EXHIBIT P

FISH AND WILDLIFE HABITATS AND SPECIES

OAR 345-021-0010(1)(p); OAR 345-022-0060

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P.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). Up to 269 1.5-MW or 134 3.0-MW turbines will be located at the Facility, depending on the final turbine size and vendor (as further described in Exhibit B, Section B.1.3). This Exhibit provides information under OAR 345-021-0010(1)(p) to demonstrate that the fish and wildlife standard in OAR 345-022-0060 can be satisfied.

OAR 345-021-0010(1)(p) requires:

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

In turn, OAR 345-002-0060 requires that

"[T]he Council must find that the design, construction and operation of the facility, taking into account mitigation, are consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025 in effect as of September 1, 2000.

Exhibit P contains evidence upon which the Energy Facility Siting Council (Council) can make the required findings under OAR 345-022-0060 and conclude that the design, construction, and operation of the Facility, taking into account mitigation, are consistent with the Oregon Department of Fish and Wildlife (ODFW) fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025, which are set forth in Section P.2. The analysis area, for purposes of Exhibit P, includes the area within the Facility site boundary and the area within 0.5 mile of the site boundary. (See Project Order, Section VI.)

As described in this Exhibit, the construction and operation of the Facility will have no significant impacts on any Category 1 habitat. Further, the construction and operation of the Facility will avoid, minimize, and/or mitigate impacts to habitat that is categorized as Categories 2 through 6, consistent with the applicable provisions of OAR 635-415-0025. Predicted avian and bat mortality from Facility operations is expected to be within the range documented at other wind generation facilities in the region. In short, Facility design, construction, and operation are not expected to cause significant impacts to sensitive or other wildlife species using the Facility site.

Sections P.2 through P.7 provide information about the fish and wildlife habitats and state sensitive species and federal species of concern (non-listed, special-status species) that may be affected by the Facility, in accordance with OAR 345-021-0010(1)(p). Studies discussed in Exhibit P were designed to assess use by all wildlife (for example, the avian use study), regardless of whether the species has special federal or state status. Exhibit Q addresses state and federal threatened, endangered, or proposed candidate species.

P.2 FISH AND WILDLIFE HABITAT MITIGATION GOALS AND STANDARDS

OAR 635-415-0025 defines six habitat categories and establishes mitigation goals and implementation standards for each category. For easy reference, the six habitat categories and corresponding mitigation goals and implementation standards are described below:

(1) ***"Habitat Category 1"*** *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.*

(a) The mitigation goal for Category 1 habitat is no loss of either habitat quantity or quality.

(b) The Department (ODFW) shall act to protect Category 1 habitats described in this subsection by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) No authorization of the proposed development action if impacts cannot be avoided.

Note: Clarification of Category 1 habitat is provided in Attachments P-1 through P-3 and in Section P.4.1.

(2) ***"Habitat Category 2"*** *is essential habitat for a fish or wildlife species, population, or unique assemblage of species and is limited either on a physiographic province or site-specific basis depending on the individual species, population, or unique assemblage.*

(a) The mitigation goal if impacts are unavoidable is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 2 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss of either pre-development habitat quantity or quality. In addition, a net benefit of habitat quantity or quality must be provided. Progress towards achieving the mitigation goals and standards shall be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures shall be implemented and completed either prior to or concurrent with the development action.

(c) If neither 635-415-0025(2)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(3) **"Habitat Category 3"** is essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population.*

(a) The mitigation goal is no net loss of either habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 3 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and standards shall be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures shall be implemented and completed either prior to or concurrent with the development action.

(c) If neither 635-415-0025(3)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(4) **"Habitat Category 4"** is important habitat for fish and wildlife species.*

(a) The mitigation goal is no net loss in either existing habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 4 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through reliable in-kind or out-of-kind, in-proximity or off-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and standards shall be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures shall be implemented and completed either prior to or concurrent with the development action.

(c) If neither 635-415-0025(4)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(5) **"Habitat Category 5"** is habitat for fish and wildlife having high potential to become either essential or important habitat.*

(a) The mitigation goal, if impacts are unavoidable, is to provide a net benefit in habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 5 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through actions that contribute to essential or important habitat.

(c) If neither 635-415-0025(5)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

Note: Clarification about mitigation for impacts to Category 5 habitat was provided in a letter from ODFW (Attachment P-4).

*(6) **"Habitat Category 6"** is habitat that has low potential to become essential or important habitat for fish and wildlife.*

(a) The mitigation goal is to minimize impacts.

(b) The Department shall act to achieve the mitigation goal for Category 6 habitat by recommending or requiring actions that minimize direct habitat loss and avoid impacts to off-site habitat.

Note: Clarification of wheat fields as Habitat Category 6 was provided in an ODFW memo. A copy of this letter is provided as Attachment P-5. The Applicant understands that this clarification also applies to other croplands, such as mustard fields.

P.3 IDENTIFICATION OF BIOLOGICAL AND BOTANICAL SURVEYS

(A) A description of biological and botanical surveys performed that support the information in this exhibit, including a discussion of the timing and scope of each survey.

Response: Sections P.3.1 through P.3.3 summarize the information review and the biological and botanical (habitat, wildlife, rare plants) investigations completed specifically for the Facility and reference other studies conducted for wind facilities in the vicinity. Wind facilities in the vicinity of the Facility are depicted in Figure P-1.

The information review included the Facility site boundary, a 5-mile buffer, and state and federal special-status species within Gilliam and Morrow counties, Oregon, and Klickitat County, Washington. The field investigation area varied by resource, as described in Sections P.3.2 and P.3.3.

P.3.1 Information Review

Species data were obtained from the U.S. Fish and Wildlife Service (USFWS) for Gilliam, Morrow, and Klickitat counties and through the Oregon Natural Heritage Information Center (ORNHIC) for state and federal threatened, endangered, and candidate species, as well as state sensitive species and federal species of concern (non-listed, special-status species) within the site boundary and within 5 miles of the Facility (see Attachment P-6).

Based on the USFWS species lists and the ORNHIC database query, 57 state sensitive species and federal species of concern (non-listed, special-status species) were identified as potentially occurring within the site boundary or within a 5-mile buffer, as listed in Table P-1 (see Attachment P-6). The ORNHIC database had records of seven non-listed, special-status wildlife or plants within 5 miles of the Facility (ORNHIC, 2009; see Attachment P-6).

Based on results of the USFWS species lists review and the ORNHIC database query, 21 state and federal threatened, endangered, and candidate species were identified as potentially occurring within the Facility site boundary or a 5-mile buffer area. Exhibit P focuses on the state sensitive species and federal species of concern (non-listed, special-status species). State and federal threatened, endangered, and candidate species are discussed in Exhibit Q, except for those species that are state-listed in Washington only, which are discussed in this Exhibit (Exhibit P). The 21 species are listed in Table Q-1 and described further in Exhibit Q.

Table P-1 and Table Q-1 (Exhibit Q) were used to design the field surveys described in Sections P.3.2 and Q.2.2. Results from the field surveys are included in the tables and further described in Sections P.7 and Q.2.

If there is no suitable habitat for the species within the site boundary**,** the species is not addressed further in this document. Use of the Facility site by bats and potential Facility impacts were assessed through a review of existing information available for nearby wind power facilities and through a comparison of the Facility site characteristics to those facilities rather than through additional studies.

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Mammals				
Wolverine *Gulo gulo luteus*	SoC	--	SC	**N** – None observed; no suitable habitat.
White-tailed jackrabbit *Lepus townsendii*	--	SU	SC	**D**—Documented within the site boundary during special-status wildlife surveys in 2008 in three locations. Two records within the 5-mile database search area (ORNHIC, 2009). Recorded at Leaning Juniper IIA (LJIIA) and Leaning Juniper IIB (LJIIB) in two locations during ground transect surveys (NWC, 2009a). Observed in the general area (Kronner et al., 2007a; Kronner et al., 2007b; PPM, 2006; Caithness Shepherds Flat, 2007). Known to occur on nearby U.S. Department of Interior, Bureau of Land Management (BLM), land (G. Wing Pers. Comm., 2009). Prefers open, bunchgrass steppe and frequents Conservation Reserve Program (CRP) grasslands.
Western gray squirrel *Sciurus griseus griseus*	SoC	SV	T[f]	**N** – None observed; no suitable habitat.

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Townsend's ground squirrel *Spermophilus townsendii*	SoC	--	SC	**N** – None observed. Potentially suitable habitat is present.
Hoary bat *Lasiurus cinereus*	--	SV	--	**N**—Foraging habitat includes riparian areas, grasslands, shrub-stepped, forest edges and opening, urban areas. Roosts in coniferous and deciduous trees. Likely to occur during fall migration, based on fatality records at regional and nearby wind facilities. This species was recorded during acoustical monitoring conducted at Blalock Canyon in early September 2005 and along Rock Creek in 2008 and 2009 (Kronner and Gritski, personal field notes).
Silver-haired bat *Lasionycteris noctivagans*	SoC	SV	--	**N**—Area lacks tree roost sites. Considered likely to occur during fall migration, based on fatality records at regional and nearby wind facilities and pre-construction sampling conducted in July and September 2000 for the Condon Wind Farm, Gilliam County, Oregon (Kronner and Gritski, field notes, 2006–2009).
Western small-footed myotis *Myotis ciliolabrum*	SoC	--	SM	**N**—Roosts in rock crevices, caves, mines, talus slopes, and buildings. Forages in desert, semi-arid shrubland, riparian areas, and coniferous forest habitat. Known to occur in Rock Creek area and along Willow Creek (Kronner and Gritski, field notes 2006–2009).
Long-eared myotis *M. evotis*	SoC	--	SM	**N**—More common in forests than in arid grassland and shrub-steppe. Roosts in rock crevices, tree cavities, under loose bark, tree stumps, caves, mines, buildings.
Fringed myotis *M. thysanodes*	SoC	SV	SM	**D**—Most common roosts are in caves, mines, and snags; there are no records of this species for the Columbia Basin. Recorded during acoustical monitoring conducted along Rock Creek, near Olex, in August 2009 (Kronner and Gritski, field notes 2009).
Long-legged myotis *M. volans*	SoC	SV	SM	**N**—More common in forests than in arid grassland and shrub-steppe. Roosts in tree cavities, under loose bark, rock crevices, and buildings.
Yuma myotis *M. yumanensis*	SoC	--	--	**N**—Might roost in rock crevices or old, abandoned buildings, but would most likely forage near or over the Columbia River. Documented August 25, 2005, through acoustical monitoring at the town of Arlington (Kronner and Gritski, personal field notes 2005).
Pallid bat *Antrozus pallidis*	SoC	SV	SM	**N –** Roosts in rock crevices, tree hollows, mines, caves, buildings and forages in rocky deserts, grasslands; take large insects, often from the ground. Presence will depend on availability of deep rock crevices as other roost types are mostly lacking.

