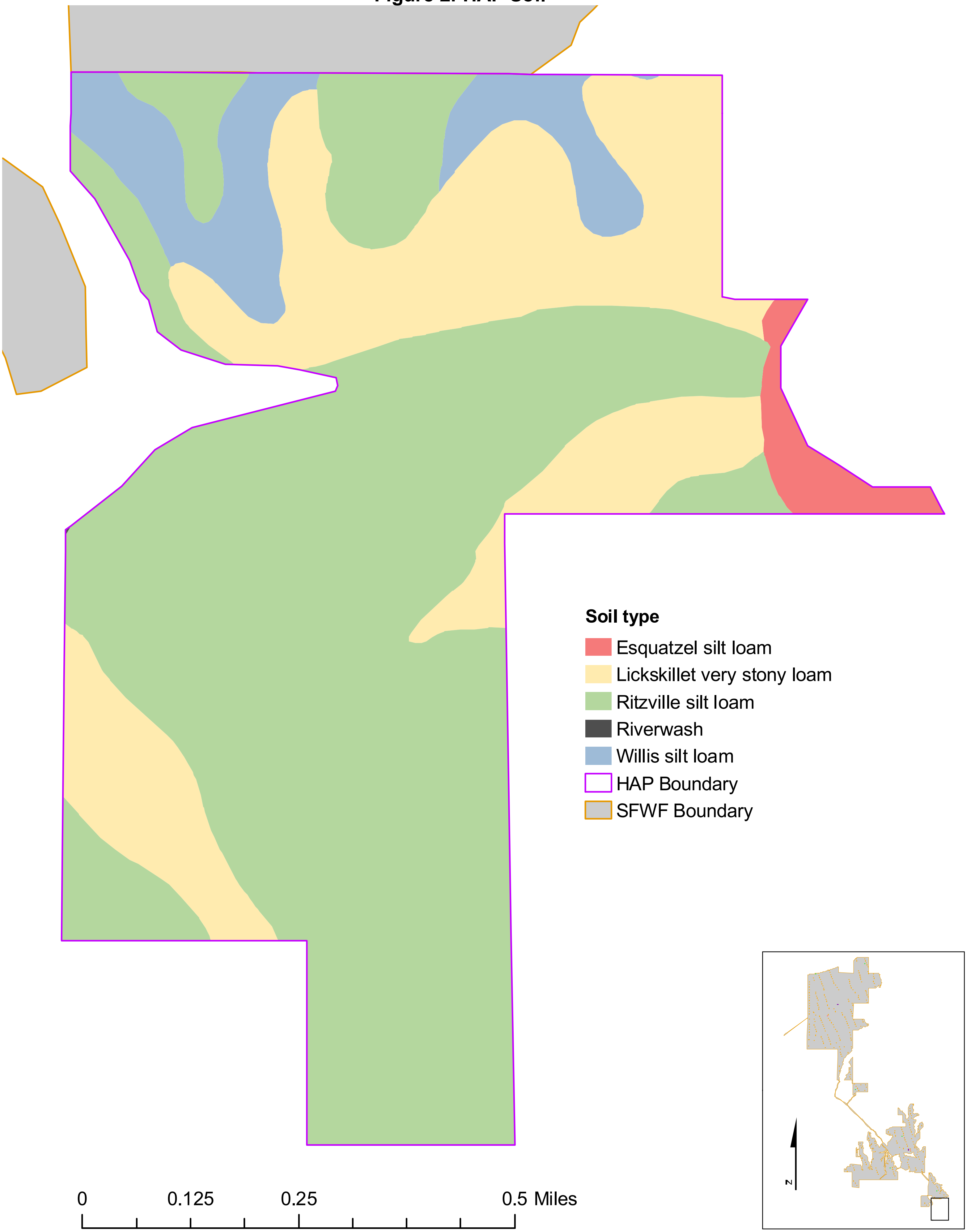