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Spotted bat *Euderma maculatum*	SoC	SV	SM	**N –** Roosts in rock crevices in cliff faces. Nearest record is Cottonwood Creek at the John Day River. Forages in riparian areas, meadows, old agricultural fields, forest openings. This species has patchy distribution; it is difficult to capture, and many "sightings" are based on its audible echolocation signal.
Townsend's big-eared bat *Corynorhinus townsendii*	SoC	SC	C[f]	**N**—Habitat is typically coniferous forests, desert scrub, pinyon-juniper; sometimes found in arid grassland and agricultural areas. Appropriate roost sites (mines, caves, building) are mostly lacking, with the exception of farm buildings, suitability unknown. One record for Gilliam County (although not an easily detected species) (Kronner and Gritski, field notes 2006–2009). Closest known breeding population in Klickitat County, Washington.
Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*	SoC	--	C[f]	**N** – Appropriate roost sites are mostly lacking.
Birds				
Greater sandhill crane *Grus canadensis tabida*	--	SV	E[f]	**N**—Not observed. May occur as migrant during migration seasons. Usually flies higher than rotor-swept area during migration. Documented during Willow Creek Winds avian use study once during fall and once during winter (Kronner et al., 2007b) and two observations in spring season at Shepherds Flat Wind Farm (Caithness Shepards Flat, 2007).
Long-billed curlew *Numenius americanus*	BoCC	SV	SM	**D**—Numerous detections during spring and summer season point counts onsite the Facility at five plots (A, B, C, J, K). Two ORNHIC records within the 5-mile search area (ORNHIC, 2009). Recorded at LJIIB during avian use surveys (at six plots) and LJIIA (NWC, 2009a; LJWP, 2006), and some nesting documented. Two detections within the Facility site boundary during LJIIB ground transect surveys as well as 10 other detections at LJIIB during ground-based surveys near the Facility (NWC, 2009a). Also observed frequently elsewhere in the vicinity (Kronner et al., 2007a and b; Kronner et al., 2008b, PPM, 2006; CSF, 2007; SBW, 2009). Most observations were on open low/shrub grassland gentle terrain. Nests in grassland flats and plateaus. Considered "Highly Imperiled" (U.S. and Canadian shorebird conservation plans) because of declines throughout its geographic range. The northeastern portion of the Facility is adjacent to part of BLM's Horn Butte Area of Critical Environmental Concern (ACEC) established for nesting long-billed curlew. The Horn Butte Curlew ACEC is approximately 6,000 acres, contains curlew nests and nesting habitat (some of it is being restored or enhanced), and is located 5 miles east of Arlington (BLM, 2008; Wing, 2009).

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Greater sage grouse *Centrocercus urophasianus*	SoC	SV	T[f]	**N** – None observed; outside species' current range.
Mountain quail *Oreortyx pictus*	SoC	--	--	**N** – None observed; no suitable habitat.
Golden eagle *Aquila chrysaetos*	BGEPA BoCC	--	C[f]	**D**—One observed in winter in-transit to 2008-2009 avian use study plots (J and K), one observed in fall 2009 outside 800-meter study plot GG, and one observed in-transit in fall 2009 at plot BB. Observed infrequently during avian use study of LJIIA, at Willow Creek Winds Project, and elsewhere in the vicinity (Kronner et al., 2007a and b; PPM, 2006; LJWP, 2006). Three historic nests within 1.88 and 5 miles of the Facility site; the nest closest to the Facility was not active in 2009, but the nest site and general area will be checked in 2010 for raptor nesting.
American peregrine falcon *Falco peregrinus anatum*	DL BoCC	SV	SS	**N**—Not observed onsite during surveys or in the immediate area. Has been seen in Arlington area (Morgan, 2004). Basalt cliffs along Columbia River are potentially suitable for nesting but lesser-quality than further west along the Columbia River. Historic nest sites are present within approximately 8 to 50 miles of the Facility (Cherry, 2007).
Ferruginous hawk *Buteo regalis*	SoC BoCC	SC FS	T[f]	**D**—Nests within the site boundary and within 2 miles of the Facility (nine known active nests in 2009; Figure P-4). One individual documented during winter season and two in summer season point counts at the Facility site. Detected onsite in multiple locations during special-status wildlife surveys in March 2008. Two documented during avian use surveys of LJIIB, one at plot D, which overlaps with the western portion of the Facility site. Also documented during 2008 special-status wildlife surveys onsite. Nests in and near the LJI and LJIIB facility sites and vicinity (Gritski et al., 2008; LJWP, 2009; CSF, 2007). Nests in juniper trees. One ORNHIC record within 5 miles of the Facility (ORNHIC, 2009).
Swainson's hawk *B. swainsoni*	BoCC	SV	SM	**D**—Nests onsite Facility and within 2 miles of the Facility (18 known nests in 2009; Figure P-4). Detected onsite during avian use surveys at all plots and all seasons, with greatest use in summer season (12 detections). Nests onsite the LJI and LJIIB facility sites and in the vicinity in junipers or isolated deciduous trees (Gritski et al., 2008; LJWP, 2006; LJWP, 2009; Kronner et al., 2007a and b ; Kronner et al., 2008b; PPM, 2006; CSF, 2007; Saddle Butte Wind, LLC (SBW), 2009). One recorded in ORNHIC records within 5 miles of the Facility (ORNHIC, 2009).

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Northern goshawk *Accipiter gentilis*	SoC	SC	C[f]	**N** – None observed; no suitable habitat.
Western burrowing owl *Athene cunicularia*	SoC BoCC	SC	C[f]	**D**—Not confirmed within Facility survey corridors to date, but nesting confirmed in one location at LJIIB during spring 2009 and one confirmed nest observed at LJI in 2005; one also observed in fall at this site (NWC, 2009b; LJWP, 2006). Nesting and observations in the vicinity (Kronner et al., 2007a and b; PPM, 2006; CSF, 2007). One ORNHIC record of nesting within 5 miles of the Facility (ORNHIC, 2009).
Loggerhead shrike *Lanius ludovicianus*	BoCC	SV	C[f]	**D**—One detection of this species within the Facility site boundary during spring avian use surveys, observed in-transit to avian use surveys (two detections in spring, one in winter), and documented during 2008 special-status wildlife surveys in two locations in March. Individuals and nests were found at LJIIA and LJIIB and the vicinity in areas with mature sagebrush cover or in juniper woodlands or isolated juniper trees (NWC, 2009b; LJWP, 2006; Kronner et al., 2007a and b; Kronner et al., 2008b; PPM, 2006; CSF, 2007; SBW, 2009). Not typically found in the Columbia Basin in winter. Observed along Highway 19 about 8.5 miles south of Arlington in December 1999 and 2009 (Kronner, personal field notes).
Lewis' woodpecker *Melanerpes lewis*	SoC	SC	C[f]	**N**—May fly through during migration. Two detections of this species at the Shepherds Flat in May (CSF, 2007).
White-headed woodpecker *Picoides albolarvatus*	SoC	SC	C[6]	**N** – None observed; no suitable habitat.
Willow flycatcher *Empidonax trailli adastus*	SoC	SV	--	**N**—May fly through during migration. Observed during surveys for Shepherds Flat (CSF, 2007). Utilizes riparian habitat.
Olive-sided flycatcher *Contonpus cooperi*	SoC	SV	--	**N** – None observed; no suitable habitat.
Yellow-breasted chat *Icteria virens*	SoC	SC	--	**N**—Observed along Rock Creek near Olex (Kronner and Gritski field notes, 2009) in riparian habitat. May fly through the Facility site during local dispersal and migration, the Facility (Eightmile drainage) lacks perennial streams and riparian shrub cover sufficient to support this species breeding.
Sage sparrow *Amphispiza belli*	BoCC	SC FS	C[6]	**D**—Documented during special-status wildlife surveys in March 2008 in one location. Needs extensive sagebrush shrub habitat to support breeding populations. Known to nest in the general area in larger patches of sagebrush and is seen occasionally in smaller patches during migration (Kronner 2001 and 2009). Breeds at Boardman Conservation Area to the east of the Facility. Observed (1) in northern portion of Shepherds Flat Project in Eightmile Canyon in June (CSF, 2007).

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Grasshopper sparrow *Ammodramus savannarum*	--	SV FS	SM	**D**—Two detections during summer avian use surveys onsite Facility. Observed during spring and summer point count surveys at LJIIB, plot L, which intersects with the Facility site boundary. Observed within the LJIIA area during the nesting season and in the vicinity (CSF, 2007; LJWP, 2006; Kronner et al., 2007a and b; Kronner et al., 2008b; PPM, 2006). One ORNHIC record within 5 miles of the Facility (ORNHIC, 2009). Requires sufficient grassland with good vertical structure for nesting cover and perching.
Reptiles and Amphibians				
Sharptail snake *Contia tenuis*	SoC	--	C[6]	**N** – None observed; outside known range.
Northern sagebrush lizard *Sceloparus graciosus graciosus*	SoC	SV	C[f]	**D**—Not documented onsite, but documented at LJIIB in four locations in juniper woodland habitat. Suitable habitat where there is less dense grass cover; also found in sandy soils with sagebrush and juniper or sagebrush. Observed within LJIIA site and in the vicinity (LJWP, 2006; PPM, 2006).
Western pond turtle *Clemmys marmorata*	SoC	SC	E[f]	**N** – None observed; no suitable aquatic habitat.
Western toad *Bufo boreus*	--	SV	C[6]	**N**—One ORNHIC record with 5 miles of the Facility (ORNHIC, 2009). No aquatic habitat, very limited potential for upland movements during wet periods. Known to occur along perennial streams such as Rock Creek, (Kronner and Gritski, field notes 2006–2009).
Larch mountain salamander *Plethodon larselli*	SoC	SV	SS	**N** – None observed; outside known range.
Fish				
Chinook salmon, Middle Columbia River ESU (spring run) *Onchorhynchus tshawytscha*	--	SV	--	**N** – None observed; no suitable perennial stream habitat.
Redband trout *O. mykiss*	SoC	SV	SC	**N** – None observed; no suitable perennial stream habitat.
Westslope cutthroat trout *O. clarkii lewisi*	SoC	SV	--	**N** – None observed; no suitable perennial stream habitat.
Pacific lamprey *Lampetra tridentata*	SoC	SV	SM	**N** – None observed; no suitable perennial stream habitat.
River lamprey *L. ayresi*	SoC	--	--	**N** – None observed; no suitable perennial stream habitat.

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented
Western brook lamprey *L. richardsoni*	SoC	--	SM	**N** – None observed; no suitable stream habitat.
Margined sculpin *Cottus marginatus*	SoC	SV	SS	**N** – None observed; no suitable perennial stream habitat.
Invertebrates				
California floater mussel *Anodonta californiensis*	SoC	--	--	**N** – None observed; no suitable habitat.
Giant Columbia spire snail *Fluminicola columbiana*	SoC	--	--	**N** – None observed; no suitable habitat.
Lynn's clubtail dragonfly *Gomphus lynnae*	SoC	--	SC	**N** – None observed; no suitable stream habitat.
Plants				
Robinson's onion *Allium robinsonii*	SoC	-- / 2-ex	--	**N** – None observed; no suitable habitat.
Ames' milk-vetch *Astragalus pulsiferae var. suksdorfii*	SoC	-- / --	E[f]	**N** – None observed; outside known range.
Stalked-pod milk-vetch *A. scleroscarpus*	--	-- / 3	--	**Y –** Documented in site boundary during surveys conducted for LJIIB.
Columbia milk-vetch *A. succumbens*	--	-- / 4	--	**Y –** Documented in site boundary during surveys conducted for LJIIB.
Long-bearded sego lily *Calochortus longebarbatus* var. *longebarbatus*	SoC	-- / 4	SS	**N** – None observed; outside known range.
Gray cryptantha *Cryptantha leucophaea*	--	-- / 2-ex	E[f]	**Y** – Documented in 5-mile analysis area, but outside site boundary.
Columbia bladderpod *Lesquerella douglasii*	--	-- / 3	--	**Y** – Documented in 5-mile analysis area, but outside site boundary.
Watson's desert-parsley *Lomatium watsonii*	--	-- / 2	--	**N –** None observed
Whitebark pine *Pinus albicaulis*	SoC	-- /	--	**N** – None observed; no suitable habitat.
Woven spore lichen *Texosporium sancti-jacobi*	SoC	-- /	T[6]	**N** – None observed; potentially suitable habitat present.

TABLE P-1
Non-listed Special-status Wildlife and Plant Species of Known or Potential Occurrence Within Facility Site Boundary and 5-Mile Buffer

Common Name and Scientific Name	Federal Status[a]	Oregon/ ORNHIC Status[b]	Washington Status[c,d]	Occurrence Within or Within 5 Miles of the Site Boundary[e] D = Documented N = Not Documented

[a] U.S. Fish and Wildlife Service, 2008a, 2008b, 2008c.

[b] Oregon Natural Heritage Information Center (ORNHIC), 2009.

[c] Washington Department of Natural Resources (WDNR), 2009.

[d] Washington Department of Fish and Wildlife (WDFW), 2009.

[e] Source: NWC, 2009b (Attachment P-7).

[f] This species is state-listed in Washington state only; therefore, it is addressed in this Exhibit, rather than Exhibit Q, which provides a discussion of species that are federal listed or Oregon state-listed.

Status Definitions

-- = No status.

Federal

SoC = Species of Concern.
DL = Delisted.
BGEPA = Bald and Golden Eagle Protection Act.
BoCC = USFWS Birds of Conservation Concern (BCR 9, Great Basin).

Note: All migratory birds are protected by the Migratory Bird Treaty Act.

Oregon and Washington

T = Washington state threatened.

E = Washington state endangered

C = Washington state candidate for listing as threatened or endangered.

SV = Sensitive-vulnerable; listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring.

SC = Sensitive-critical; listing as threatened or endangered is pending or may be appropriate if immediate conservation actions are not taken.

SU = Sensitive-undetermined; status is unclear, may be susceptible to population decline of sufficient magnitude that the species could qualify for endangered, threatened, critical, or vulnerable status. Additional information is required before a determination can be made.

SP = Sensitive-peripheral or naturally rare; low population caused by naturally limiting factors; maintaining status quo for habitats and populations is minimum requirement.

SS = State sensitive: Any taxon that is vulnerable or declining and could become endangered or threatened in the state without active management or removal of threats.

FS = Focal species highlighted in the Draft John Day Subbasin Plan (NWPPC, 2004)

SM = State Monitor; species are not considered species of concern, but are monitored for status and distribution. They are managed by WDFW as needed, to prevent them from becoming endangered, threatened, or sensitive.

X = State Extinct; possibly extinct or extirpated

ORNHIC

ORNHIC List 1 – Threatened or endangered throughout range.

ORNHIC List 2 – Threatened, endangered, or extirpated from Oregon; secure elsewhere.

ORNHIC List 3 – Review.

ORNHIC List 4 – Watch.

Ex – Believed extirpated.

Federal

SoC = Species of Concern; former Category 2 candidates for which additional information is needed in order to propose as threatened or endangered under the ESA; these species are under review for consideration as candidates for listing under the ESA.

DL = Delisted. Removed from listed of federal threatened and endangered species.

P.3.2 Field Survey Methods

P.3.2.1 Summary of Field Survey Methods

Table P-2 summarizes field surveys that have been conducted within the Facility site boundary, beginning in 2008, and highlights the amount of biological data available for the general area, as well ongoing and future planned investigations.

TABLE P-2
Summary of Previous Field Surveys Conducted Within Montague Wind Power Facility Site Boundary

Date	Description
2008	Special-status wildlife surveys for a portion of the site boundary
2008–2009	Avian use surveys of five plots conducted from fall 2008 to summer 2009
2009–Present	Avian use surveys of six plots beginning in fall in areas not covered by 2008-2009 avian use surveys
2009	Aerial raptor nest survey for a portion of the site boundary
2009	Wildlife habitat mapping and categorization
2009	Bat use review
2010	Special-status plant surveys
2010	Special-status wildlife surveys in areas previously not surveyed
2010	Field verification of habitat types and reassessment of categories, if needed, pending 2010 wildlife survey results
2010	Aerial raptor nest survey

Further details of the completed, ongoing, and planned biological investigations are provided below and in Attachment P-7.

P.3.2.2 Plants

Surveys for state and federal special-status plants were conducted by Northwest Wildlife Consultants, Inc. (NWC) in areas of the Facility site boundary that overlap with the site boundaries for Pebble Springs Wind Farm (Pebble Springs) in spring 2006 (PPM Energy [PPM], 2006) and with LJIIB in spring 2009 (NWC, 2009a). The survey methods were similar to those used in surveys conducted for other wind energy facilities in the area.

In 2009, the Applicant contracted CH2M HILL to design and conduct a botanical field investigation for the proposed Facility for state and federal threatened, endangered, candidate, and rare plant species (see Exhibit Q, Attachment Q-1). The study began with a pre-field review of existing data to determine the listed and rare plant species that could occur within the site boundary. The pre-field review identified nine non-listed, special-status plant species with potential to occur within the site boundary (Table P-1). Between October 12 and December 4, 2009, CH2M HILL conducted a habitat assessment for state and federal listed and rare plants within portions of the site boundary accessible by roads (Attachment Q-1). Biologists will conduct focused botanical surveys

during the appropriate bloom period in 2010 to identify additional state or federally listed or non-listed, special-status plant populations located near proposed Facility components. Preliminary survey corridors for the planned botanical surveys are shown in Figure P-2. CH2M HILL will provide a written report of the field investigation to ODFW to detail any identified non-listed, special-status plant species.

Potentially suitable habitat was identified for three state and federal threatened, endangered, or candidate plant species: the dwarf evening primrose, as well as the two special-status plant species that have already been identified within the site boundary, Laurent's milk-vetch and sessile mousetail. These plant species are discussed in Exhibit Q. Potentially suitable habitat was also identified for (1) two other plant species, woven spore lichen and gray cryptantha, which have no Oregon status, but are listed as threatened in Washington State, and (2) three non-listed species that are tracked by ORHIC and have been identified within the site boundary or near vicinity: stalked-pod milk-vetch, Columbia milk-vetch, and Columbia bladderpod. Species that are listed or candidates in Washington State but are not listed federally or in the state of Oregon are addressed in this Exhibit.

If any state or federally listed plant species are identified during the 2010 field investigation, the Applicant will ensure that construction and operation of the Facility will have no impact on individuals or populations. The Applicant will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources.

The Applicant has committed to designing the Facility components to minimize impacts to native habitat and to avoid any threatened or endangered plant species. Section P.9 provides further details on avoidance measures.

P.3.2.3 Wildlife

Wildlife Surveys

Surveys for non-listed, special-status wildlife species were conducted by NWC in portions of the Facility site boundary that overlap with Pebble Springs and LJIIB in spring 2006 (PPM, 2006) and spring 2009 (NWC, 2009a), respectively (see Figure P-3). Survey methods were the same as those described in Attachment P-7 (NWC, 2009b).