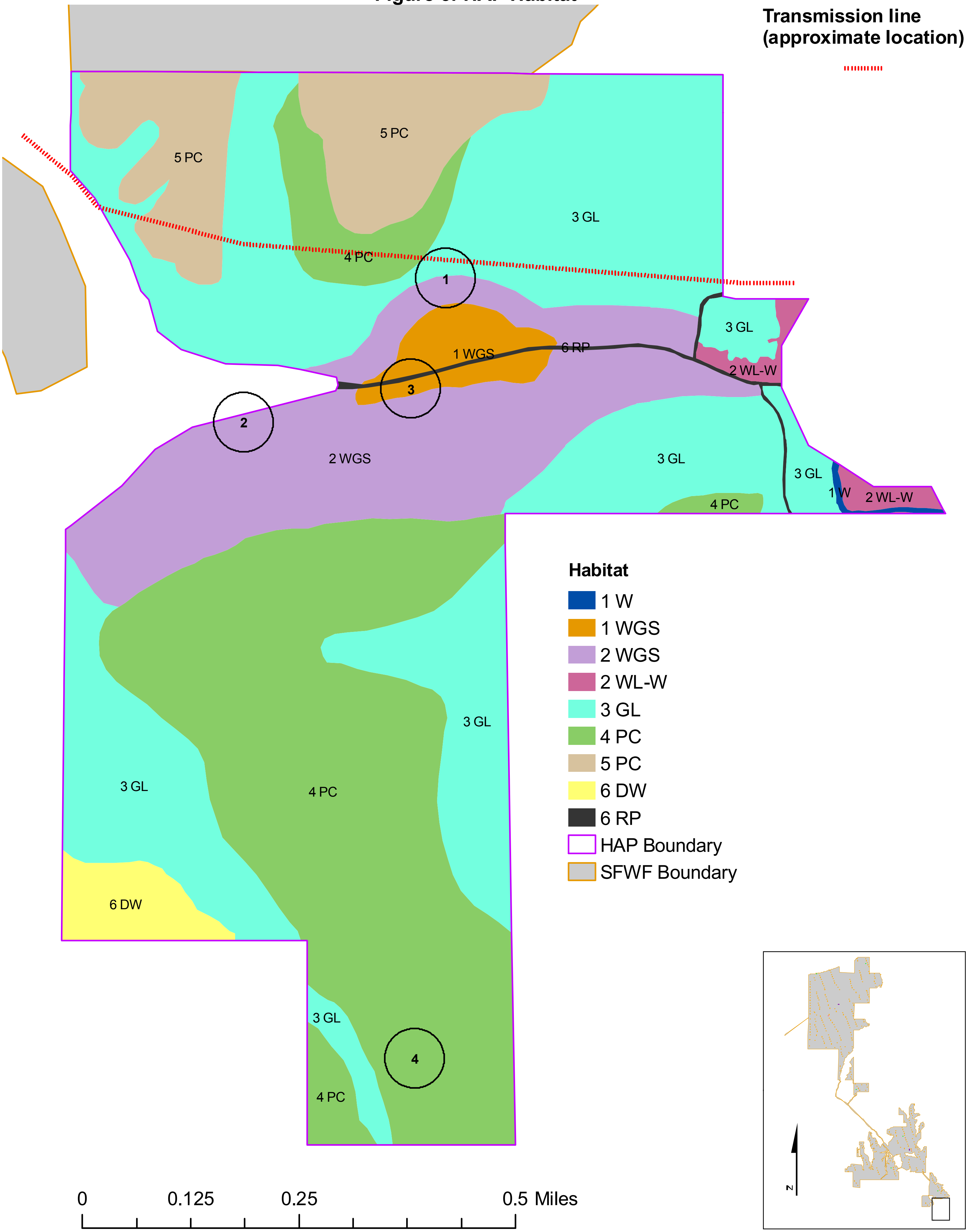