Wildlife surveys for the proposed Facility began in 2008 and are ongoing. The Applicant enlisted NWC to design and conduct habitat and wildlife field investigations for the Facility (see Attachment P-7). Suitable habitat for federal and state-listed wildlife within the site boundary was evaluated by conducting habitat mapping of broad-level habitat types and assigning habitat quality ratings (Attachment P-7). NWC conducted special-status species surveys in suitable habitat in March 2008 in a portion of the site boundary, as shown in Figure P-3). Surveys were not conducted in disturbed areas lacking suitable habitat, such as plowed wheat fields. NWC surveyed for both special-status species, as described in Exhibit Q, and non-listed, special-status species. The following non-listed, special-status species were identified as potentially occurring (based on habitat conditions) within the site boundary: long-billed curlew, burrowing owl, Swainson's

hawk, ferruginous hawk, golden eagle, loggerhead shrike, grasshopper sparrow, savannah sparrow, and white-tailed jackrabbit.

Special-status wildlife surveys are planned for spring 2010 in all corridors not evaluated thoroughly for all the target species. The spring 2010 surveys will follow the methods described above. Results of the 2008, 2009, and planned spring 2010 wildlife surveys will be reported following the 2010 surveys. These surveys will be conducted prior to construction, and the Applicant has committed to designing the permanent Facility components and temporary disturbance areas to avoid any threatened, endangered, or candidate species found during these clearance surveys.

Avian Use Surveys

NWC conducted a full year of avian use surveys at five plots from September 4, 2008, to August 7, 2009 (Figure P-4; NWC, 2009b). Surveys in fall and winter seasons were previously reported as study plots in the "surrounding area within 5 miles" for the Leaning Juniper IIB Wind Power Facility (LJIIB) amended site boundary wildlife baseline study (Leaning Juniper Wind Power II LLC [LJWP], 2009; NWC, 2009a).

NWC also initiated avian surveys at six additional plots, located within areas of the Facility site boundary that had not been addressed by the 2008-2009 surveys, as shown in Figure P-4.

The protocol used for avian use surveys and data analysis for the Facility was consistent with protocols of similar baseline studies conducted at other wind power facilities in the Columbia Basin, including Leaning Juniper IIA Wind Power Facility (LJIIA) and LJIIB (LJWP, 2006; LJWP, 2009), Pebble Springs (PPM, 2006), Rattlesnake Road Wind Farm (Rattlesnake Road) in Oregon (Kronner et al., 2007a), Klondike I Wind Power Project (Klondike I) (Johnson et al., 2002), Klondike III Wind Power Project (Klondike III) (Mabee et al., 2005), Vansycle Ridge Wind Farm (Vansycle Ridge) in Oregon, Stateline Wind Energy Center (Stateline) at the Oregon/Washington border (URS Corporation [URS] and Western EcoSystems Technology, Inc. [WEST], 2001), Big Horn Wind Farm (Big Horn) in Washington (PPM, 2004; Kronner et al., 2006a and b), Combine Hills Wind Farm (Combine Hills) in Oregon (Young et al., 2002), and others. This method utilizes a large-plot point-count method. Each circular study plot was 800 meters (approximately 0.5 mile) in radius and located to provide good coverage of, and viewing conditions within, Facility areas proposed for development. Additional details about the study methods are provided in Attachment P-7.

Raptor Nest Surveys

The Facility raptor nest survey area extends 0.5 mile from the preferred transmission line route and alternates and 2 miles from all other areas of the site boundary. The area of the raptor nest survey radius is approximately 193 square miles. Approximately 50 percent of the site boundary has already been surveyed for nesting raptors during studies conducted for Pebble Springs and Leaning Juniper II (Figure 12 of PPM, 2006; LJWP, 2006; LJWP, 2009; Kronner et al., 2005; NWC, 2009a). In addition, approximately 35 percent of the 2-mile Facility raptor survey radius was surveyed in 2009 for nesting

raptors for adjacent wind facilities. Data were reviewed from several adjacent wind facilities surveyed for raptor nests in 2009 by NWC, including Leaning Juniper I (LJI), LJIIA, and LJIIB, and Pebble Springs.

While a large portion (more than one-third) of the overall Facility raptor nest survey radius was surveyed in 2009 for various facilities, surveys of the remaining area within the Facility 2-mile raptor survey radius are planned for 2010. Where portions of the Facility 2-mile raptor survey radius overlap with operating wind facilities, raptor nest surveys will avoid operating turbines. The Applicant will also coordinate with other developers conducting raptor nest surveys in 2010 to reduce duplication; for example, a large portion of remaining area within the Facility 2-mile raptor survey radius overlaps with the 2-mile raptor survey radius for the Shepherds Flat Wind Farm (Shepherds Flat) and the Saddle Butte Wind Park (both in Oregon). Also in 2010, Swainson's and ferruginous hawk nests identified in 2009 in areas already surveyed that are within the Facility 2-mile survey radius will be checked for status, as requested by ODFW.

In 2009, NWC reviewed current land use within the site boundary, as shown in the aerial photograph in Figure P-5. Aerial as well as ground-based raptor nest surveys were conducted by NWC for adjacent planned or operating wind facilities and their associated 2-mile aerial survey radius (where applicable), including LJI, LJIIA and LJIIB, and Pebble Springs. As a result, approximately 50 percent of the Facility's 2-mile raptor survey area was surveyed in 2009. The areas surveyed and raptor and other large bird (common raven) nests found within the Facility 2-mile raptor nest survey area are presented in Appendix P-7, Figure 4. Figure P-6 shows sensitive raptor nests.**]**

Data were also provided by a Washington Department of Fish and Wildlife (WDFW) raptor specialist who conducted a radio telemetry study in 2008 of nesting ferruginous hawks in and near Eightmile Canyon (Watson, 2009), located approximately 4 miles or more east of the Facility, to supplement a Western U.S. study on the species. The nests studied by WDFW, as well as NWC internal nest records from 2008 of raptor nests in Eightmile Canyon (Kronner, 2009), are depicted in Figure 4 of Attachment P-7. New records for these two studies from the 2008 nest survey year were reviewed. However, the survey areas for these latter two data sources are not shown in Figure 4, as the survey methods were more linear in extent and generally differed from typical raptor aerial nest surveys conducted for wind facility pre- and post-construction studies. Data from the various sources were used in fall 2009 by the Applicant to aid in micrositing turbine placement to minimize potential direct impacts to locally nesting raptors, in particular, Swainson's hawk, ferruginous hawk, and prairie falcon.

Additionally in 2009, nests were checked from the ground in some areas to supplement the aerial surveys, where needed (Gritski, 2009a). During the walking transect surveys conducted for special-status wildlife species, isolated trees, basalt cliffs, and other suitable raptor nest structures were checked for sign of nesting raptors. Those found are also included in Figure 4.

A second aerial raptor nest is planned for spring 2010. NWC will conduct the 2010 survey using methods similar to those used for each of the studies identified above. Details about survey methods are presented in Attachment P-7. During the 2010 spring

season, ground-based walking transects for special-status species and habitat, suitable trees, and other potential raptor nest structures such as basalt cliffs and escarpments will be examined for use.

Bat Habitat Suitability

Use of the Facility site by bats and potential Facility impacts were assessed through a review of existing information available for nearby wind power facilities and a comparison of the proposed Facility site characteristics to those of nearby wind facilities.

P.3.3 Habitat Typing and Categorization

P.3.3.1 Habitat Mapping

To identify broad habitat types, NWC reviewed historical land cover maps from the Oregon Gap Analysis Program. Fine-scale habitat mapping, preliminary field reconnaissance, and verification were conducted within the Facility site boundary during 2008–2009, as shown in Figure P-7. Habitat category ratings were assigned pursuant to OAR 635-415-0025, based on a combination of vegetative structure, habitat functionality, and overall ecological condition for wildlife, in particular for special-status species. Habitat types and categories will be field-verified and reassessed, as needed, after the spring 2010 special-status wildlife surveys. Habitat subtypes and their assigned ODFW wildlife habitat categories as defined in OAR 635-415-0025 are discussed in Section P.4. Additional information about methods used to identify habitat types and categories is provided in Attachment P-7.

P.4 IDENTIFICATION AND DESCRIPTION OF HABITAT

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

Response: Habitat in the surrounding area consists of cropland, Conservation Reserve Program (CRP), grassland, shrub-steppe, and juniper woodland, and is discussed throughout this Exhibit (see Figure P-7). Additional information about habitat in the surrounding area is provided in the LJI, LJII, Pebble Springs, Shepherds Flat, Saddle Butte, and Willow Creek Wind Farm (Willow Creek) biological survey reports and permit applications (LJWP, 2009; LJWP, 2006; NWC, 2009b; Kronner et al., 2005; PPM, 2006; Kronner et al., 2007a).

Habitat types and categories were mapped and categorized within the Facility site boundary in 2008-2009 using the methods described above. Habitat types include cropland and other non-native disturbed sites; CRP or other planted grasslands; native perennial grasslands; shrub-steppe; juniper woodlands with sagebrush or open, low-shrub understories; narrow riparian habitat in poor to fair condition; and basalt escarpments. Perennial streams that flow aboveground are not present; major drainages are intermittent, with limited riparian habitat. The results of the habitat mapping within the Facility site boundary are described below and shown in Table P-3 and Figure P-7.

In general, no new unique habitat types exist within the anticipated development areas of the site boundary that have not already been studied for the adjacent LJII facility. There are, however, a few differences among the Facility habitat types and those at other nearby wind facilities. The Facility site boundary does contain irrigated agricultural lands (alfalfa and other irrigated crops) that are not present in other nearby studied sites (listed above), but these fields are in the lower elevations along drainage bottoms such as Eightmile Canyon, not on higher-elevation sites within the site boundary where turbines would be placed. In addition, the juniper woodland habitat type is more extensive in some portions of the Facility site boundary (found along Eightmile and Fourmile canyons) than at other nearby studied sites (NWC, 2009b; see Attachment P-7). However, like the irrigated agricultural lands, these habitats generally are found at lower elevations, and the turbines would be placed along the higher elevation sites. The Applicant is committed to avoiding impacts to trees to the extent practicable. Wildlife habitat mapping and categorization will be field-verified and reassessed, if needed, pending 2010 wildlife survey results.

TABLE P-3
Habitat Types and Habitat Categories within the Montague Wind Power Facility Site Boundary

General Land Cover Type and Codes	Specific Habitat Type ("Subtype") and Mapping Codes	Specific Habitat Type Description	Acres in Site Boundary
Developed (D)	Old Field (DB)	Previously cultivated but likely not DC (see below), currently occupied by a variety of common non-native and native vegetation plants (rabbitbrush shrubs/annual grasses and weeds). Native vegetation is minor component. Common species: horned lark (HOLA), western meadowlark (WEME) foraging, may occasionally include savannah sparrow (SVSP).	7.54
	CRP or Other Planted Grassland (DC)	Planted grassland on previously farmed or other disturbed lands that may be enrolled in the Conservation Reserve Program. Residual (not previously plowed) native vegetation patches in a few locations. Old grass stands contain rabbitbrush or other shrubs but are not dominant (see SSB below). May support white-tailed jackrabbits (WTJ). Common species include WEME and grasshopper sparrow (GRSP) where grassland is mature.	1,512.19
	Irrigated Agriculture (DI)	Agricultural crop or livestock pasture fields that are irrigated for all or a portion of the growing season. The use was determined by presence of farm crop and onsite irrigation implements such as pipes, sprinklers, pumps, and motors.	270.76
	Dryland Wheat or Other Small Grain (DW)	Agricultural fields currently in small grain production or fallow. Common species include HOLA and mourning dove in winter stubble or when fallow.	12,660.54
	Other (DX)	Developed/disturbed areas including farming/ranching home and shop sites, corrals, structures, feedlots, inactive and active gravel quarries, pastures, roads, rights-of-way, and waste areas associated with ongoing human activities. Not considered of significant value to native wildlife species.	246.57

TABLE P-3
Habitat Types and Habitat Categories within the Montague Wind Power Facility Site Boundary

General Land Cover Type and Codes	Specific Habitat Type ("Subtype") and Mapping Codes	Specific Habitat Type Description	Acres in Site Boundary
Exposed Rock (ER)	Escarpment (ESC)	Linear Columbia River Basalt outcroppings approximately 3 to 15 meters (10 to 50 feet) in height, found on steeper slopes that bound canyon edges and shoulders. Plant diversity and cover is very low on escarpments. Provides critical nesting substrate and perching sites for raptors and crevices for bats. Provides shade and thermal cover for deer in summer and serve as good windbreaks. May also provide home sites for wood rats and marmots.	28.67
Grassland (G) Steppe dominated by native and/or non-native grasses (<20% shrub cover)	Exotic Annual Grassland (GA)	Dominated by exotic annual grass and/or weeds. Open, low shrubs present in larger blocks. Some GA sites support long-billed curlew (LBCU), Washington ground squirrel (WGS). Common bird species include HOLA.	3,205.90
	Native Perennial Grassland (GB)	Dominated by native perennial bunchgrass. Shrubs, if present, are an inconspicuous component. May support WGS, WTJ, burrowing owl. Important nesting habitat for ground-nesting birds such as GRSP, SVSP, and vesper sparrow. Common bird species include WEME and HOLA. This is an Oregon Conservation Strategy Habitat.	3,814.88
Shrub-steppe (SS) Steppe dominated by shrubs (>20% shrub cover)	Sagebrush Shrub-steppe (SSA)	Big sage sagebrush/bunchgrass-annual grass. Offers high-quality breeding habitat for shrub obligate species including loggerhead shrike (LOSH). May also support WGS and WTJ. Common species include WEME and mourning dove. Sage sparrow, Brewer's sparrow and lark sparrow are present in larger blocks. This is an Oregon Conservation Strategy Habitat.	2,701.78
	Rabbitbrush-Snakeweed Shrub-steppe (SSB)	Rabbitbrush-snakeweed-buckwheat/bunchgrass-annual grass. Most of these areas are formerly SSA (sagebrush-rabbitbrush-snakeweed/bunchgrass - annual grass) attempting to recover from recent fire or are older DC/CRP and have significant shrub component. Many sites contain mature big sagebrush cover in patches approx. 2 acres and less in area. Can support LBCU, WTJ, and WGS. Common species include HOLA and WEME. Lark sparrow occasionally found nesting.	8,575.34
Woodland (W) With >10% tree cover	Juniper Woodland (WJ)	Open canopy woodland consisting of western juniper trees in more concentrated distribution (vs. scattered individual trees in other habitat types). Often with significant big sage and grass understory component. Potential habitat for nesting ferruginous hawk and Swainson's hawk, foraging and nesting loggerhead shrike, foraging and breeding short-horned and sagebrush lizards. Migrating and wintering habitat for American robins, Townsend's solitaire, waxwings, and mountain bluebirds. Mourning dove nesting habitat. Recent wildfires have killed some juniper trees in the Eightmile Canyon area.	

TABLE P-3
Habitat Types and Habitat Categories within the Montague Wind Power Facility Site Boundary

General Land Cover Type and Codes	Specific Habitat Type ("Subtype") and Mapping Codes	Specific Habitat Type Description	Acres in Site Boundary
	Riparian Woodland (WR)	Riparian woodland is limited to one narrow intermittent linear stream course in Eightmile Canyon. Willow is the dominant deciduous tree of the overstory. Provides important roosting habitat for bats; important thermal cover for mule deer; important nesting and migration habitat for passerines.	2.49
Total		**33,402.32**	
Percent Agricultural and CRP		14,443.49 (43%)	
Percent Grassland		7,020.78 (21%)	

Source: NWC, 2009a (Attachment P-7).

P.4.1 Category 1 Habitat

Habitat Category 1 is irreplaceable, essential habitat for a fish or wildlife species, a population, or a unique assemblage of species that is limited on either a physiographic province or site-specific basis, depending on the individual species, population, or unique assemblage. The Applicant's basis for determining the nature and extent of the Category 1 as opposed to Category 2 habitat within the site boundary is outlined below.

In a letter dated March 15, 2002, ODFW provided clarification on habitat categories for Washington ground squirrel (WGS). ODFW stated that potential WGS habitat is Category 2, not Category 1, if the habitat is considered replaceable when considering the consequences of a proposed development action (FPL Energy Vansycle, LLC [FPLE], 2002, Tab 14). A copy of this letter is provided as Attachment P-1. In a September 2008 comment letter on the preliminary application for a site certificate for the Helix Wind Power Facility, ODFW provided additional clarification that a "cluster of holes where the squirrels are residing during the time of a survey is considered Category 1 habitat" and must be avoided (see Attachment P-2).[1] ODFW defined the area "depicted by a 785-foot ring around the outside of the cluster of holes where the Washington ground squirrels are residing" as "required area for squirrel survival" that is also Category 1 habitat. Further, ODFW went on to state that habitat adjacent to a WGS "colony" (defined by ODFW as a "cluster of holes") is considered Category 2 habitat and "an area of potential [WGS] use" if it is of a similar habitat type and quality as the area occupied by the WGS.[2] It is recognized, however, that certain conditions within the 785-foot area could cause the extent of Category 1 habitat to decrease, including the presence of existing improvements, tilled field edges, or unvegetated, continuous vertical drop rim

[1] Letter from Rose Owens, ODFW, September 15, 2008 (comments on the preliminary application for a site certificate for the Helix Wind Power Facility)

[2] In the Helix comment letter, ODFW defined a WGS "colony" as "the cluster of holes as well as the required habitat for squirrel survival."

rock, which has no burrowing or food value to WGSs that choose to explore the area, just as such conditions influence the valuation of habitat outside the 785-foot area.

In October 2008, following prolonged discussions with interested stakeholders, ODFW, the Oregon Department of Energy (ODOE), and USFWS released the Oregon Columbia Plateau Ecoregion Wind Energy Siting and Permitting Guidelines (Guidelines). The Guidelines provided guidance on how to characterize habitat and implement OAR 635-415-0025. In the Mitigation section (on pages 21-22 of the Guidelines), a table sets out the ODFW habitat categories and gives examples of each category. For Category 1 habitat, the example habitat includes "[WGS] burrow complexes and required adjacent habitat for squirrel survival." Comparatively, examples of Category 2 habitat include "[u]noccuppied but potential [WGS] habitat adjacent to an existing colony."

Since late 2008, however, ODFW appears to have changed its prior recommendations and the guidance in the Guidelines. In comments on the Applicant's *Request for Amendment No. 1 to the Site Certificate for the Leaning Juniper II Wind Power Facility* (LJWP, 2009), ODFW instead took the position that for purposes of classifying WGS habitat for the LJIIB area, ODFW would treat a single identified WGS hole as a "cluster" when defining the Category 1 area, including required adjacent habitat. During these discussions, the Applicant did not agree with ODFW's interpretation and expressed concerns that such an interpretation would be inconsistent with prior ODFW recommendations and the Guidelines. Although the 785-foot buffer ultimately was imposed for a single WGS hole in the LJIIB area in the *Leaning Juniper II Wind Power Facility Final Order on Amendment #1*, dated November 2009, the Applicant maintains that the proper application of the recommended 785-foot buffer is from an identified and surveyed WGS colony, or cluster of WGS holes or patches, consistent with prior recommendations and as described in the Guidelines. Therefore, the following sections describe the surveyed Category 1 habitat within this context to demonstrate that the Facility is consistent with OAR 635-415-0025 and thus satisfies OAR 345-022-0060.[3]

WGS detections (holes, pellets, individuals or vocalizations) were observed in shrub-steppe and grassland habitat during the 2008 or 2009 surveys within the Facility site boundary, as shown in Figure Q-2 and Table Q-2 of Exhibit Q. Based on these observations, habitat that would usually be characterized as Category 2, 3, or 4, was reevaluated based on the presence of WGS. As discussed in Exhibit Q, Table Q-2 describes each WGS detection, including whether the observance was of an individual WGS or multiple WGSs; whether burrows were present, and, if so, whether the holes were occupied; the location's characteristics; and details of the evidence showing signs of WGS. With this information, the location of occupied WGS colonies and the adjacent habitat required for squirrel survival (determined as the habitat within 785 feet of an occupied WGS colony) were identified as Category 1 habitat. The locations of Category 1

[3] The Applicant demonstrates in this Exhibit that the design, construction, and operation of the Facility will comply with OAR 345-022-0060. However, to the extent that ODOE disagrees with the Applicant's characterization of Category 1 WGS habitat and therefore finds that the Applicant does not meet OAR 345-022-0060, the Applicant reserves the right to argue in the future that the Facility is nonetheless allowed under OAR 345-022-0000 by demonstrating that the overall public benefits of the Facility outweigh the damage to resource protected under OAR 345-022-0060. Further, the Applicant reserves the right to argue in the future and demonstrate that the Facility is allowed under the public benefits balancing test, even if the Facility footprint encroaches on the 785-foot buffer extending from an occupied WGS colony or complex of holes.