Figure 3: HAP Habitat



Photograph 1: From location 1 (Figure 3) looking northeast

Photograph 2: From location 1 (Figure 3) looking northwest

Photograph 3: From location 2 (Figure 3) looking east northeast

Photograph 4: From location 3 (Figure 3) looking east northeast

Photograph 5: From location 4 (Figure 3) looking northeast

Shepherds Flat Wind Farm: Alternate Habitat Mitigation Plan

I. Introduction This plan is an alternate to that originally proposed by the applicant. It describes methods and standards for preservation and enhancement of an area of land near the Shepherds Flat Wind Farm (SFWF) to mitigate for the impacts of the facility on wildlife habitat.[1] The mitigation area referred to in this alternate plan is designated as the 'Habitat Alternate Parcel (HAP) to distinguish it from the Habitat Replacement Parcel (HRP) previously identified and described by the applicant in the original plan. The alternate plan addresses mitigation for both the permanent impacts of facility components and the temporal impacts of facility construction. The certificate holder shall protect and enhance the mitigation area as described in this plan. This plan specifies habitat enhancement actions and monitoring procedures to evaluate the success of those actions. Remedial action may be necessary if progress toward habitat enhancement success is not demonstrated in any part of the mitigation area.

II. Description of the Impacts Addressed by the Plan

The estimated land area that would be occupied by permanent facility components (the "footprint") is approximately 173 acres, based on a worst-case estimate.[2] In addition to the footprint impacts, construction of the facility would disturb approximately 151 acres, based on a worst-case estimate. Although much of the area is cropland, habitat affected by construction disturbance includes areas of perennial bunchgrass and desirable shrubs. After disturbance, the recovery of perennial bunchgrass species to a mature stage might take five to seven years; recovery of desirable shrubs such as bitterbrush and sagebrush might take ten to 30 years to reach maximum height and vertical branching. Even where recovery of these habitat subtypes is successful, there is a loss of habitat quality during the period of time needed to achieve recovery (temporal impact).

III. Calculation of the Size of the Mitigation Area

The actual footprint and construction disturbance areas cannot be determined until the final design layout of the facility is known. Before beginning construction of the facility, the certificate holder shall provide to the Oregon Department of Energy (Department) a map showing the final design configuration of the facility and a table showing the estimated areas of permanent impacts and construction area impacts on habitat (by category, habitat types and habitat subtypes). The certificate holder shall calculate the size of the mitigation area, as illustrated below, based on the final design configuration of the facility. The certificate holder shall implement the habitat enhancement actions described in this plan, after the Department has approved the size of the mitigation area. This plan does not address additional mitigation that might be required under the Shepherds Flat Wind Farm Wildlife Monitoring and Mitigation Plan.

The mitigation area must be large enough to meet the habitat mitigation goals and standards of the Oregon Department of Fish and Wildlife (ODFW) described in OAR 635-415-0025. The ODFW goals require mitigation to achieve "no net loss" of habitat in

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[1] This plan is incorporated by reference in the site certificate for the Shepherds Flat Wind Farm and must be understood in that context. It is not a "stand-alone" document. This plan does not contain all mitigation required of the certificate holder.

[2] "Worst-case" estimates in this plan are based on revised Table P-6a Alternate (Application Supplement, ____________).

Categories 2, 3 and 4 and a "net benefit" in habitat quantity or quality for impacts to habitat in Categories 2 and 5.

For the footprint impacts, the mitigation area includes two acres for every one acre of Category 2 habitat affected (a 2:1 ratio) and one acre for every acre of footprint impacts to Category 3, 4 and 5 habitat (a 1:1 ratio). The 2:1 ratio for Category 2 is intended to meet the ODFW goals of "no net loss" of Category 2 habitat and "net benefit" of habitat quantity for impacts to both Category 2 and Category 5 habitat. The 1:1 ratio for the footprint impacts to Category 3, 4 and 5 habitat is intended to meet the ODFW goal of "no net loss" of habitat in these categories.

To mitigate for construction impacts outside the footprint, the mitigation area includes ½ acre for every Category 2, 3 or 4 SS-S (shrub steppe sagebrush) and SS-P (shrub steppe purshia [bitterbrush]) habitat affected (a 0.5:1 ratio). This portion of the mitigation area is intended to address the temporal loss of habitat quality during the recovery of SS-S and SS-P habitat disturbed during construction. The size of this portion of the mitigation area is based on the assumption that restoration of disturbed SS-S and SS-P habitat is successful, as determined under the Shepherds Flat Wind Farm Revegetation Plan. If the revegetation success criteria are not met in the affected areas, then the Council may require the certificate holder to provide additional mitigation.

The area of impact within each affected habitat category and the corresponding mitigation area for each category are calculated as follows, based on worst-case estimates:

Category 2
Footprint impacts: 0 acres
Temporal impacts to SS-S or SS-P: 0 acres
Mitigation area: (0 acres x 2) + (0 acres x 0.5) = 0 acres

Category 3
Footprint impacts: 125 acres
Temporal impacts to SS-S or SS-P: 8.6 acres
Mitigation area: 125 acres + (8.6 acres x 0.5) = 129.3 acres

Category 4
Footprint impacts: 26 acres
Temporal impacts to SS-S or SS-P: 0.36 acres
Mitigation area: 26 acres + (0.36 acres x 0.5) = 26.2 acres

Category 5
Footprint impacts: 1.4 acres
Mitigation area: 1.4 acres

Total mitigation area (rounded to nearest whole acre): 157 acres

IV. Description of the Mitigation Area

The certificate holder shall select a mitigation area in proximity to the facility where habitat protection and enhancement are feasible consistent with this plan.[3] The applicant identified a 437-acre parcel where habitat protection and enhancement are feasible and sufficient land area is available to accommodate the size of the mitigation area, based on a worst-case estimate.[4] Before beginning construction, the certificate holder shall determine the final size and boundaries of the mitigation area in consultation with ODFW and the affected landowners and subject to the approval of the Department. The final mitigation area must contain suitable habitat to achieve the ODFW goals of no net loss of habitat in Categories 2, 3 and 4 and a net benefit in habitat quantity or quality for impacts to habitat in Categories 2 and 5 through appropriate enhancement actions. Before beginning construction of the facility, the certificate holder shall acquire the legal right to create, maintain and protect the habitat mitigation area for the life of the facility by means of an outright purchase, conservation easement or similar conveyance and shall provide a copy of the documentation to the Department.[5]

V. Habitat Enhancement Actions

The objectives of habitat enhancement are to protect habitat within the mitigation area from degradation and to improve the habitat quality of the mitigation area. By achieving these goals, the certificate holder can address the permanent and temporal habitat impacts of the SFWF and meet the ODFW goals of no net loss of habitat in Categories 2, 3 and 4 and a net benefit in habitat quantity or quality for impacts to habitat in Categories 2 and 5. The certificate holder shall initiate the habitat enhancement actions as soon as the final design configuration of the SFWF is known and the size of the mitigation area has been determined and approved by the Department. The certificate holder shall implement the following enhancement actions:

1) Elimination of Livestock Grazing. The certificate holder shall restrict grazing within the habitat mitigation area. Eliminating livestock grazing within the mitigation area will enable recovery of native bunchgrass and sagebrush in areas where past grazing has occurred, resulting in better vegetative structure and complexity for a variety of wildlife.

2) Weed Control. The certificate holder shall implement a weed control program. Under the weed control program, the certificate holder shall monitor the mitigation area to locate weed infestations. The certificate holder shall continue weed control monitoring, as needed, for the life of the facility. As needed, the certificate holder shall use appropriate methods to control weeds. Weed control on the mitigation site will reduce the spread of noxious weeds within the habitat mitigation area and on any nearby grassland, CRP or cultivated agricultural land. Weed control will promote the growth of

[3] OAR 635-415-0005 defines "in-proximity habitat mitigation" as follows: "habitat mitigation measures undertaken within or in proximity to areas affected by a development action. For the purposes of this policy, 'in proximity to' means within the same home range, or watershed (depending on the species or population being considered) whichever will have the highest likelihood of benefiting fish and wildlife populations directly affected by the development."

[4] The 435-acre parcel is described in Section ______ of the Final Order on the Application.

[5] As used in this plan, "life of the facility" means continuously until the facility site is restored and the site certificate is terminated in accordance with OAR 345-027-0110.

desirable native vegetation. The certificate holder may consider weeds to be successfully controlled when weed clusters have been eradicated or reduced to a non-competing level. Weeds may be controlled with herbicides or hand-pulling. The certificate holder shall notify the landowner of the specific chemicals to be used on the site and when spraying will occur. To protect locations where young desirable forbs may be growing, spot-spraying may be used instead of total area spraying.

3) Fire Control. The certificate holder shall implement a fire control plan for wildfire suppression within the mitigation area. The certificate holder shall provide a copy of the fire control plan to the Department before starting habitat enhancement actions. The certificate holder shall include in the plan appropriate fire prevention measures, methods to detect fires that occur and a protocol for fire response and suppression. The certificate holder shall maintain fire control for the life of the facility. If any part of the mitigation area is damaged by wildfire, the certificate holder shall assess the extent of the damage and implement appropriate actions to restore habitat quality in the damaged area.

4) Erosion Control. The certificate holder shall monitor the mitigation area to locate sites at which past cattle grazing or vegetation loss has caused soil erosion to occur. As needed, erosion shall be managed by a combination of sediment barriers such as hay bales, mulch or native rock, and by seeding the affected area with native grasses. The certificate holder may consider erosion to be successfully controlled when eroded areas can support vegetation and no indications of new soil loss are evident.