WGS habitat within the site boundary are shown in Figure P-8. Three habitat types were identified as Category 1 within the site boundary: Shrub-steppe, Grassland, and Developed.

P.4.1.1 Shrub-steppe

Shrub-steppe is classified as Category 1 habitat where it provides irreplaceable, limited, and essential habitat for a wildlife species—in this case, the WGS. WGS burrows were detected in two subtypes of Category 1 Shrub-steppe within the site boundary: Sagebrush (Big Sage) Shrub-steppe (subtype SSA) and Rabbitbrush/Snakeweed Shrub-steppe (subtype SSB). Shrub-steppe SSA and SSB habitat was also present within 785 feet of WGS burrows and is therefore considered Category I habitat, as shown in Figure P-8 and Figure 2b of Attachment P-7.

Category 1 Sagebrush (Big Sage) Shrub-steppe (SSA) is similar in vegetative cover and ecological condition to the immediately adjacent Category 2 or 3 SSA habitat within the site boundary, but because of its proximity to known WGS burrows, the habitat is deemed Category 1. This habitat also offers high-quality breeding habitat for shrub obligate species including loggerhead shrike and white-tailed jackrabbit. Sage sparrow, Brewer's sparrow, and lark sparrow are present in larger blocks of both Category 1 and 2 SSA habitat. Sagebrush lizard and other reptiles are likely to be found in areas where more sandy soils are present. Commonly occurring species include western meadowlark and mourning dove.

Category 1 Rabbitbrush/Snakeweed Shrub-steppe (SSB) is similar in vegetative cover and ecological condition to the immediately adjacent Category 2, 3, 4, or 5 SSB habitat within the site boundary. Category 1 SSB within the site boundary exists only because of its proximity to known WGS colonies. This habitat also provides foraging, cover, and/or nesting habitat for grasshopper sparrows and white-tailed jackrabbit, as well as common birds and mammals.

There are approximately 108 acres of Category 1 SSA and 199 acres of Category 1 SSB habitat within the Facility site boundary.

P.4.1.2 Grassland

Grassland is classified as Category 1 habitat where it provides irreplaceable, limited, and essential habitat for a wildlife species—in this case, the WGS. WGS burrows were detected in two subtypes of Grassland within the site boundary: Exotic Annual (subtype GA) and Native Perennial (subtype GB). Grassland GA and GB habitat was also present within 785 feet of WGS burrows and is therefore considered Category 1 habitat, as shown in Figure P-8 and Figure 2b of Attachment P-7.

Category 1 Exotic Annual Grassland (GA) is similar in vegetative cover and ecological condition to the immediately adjacent Category 2, 3, or 4 GA habitat. Category 1 GA habitat Exotic Annual Grasslands within the site boundary exists only because of its proximity to known WGS colonies. This habitat also provides habitat for nesting long-billed curlew and commonly horned larks.

Category 1 Native Perennial Grassland (GB) is the same or similar in vegetative cover and ecological condition to the immediately adjacent Category 2, 3, or 4 GB habitat. Category 1 GB habitat within the site boundary exists only because of its proximity to known WGS colonies. This habitat also provides essential foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit, and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat. Native grasses and forbs provide forage for mule deer.

There are approximately 59 acres of Category 1 GA and 55 acres of Category 1 GB habitat within the Facility site boundary.

P.4.1.3 Developed

Developed habitat is classified as Category 1 habitat where it provides irreplaceable, limited, and essential habitat for a wildlife species—in this case, WGS. Developed CRP or Other Planted Grassland (subtype DC) habitat is located within 785 feet of WGS burrows; however, there were no WGS burrows in this type of habitat within the Facility site boundary. (See Figures P-8 and 2b of Attachment P-7.)

Category 1 Developed – CRP or Other Planted Grasslands (DC) share the same vegetative cover and ecological conditions as neighboring Category 3 Developed DC habitat within the site boundary. Category 1 DC habitat within the site boundary exists only because of its proximity to known WGS burrows. This habitat also supports white-tailed jackrabbits and savannah sparrows as well as grasshopper sparrows and western meadowlarks that are commonly found in this habitat subtype.

There are approximately 88 acres of Category 1 DC habitat within the site boundary.

P.4.2 Category 2 Habitat

Four habitat types were identified as Category 2 within the site boundary: Exposed Rock, Grassland, Shrub-steppe, and Woodland.

P.4.2.1 Exposed Rock

Escarpment (subtype ESC) is the only subtype of Category 2 Exposed Rock within the site boundary. Category 2 Escarpment provides essential nesting habitat for raptors, roosting habitat for bats and owls, and habitat for some passerines.

Category 2 Escarpments (ESC) are linear Columbia River Basalt outcroppings approximately 3 to 15 meters (10 to 50 feet) in height, found on steeper slopes that bound canyon edges and shoulders (i.e., Eightmile Canyon). Grazing pressure is light in Escarpment habitat, and when present, vegetative cover consists of Sandberg's bluegrass, non-native grasses, and various native and non-native forbs. Soils are absent or very shallow because of rock outcroppings and steep slopes. Pockets of deeper soils are present in swales located in areas with less exposed basalt and fewer cliffs. Category 2 ESC habitats provide critical nesting substrate and perching sites for raptors, crevices for bats, and habitat for some passerines. Escarpments provide shade and

thermal cover for deer in summer and serve as good windbreaks. They may also provide home sites for wood rats and marmots.

Approximately 29 acres of Category 2 ESC exist within the Facility site boundary.

P.4.2.2 Grassland

Category 2 Grasslands provide essential nesting/denning and foraging habitat for several special-status species. These Grasslands also show fewer signs of impacts resulting from wildfires and domestic livestock grazing pressure, and have more native plant diversity and more fairly intact soil surface crust than do the Category 3 and 4 habitats. There are two subtypes of Category 2 Grassland within the Facility within the site boundary: Exotic Annual Grassland (subtype GA), and Native Perennial Grassland (subtype GB).

Category 2 Exotic Annual Grasslands (GA) in the site boundary are grasslands that are primarily non-native but extensive in size and support species of interest. The forb component is composed primarily of non-native weeds such as cheatgrass, tumble mustard, bulbous bluegrass, mustard, and cereal rye, with occasional patches of native bunchgrass, primarily Sandberg's bluegrass. The high weed content has been caused primarily by the recent hot fires, which burned native shrubs and bunchgrasses and were followed by heavy grazing and/or wind erosion. Lack of native grasses and the dense weed cover limit the ability of most wildlife species to use these areas for forage or cover. Category 2 GA grasslands are similar to Category 3 Exotic Annual Grassland in that they occur as a large contiguous area on a broad open flat and provide important nesting habitat for long-billed curlews. In addition, Category 2 GA grasslands were conservatively designated as such because of their proximity to areas with documented WGS use and may provide suitable alternate habitat for cyclic expansion over time. Category 2 GA is found on Shutler Flat in the western portion of the site boundary.

Category 2 Native Perennial Grasslands (GB) are composed primarily of perennial bunchgrasses, such as Sandberg's bluegrass (*Poa secunda*). Bluebunch wheatgrass (*Pseudoroegneria spicata*) is also present. Soils appear to be generally medium to deep. Other native species such as Idaho fescue (*Festuca idahoensis*) and western needle-and-thread grass (*Hesperostipa comata*) are occasionally present in the appropriate soil types for the species. Various native forbs and low shrubs such as gray rabbitbrush and, to a lesser extent, green rabbitbrush are present but are an inconspicuous component. Native vascular plants are diverse, and a variety of invertebrates can be found utilizing the plants throughout the growing season. Non-native grasses are present throughout and consist of cheatgrass (*Bromus tectorum*), bulbous bluegrass (*Poa bulbosa*), and annual cereal rye (*Secale cereale*). Snakeweed (*Gutierrezia sarothrae*) is present but not dominant. The non-native grasses and the snakeweed are typical throughout the Columbia Basin, but non-native plants are generally less extensive in Category 2 Grasslands than in Category 3 and 4 Grasslands. Deep soil native bunchgrass sites in good-to-excellent condition are limited and becoming more limited in the general area. Category 2 GB grasslands provide essential foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit, and burrowing owl have been shown to use this

habitat. Western meadowlark and horned lark occur commonly in this habitat. Native grasses and forbs provide forage for mule deer.

There are approximately 572 acres of Category 2 GA and 429 acres of Category 2 GB habitat within the Facility site boundary.

P.4.2.3 Shrub-steppe

Shrub-steppe is classified as Category 2 where it provides essential habitat to target species such as grasshopper sparrows. There are two subtypes of Category 2 Shrub-steppe: Sagebrush (Big Sage) Shrub-steppe (subtype SSA) and Rabbitbrush/Snakeweed (subtype SSB).

The Category 2 Sagebrush (Big Sage) Shrub-steppe (SSA) consists of an overstory of mature stage (large-structure) patches of basin big sagebrush (*Artemesia tridentata* v. *tridentata*) and may have occasional western juniper (*Juniperus occidentalis*) acting as a superstory vegetation component. Understory plants consist of a mix of native bunchgrasses and exotic annual grasses, depending largely on level of impact from disturbance. Common grasses are Sandberg's bluegrass, bluebunch wheatgrass, cheatgrass, and bulbous bluegrass. Category 2 SSA has a higher shrub density and greater plant health than does the similar but lesser-quality Category 3 Sagebrush (big sage) habitat. Category 2 SSA is found on deep soils throughout the site boundary, usually on slopes or in draws that prevent agricultural use. Category 2 SSA offers high-quality breeding habitat for shrub obligate species including loggerhead shrike and may support WGS and white-tailed jackrabbit. Sage sparrow, Brewer's sparrow, and lark sparrow are present in larger blocks of this habitat. Sagebrush lizard and other reptiles are likely to be found in areas where more sandy soils are present. Commonly occurring species include western meadowlark and mourning dove.

The Category 2 Rabbitbrush/Snakeweed Shrub-steppe (SSB) has an overstory dominated by low-growing gray rabbitbrush (*Ericameria nauseosa*) or, to a lesser extent, green rabbitbrush (*Chrysothamnus viscidiflorus*). Snakeweed is fairly extensive throughout and is the dominant mid-height structure. Small patches of big sagebrush are intermittent. Understory plants are primarily native and non-native bunchgrasses including Sandberg's bluegrass; western needle-and-thread grass; buckwheat; and annual, non-native grasses such as cheatgrass and bulbous bluegrass. Annual cereal rye is present in swales and deeper soils where disturbance has removed most of the native vegetation. Weeds are more common than Sagebrush (Big Sage) in parts of Rabbitbrush/Snakeweed habitat as a result of recent fires or land use practices. These weeds include Russian thistle (*Salsola kali*) and tumble mustard (*Sisymbrium altissimum*). Many sites contain small patches (<1 acre) of sagebrush (big sage). Category 2 SSB could also provide foraging, cover, and/or nesting habitat for grasshopper sparrows and white-tailed jackrabbit as well as common horned lark and western meadowlark.

There are approximately 2,318 acres of Category 2 SSA and 885 acres of Category 2 SSB habitat within the Facility site boundary.

P.4.2.4 Woodland

Woodland habitat is classified as Category 2 where it provides essential nesting habitat for special-status raptors such as ferruginous and Swainson's hawks. There are two Category 2 subtypes of woodland habitat within the site boundary: Juniper Woodland (subtype WJ) and Riparian Woodland (subtype WR).

Category 2 Juniper Woodland (WJ) habitats are larger and denser (in canopy cover) than Category 3 Juniper Woodland habitat. Category 2 WJ consists of an open canopy of mature and sometimes immature (ingrowth) western juniper. Understory varies widely in this habitat subtype, usually because of land use practices. The most common understory is sagebrush or bunchgrass. In heavily affected areas, annual grasses and weeds constitute the understory. Recent wildfires have killed some juniper trees in the Eightmile Canyon area. Category 2 WJ habitat provides potential nesting habitat for ferruginous and Swainson's hawks and potential foraging and nesting habitat for loggerhead shrikes. This habitat also provides potential foraging and breeding habitat for short-horned and sagebrush lizards. American robins, Townsend's solitaire, waxwings, and mountain bluebirds use this habitat for wintering and while migrating. Mourning doves commonly nest in Juniper Woodland habitat.

The Category 2 Riparian Woodland (WR) habitat within the site boundary is limited to one narrow, intermittent linear stream course in Eightmile Canyon. Other very small patches are present nearby but were too small to map as separate habitat subtype units. Willows (*Salix* spp.) constitute the primary overstory of this habitat subtype; black cottonwood (*Populus trichocarpa*) is present but less extensive. This woodland habitat provides essential nesting habitat for the target species ferruginous and Swainson's hawk. Category 2 WR habitat also provide important roosting habitat for bats, important thermal cover for mule deer, and nesting and migration habitat for passerines. Tree owls are occasionally found roosting and nesting in this habitat subtype.

There are approximately 245 acres of Category 2 WJ and 2 acres of Category 2 WR within the Facility site boundary.

P.4.3 Category 3 Habitat

Four types of habitats were identified as Category 3 within the site boundary: Developed, Grassland, Shrub-steppe, and Woodland.

P.4.3.1 Developed

Category 3 Developed habitats are areas where former disturbances have ceased and the disturbed areas have attained sufficient ecological condition to become important or essential for wildlife. CRP or Other Planted Grassland (subtype DC) is the only developed Category 3 subtype within the site boundary.

Category 3 CRP or Other Planted Grasslands (DC) are planted grasslands on previously farmed or other disturbed lands that may be enrolled in the federal CRP. This habitat subtype is composed mainly of native or native-like grasses such as bluebunch

wheatgrass, intermediate wheatgrass, crested wheatgrass, big bluegrass, Idaho fescue, and Sandberg's bluegrass. Older plantings may contain a sparse (always subordinate), naturally seeded component of rabbitbrush, snakeweed, or sagebrush. White-tailed jackrabbits and savannah sparrows may be supported by this habitat. Grasshopper sparrows and western meadowlarks are commonly found in this habitat.

There are approximately 1,424 acres of Category 3 DC within the Facility site boundary.

P.4.3.2 Grassland

Category 3 Grasslands provide essential or important foraging and nesting habitat for special-status birds and mammals as well as common native and non-native (gamebirds) avian species. There are two Category 3 grassland habitat subtypes: Native Perennial Grassland (subtype GB), and Exotic Annual Grassland (subtype GA).

Category 3 Exotic Annual Grasslands (GA) share the vegetation composition and ecological condition as the Category 4 GA grasslands described below, except that they occur as a large contiguous area, on a broad open flat and provide important nesting habitat for long-billed curlews. Horned-larks occur commonly in this habitat. While Exotic Annual Grassland habitats occur throughout the site boundary and are generally Category 3, grasslands of this large, flat nature are limited in the area.

Category 3 Native Perennial Grasslands (GB) are dominated by the same perennial grasses found in Category 2 GB; however, these habitats have been altered through land use or wildfires or are more sparsely vegetated. They generally have a higher composition of non-native vegetation (broad-leaf weeds and annual grasses) but are still mostly native vegetation sites. Category 3 GB generally occur on sites with shallower soils and harsher exposures, or in areas that have experienced livestock grazing or frequent fires. Category 3 is the most abundant category of Native Perennial Grassland within the site boundary. Native Perennial Grasslands provide essential foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit, and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat, and native grasses and forbs provide forage for mule deer.

There are approximately 3,136 acres of Category 3 GB habitat and 1,529 acres of Category 3 GA habitat within the site boundary.

P.4.3.3 Shrub-steppe

The primary differences in the Category 2 and 3 shrub-steppe habitats are in overall functionality of the habitat and in breeding season value for special-status wildlife species. In general, Category 3 shrub-steppe tends to be weedier, less biologically diverse, has obvious signs of prior or ongoing impacts, and is a habitat type relatively common in the general area.

Category 3 shrub-steppe habitat was found in abundance throughout the site boundary. When supplemental wildlife survey data are available in spring 2010, some of the

habitat may be changed to Category 2 or Category 4, depending on the documented wildlife species values and assemblage of native wildlife using the areas classified as Category 3 shrub-steppe. The Category 3 shrub-steppe habitat is similar to the respective Category 2 shrub-steppe habitat subtypes, but has been affected more by wildfires, domestic livestock grazing, or other land use practices, resulting in less vascular and nonvascular vegetative diversity. The protective soil surface biotic crust of mosses, lichens, algae, and bacteria (cryptogamic layer) has been affected by land use, resulting in opportunities for non-native weedy plants to become established. The Category 3 shrub-steppe habitat is important to wildlife species but is not as limited as the Category 2 shrub-steppe, considering that much of the steppe habitat in the local region has experienced wildfires.

Two Category 3 shrub-steppe habitat subtypes are present: Sagebrush (Big Sage) Shrub-steppe (subtype SSA), and Rabbitbrush/Snakeweed Shrub-steppe (subtype SSB).

The Category 3 Sagebrush (Big Sage) Shrub-steppe (SSA) consists of big sagebrush at a mature stage (large structure). Patches of Category 3 SSA lack the density and plant health of Category 2 SSA or are in patches of very limited size. The overstory sagebrush in this type is often decadent or lacks full foliage. Understory vegetation in Category 3 SSA often tends toward annual grasses and low weeds. These areas historically were higher-quality habitats but are experiencing degradation caused by land use practices or frequent fires. However, the mature shrub cover still provides escape and resting cover for common wildlife and is limited in the immediate area and the region. Category 3 SSA offers high-quality breeding habitat for shrub obligate species including loggerhead shrike and may support WGS and white-tailed jackrabbit. Sage sparrow, Brewer's sparrow, and lark sparrow are present in larger blocks of this habitat subtype, while sagebrush lizard and other reptiles are likely to be found in areas where more sandy soils are present. Commonly occurring species include western meadowlark and mourning dove.

The Category 3 Rabbitbrush/Snakeweed Shrub-steppe (SSB) is by far the most abundant Shrub-steppe subtype within the site boundary. Category 3 SSB areas have been more affected by recent fires and are in an earlier seral stage than is Category 2 SSB. Native rabbitbrush and other low-stature plants such as snakeweed and buckwheat are common. The understory is native Sandberg's bluegrass and non-native cheatgrass, bulbous bluegrass, and tumble mustard. Patches of native perennial grasses such as bluebunch wheatgrass and western needle-and-thread grass are present but to a lesser extent than in Category 2 SSB. Many of these areas contain small patches of sagebrush that are less than 1 acre in size. Category 3 SSB also provides foraging, cover, and/or nesting habitat for grasshopper sparrows and white-tailed jackrabbit, as well as common horned lark and western meadowlark. This habitat may also support WGS.

Approximately 344 acres of Category 3 SSA and 7,317 acres of Category 3 SSB exist within the Facility site boundary.

P.4.3.4 Woodland

Category 3 Woodland habitats are smaller and less dense than Category 2 Woodland habitats. Trees in some sites appear unhealthy or have been affected by hot fires. One Category 3 Woodland habitat subtype occurs within the site boundary: Juniper Woodland (subtype WJ).