5) Habitat Protection. The certificate holder shall restrict uses of the mitigation area that are inconsistent with the goals of no net loss of habitat in Categories 2, 3 and 4 and a net benefit in habitat quantity or quality for impacts to habitat in Categories 2 and 5.

VI. Monitoring

1. Monitoring Procedures

The certificate holder shall hire a qualified investigator (an independent botanist, wildlife biologist or revegetation specialist) to conduct a comprehensive monitoring program for the mitigation area. The purpose of this monitoring is to evaluate on an ongoing basis the protection of habitat quality, the results of enhancement actions and the use of the area by avian and mammal species, especially during the wildlife breeding season.

The investigator shall monitor the habitat mitigation area for the life of the facility beginning in the first year after construction of the SFWF begins. The investigator shall visit the site as necessary to carry out the following monitoring procedures:

1) Annually assess vegetation cover (species, structural stage, etc.) and progress toward meeting the success criteria.

2) Annually record environmental factors (such as precipitation at the time of surveys and precipitation levels for the year).

3) Annually record any wildfire that occurs within the mitigation area and any remedial actions taken to restore habitat quality in the damaged area.

4) Annually assess the success of the weed and erosion control programs and recommend remedial action, if needed.

5) Assess the recovery of native bunchgrass and natural recruitment of sagebrush resulting from removal of livestock grazing pressure by comparing the quality of bunchgrass and sagebrush cover at the time of each monitoring visit with the quality observed in previous monitoring visits and as observed when the mitigation area was first established. The investigator shall establish photo plots of naturally recovering sagebrush and native bunchgrass during the first year following the beginning of construction of the SFWF. The investigator shall take comparison photos in the first year and in every other year thereafter until the subject vegetation has achieved mature stature. The investigator shall determine the extent of successful recovery of native bunchgrass based on measurable indicators (such as, signs of more abundant seed production) and shall report on the progress of recovery within in the monitoring plots.

6) Between April 21 and May 21 beginning in the first spring season after the beginning of construction of the SFWF, conduct an area search survey of avian species. An "area search" survey consists of recording all birds seen or heard in specific areas (for example, square or circular plots that are 5 to 10 acres in size). Area searches will be conducted during morning hours on days with low or no wind. The investigator shall determine the number searches and the number of search areas in consultation with ODFW. The investigator shall repeat the area search survey every five years during the life of the facility.

7) Beginning in the first year after the beginning of construction of the SFWF and repeating every five years during the life of the facility, the investigator shall record observations of special status plant or wildlife species (federal or state threatened or endangered species and state sensitive species) during appropriate seasons for detection of these species.

The certificate holder shall report the investigator's findings and recommendations regarding the monitoring of the mitigation area to the Department and to ODFW on an annual basis. In the annual report, the certificate holder shall describe all habitat mitigation actions carried out during the reporting year. The report to the Department may be included as part of the annual report on the SFWF.

2. **Success Criteria**

Mitigation of the permanent and temporal habitat impacts of the facility may be considered successful if the certificate holder protects and enhances sufficient habitat within the mitigation area to meet the ODFW goals of no net loss of habitat in Categories 2, 3 and 4 and a net benefit in habitat quantity or quality for impacts to habitat in Categories 2 and 5. The certificate holder must protect the quantity and quality of habitat within the mitigation area for the life of the facility. ODFW has advised the Department that protection of habitat alone (without enhancement activity) will not meet the intent of the "net benefit" goal.

The certificate holder must protect a sufficient quantity of habitat in each category to meet the mitigation area requirements calculated under Section III. As an illustration of the requirement, the following habitat quantity goals are based on the worst-case estimate described in Section III, expressed as a percentage of the mitigation area in each habitat category:

Total Mitigation Area: 157 acres

Category 2: 0 acres (0 percent)

Category 3: 129.3 acres (82 percent)

Category 4: 26.2 acres (17 percent)

Category 5: 1.4 acres (1 percent)

The certificate holder shall determine the actual mitigation area requirements, subject to Department approval, before beginning construction of the SFWF. If the land selected for the mitigation area does not already contain sufficient habitat in each category to meet these requirements, then the certificate holder must demonstrate improvement of habitat quality sufficient to change lower-value habitat to a higher value (for example, to convert Category 4 habitat to Category 3). The certificate holder may demonstrate improvement of habitat quality based on evidence of indicators such as increased avian use by a diversity of species, more abundant seed production of desirable native bunchgrass, natural recruitment of sagebrush and successful weed control. If the certificate holder cannot demonstrate that the habitat mitigation area is trending toward the habitat quality goals described above within five years after initiation of SFWF construction, the certificate holder shall propose remedial action. The Department may require supplemental planting or other corrective measures.

After the certificate holder has demonstrated that the habitat quantity goals have been achieved, the investigator shall verify, during subsequent monitoring visits, that the mitigation area continues to meet the ODFW "no net loss" and "net benefit" goals described above. The investigator shall recommend remedial action if the habitat quality within the mitigation area falls below the habitat quantity goals listed above. The Department may require supplemental planting, other corrective measures and additional monitoring as necessary to ensure that the habitat quantity goals are achieved and maintained.

VII. Amendment of the Plan

This Habitat Mitigation Plan may be amended from time to time by agreement of the certificate holder and the Oregon Energy Facility Siting Council ("Council"). Such amendments may be made without amendment of the site certificate. The Council authorizes the Department to agree to amendments to this plan. The Department shall notify the Council of all amendments, and the Council retains the authority to approve, reject or modify any amendment of this plan agreed to by the Department.

Table P-6a Alternate: Disturbance impacts for individual habitat categories and subtypes

Category and subtype	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
1 Raptor nest	0.57	0	0	0	0
1 Washington ground squirrel	1.1	0	0	0	0
2 Raptor nest	0.92	0	0	0	0
2 Shrub steppe – sage	78	0	0	0	0
2 Washington ground squirrel	22	0	0	0	0
2 Wetland-wash	6.3	0	0	0	0
2 Grassland	16	0	0	0	0
3 Curlew	6444	37	43	92	88
3 Grassland	736	5.3	5.1	22	16
3 Shrub steppe – purshia	4.3	0	0	0	0
3 Shrub steppe – rabbitbrush	122	1.5	1.5	4.1	3.6
3 Shrub steppe – sage	261	4.1	4.4	7.2	8.6
4 Grassland	6100	54	56	23	19
4 Previously cultivated	522	3.1	2.5	2.9	1.7
4 Rock and soil	149	0.33	0.53	0.29	0.16
4 Shrub steppe – sage	29	0.010	0.29	0.013	0.36
5 Previously cultivated	585	9.5	7.5	1.4	1.0
5 Shrub steppe – broom snakeweed	263	2.5	3.1	0	0
6 Dryland wheat	6598	54	50	18	11
6 Animal facility	74	0.24	0.35	0	0
6 Previously cultivated	95	0.23	0.34	0.56	0.33
6 Road and parking	244	0.61	0.70	1.4	0.98
6 Structures	39	0.23	0.18	0.26	0.16
Total	**22390**	**173**	**176**	**173**	**151**

Table P6-b Alternate: Disturbance impacts for individual habitat categories

Category	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
1	1.6	0	0	0	0
2	123	0	0	0	0
3	7568	48	54	125	116
4	6800	57	60	26	21
5	847	12	11	1.4	1.1
6	7050	55	52	21	13
Total	**22390**	**173**	**176**	**173**	**151**

Table P-6c Alternate: Disturbance impacts for individual habitat subtypes

Subtype [1]	Total on site (acres)	Typical Disturbance (acres)		Worst-case Disturbance (acres)	
		Permanent	Temporary	Permanent	Temporary
Raptor nest	1.5	0	0	0	0
Washington ground squirrel	23	0	0	0	0
Wetland-wash	6.3	0	0	0	0
Grassland	13818	100	107	139	124
Shrub steppe – purshia	4.3	0	0	0	0
Shrub steppe – sage	369	4.1	4.7	7.2	9.0
Shrub steppe – rabbitbrush	122	1.5	1.5	4.1	3.6
Shrub steppe – broom snakeweed	263	2.5	3.1	0	0
Rock and soil	149	0.33	0.53	0.29	0.16
Agricultural	7278	64	58	20	13
Disturbed	357	1.1	1.2	1.7	1.1
Total	**22390**	**173**	**176**	**173**	**151**

1. Category 4 PC and 3 CUR were added to the grassland subtype, and category 6 AF, 6 RP and 6ST added to disturbed. Agricultural includes 6 DW, 6 PC and 5 PC.