Category 3 Juniper Woodland (WJ) habitat is smaller in size and sparser in canopy cover and has weedier understories than does the Category 2 WJ habitat. Category 3 WJ habitat is limited and provides potential nesting habitat for ferruginous and Swainson's hawks and potential foraging and nesting habitat for loggerhead shrikes. This habitat also provides potential foraging and breeding habitat for short-horned and sagebrush lizards. American robins, Townsend's solitaire, waxwings, and mountain bluebirds utilize this habitat for wintering and while migrating. Mourning doves commonly nest in this habitat as well.

There are approximately 41 acres of Category 3 WJ habitat within the Facility site boundary.

P.4.4 Category 4 Habitat

Category 4 habitat is important wildlife habitat that is not limited and could include areas that have been moderately to highly grazed or show signs of other disturbance and have moderate structure and forage for wildlife. These areas are usually weedy and contain a high percentage of non-native grasses. There are three types of Category 4 habitat within the site boundary: Developed, Grassland, Shrub-steppe.

P.4.4.1 Developed

There is only one subtype of developed Category 4 habitat within the site boundary: Old Field (subtype DB).

Category 4 Old Field (DB) habitat consists of a small area in the northern portion of the site boundary that was cultivated previously and has been left to reseed naturally. The area is currently occupied by a variety of common non-native and native vegetation. Common species are cheatgrass, Russian thistle, tumble mustard, annual cereal rye, and bulbous bluegrass. Native vegetation, when present, is a minor component. Category 4 DB provides foraging habitat for horned larks and western meadowlarks.

There are approximately 8 acres of Category 4 DB habitat within the Facility site boundary.

P.4.4.2 Grassland

There are two subtypes of Category 4 Grassland in the site boundary: Exotic Annual Grassland (subtype GA) and Native Perennial Grassland (subtype GB).

Category 4 Exotic Annual Grasslands (GA) found within the site boundary are non-native grasslands with a very high weed component and disturbed or less nutrient-rich soils. The forb component is composed primarily of non-native weeds such as

cheatgrass, tumble mustard, bulbous bluegrass, mustard, and cereal rye ,with occasional patches of native bunchgrass, primarily Sandberg's bluegrass. The high weed content has been caused primarily by recent hot fires, which burned native shrubs and bunchgrasses and were followed by heavy grazing and/or wind erosion. Some of these sites support long-billed curlew. Horned-larks occur commonly in this habitat. Category 4 GA habitat is found throughout the site boundary and is found commonly throughout the Columbia Basin. Category 4 GA provides important habitat to common species, but the lack of native grasses and the dense weed cover limits the ability of most wildlife species to use this habitat for forage or cover. In addition, the weed cover, often dominated by annuals such as cheatgrass, makes the slopes in this area more susceptible to erosion and soil damage from grazing, because of a lack of the robust root structure found in perennial species such as the native bunchgrasses.

Few small patches of Category 4 Native Perennial Grassland (GB) occur within the site boundary. Category 4 GB is ecologically similar to Category 3 GB but is classified as Category 4 because its small size and isolated nature limit its value to wildlife. Category 4 GB provides important foraging habitat to a variety of common resident and migratory birds as well as common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit, and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat, and the native grasses and forbs provide forage for mule deer.

There are approximately 193 acres of Category 4 GB and 1,046 acres of Category 4 GA within the site boundary.

P.4.4.3 Shrub-steppe

Category 4 Shrub-steppe habitat is important to wildlife. Sagebrush (Big Sage) Shrub-steppe (SSA) and Rabbitbrush/Snakeweed Shrub-steppe (subtype SSB) are the two Category 4 Shrub-steppe subtypes in the site boundary.

Category 4 Sagebrush (Big Sage) Shrub-steppe (SSA) consists of big sagebrush at a mature stage (large structure) that has been affected to varying degrees from recent wildfires. These areas historically were higher-quality habitats, but they are experiencing degradation caused by land use practices or frequent fires. However, the Category 4 SSA provides escape and resting cover for common wildlife and is limited in the immediate area and the region [THIS LANGUAGE TRACKS THE CATEGORY 3 RULE DEFINITION RATHER THAN CATEGORY 4. I'D SUGGEST DELETING] SARA ASKED KAREN

Category 3 and Category 4 Rabbitbrush/Snakeweed Shrub-steppe (SSB) support the same plant species, but differ in composition. Category 4 SSB has a greater weed and annual grass component than does Category 3 SSB. While aspect and soils may contribute somewhat to this circumstance, disturbances to livestock grazing and fires have far greater effects. Category 4 SSB provides foraging and/or nesting habitat for grasshopper sparrows and white-tailed jackrabbits, as well as common horned larks and western meadowlarks. This habitat may also support WGS.

There are approximately 175 acres of Category 4 SSB and 22 acres of Category 4 SSA within the Facility site boundary.

P.4.5 Category 5 Habitat

There is no Category 5 habitat identified within the site boundary. Fire- and grazing-affected native habitats are likely to become more important for wildlife as the vegetation recovers, but land use practices are likely to influence that process (the effects could be negative or positive but are unknown at this stage). More fire or grazing-impacted habitats were conservatively rated as Category 2, 3, or 4 because of their ecological condition/functionality and documented use by wildlife.

P.4.6 Category 6 Habitat

Category 6 habitat is nonessential wildlife habitat with limited potential to become important or essential in the foreseeable future. There is one type of Category 6 habitat with the site boundary: Developed.

P.4.6.1 Developed

There are three subtypes of Developed habitat within the site boundary: Irrigated Agriculture (subtype DI), Dryland Wheat (subtype DW), and Other (subtype DX).

Category 6 Irrigated Agriculture (DI) habitat consists of agricultural crop or pasture fields that are irrigated for all or a portion of the growing season. These fields are in the lower elevations along drainage bottoms such as Eightmile Canyon, not on higher-elevation sites within the site boundary where turbines would be placed

Category 6 Dryland Wheat (DW) habitat is the largest habitat subtype within the site boundary and is extensive throughout the site boundary. This subtype consists of agricultural fields that are currently in small grain production or fallow. Horned larks and mourning doves are common in winter stubble or when fallow.

Category 6 Other (DX) habitat includes farming/ranching home and shop sites, corrals, structures, feedlots, inactive and active gravel quarries, non-irrigated pastures, gravel and paved roads, rights-of-way, and waste areas associated with ongoing human activities.

As a result of the high level of disturbance, no special-status/sensitive species are known or expected to occur with regularity in the Category 6 habitat subtypes. These areas are not considered to have important value to wildlife species and are unlikely to become important or essential wildlife habitat in the foreseeable future.

Approximately 13,178 acres of Category 6 habitat exist within the Facility site boundary.

As described above under other categories, wildlife habitat mapping and categorization will be field-verified and reassessed, if needed, pending supplemental 2010 wildlife survey results.

P.5 HABITAT LOCATIONS

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

Response: See Figures P-7 and P-8.

P.6 IDENTIFICATION OF SENSITIVE SPECIES AND SITE-SPECIFIC ODFW ISSUES

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

P.6.1 Identification of State Sensitive Species

Based on an extensive literature review, a list of state and federal non-listed sensitive species that might be present at the Facility was prepared, as shown in Table P-1 in Section P.3. Information about the literature review and field study methods is also provided in Section P.3.

P.6.2 Agency Consultation

During a site tour of LJIIB with ODFW on May 12, 2009, and a macrositing conference call with multiple agencies and stakeholders (identified below) on May 26, 2009, the Applicant discussed future wind energy facility areas under consideration for permitting and construction within the next 5 years, including the Facility (formerly known as "Leaning Juniper III/IV"). Attendees of the May 12 site tour included Steve Cherry (ODFW), Karen Kronner and Bob Gritski (NWC), and Sara Parsons (Iberdrola Renewables, Inc.). Attendees of the May 26 conference call included John White and Sue Oliver (ODOE); Bob Sallinger (Audubon Society of Portland); Doug Young and Jerry Cordova (USFWS); Rose Owens, Keith Kohl, Steve Cherry, Chris Carey, and Jon Germond (ODFW); Ken Popper (The Nature Conservancy [TNC]); Karen Kronner (NWC); and Sara Parsons and Andy Linehan (Iberdrola Renewables, Inc.). During the call, the Applicant reviewed the Facility areas and answered general questions about the facilities and construction schedules. The group also discussed the proximity of operating wind facilities in Oregon and Washington to the Columbia River and started a broader, ongoing discussion with ODFW on setbacks from the Columbia River, particularly in Sherman County, in response to concerns associated with Canada geese. When the agency and stakeholder representatives were asked for general comments about the Applicant's Facility areas, USFWS said that the overview of facilities planned in the next 5 years was very helpful, and it was reassuring that facilities were proposed in the Columbia Basin Ecoregion (ecoregion) near existing wind facilities rather than near federally listed species. TNC representatives said that, based on its initial review of the Applicant's general Facility areas, TNC was pleased with the plans, particularly the absence of one facility the Applicant had been pursuing in Wallowa County (based on TNC input, the Applicant had decided to terminate plans for that facility). On a broader topic, both USFWS and TNC noted that their main concern was about cumulative impacts of wind facilities in the ecoregion.

On October 15, 2009, NWC hosted a phone conversation with ODFW District Biologist Steve Cherry to discuss in general the Facility and the standard study protocols being implemented, including the details for the raptor nest surveys. NWC subsequently hosted a site tour with Mr. Cherry on November 3, 2009. During the conference call and site tour, the Applicant and NWC sought feedback and comments about the Facility from Mr. Cherry, who, in turn, commented primarily on the survey protocols for the Facility. These comments are summarized in Appendix F of Attachment P-7.

Biologist Jerry Cordova from USFWS was invited to the November 3 site tour, but was unable to attend because of schedule conflicts. To ensure continued communication with USFWS, the Applicant hosted a Facility briefing conference call with Mr. Cordova on November 23, 2009. Project description, permitting timeline, and study protocols were discussed. In response to a request for comments, Mr. Cordova indicated that USFWS would be sending ODOE a Facility-specific comment letter on the Notice of Intent and that he may be interested in a site tour sometime in the future.

A site tour was offered by NWC to Leslie Nelson of TNC, a non-governmental, non-profit organization. Ms. Nelson indicated that she would not be available until January 2010, but may be interested in a tour at that time. The Applicant and NWC hosted a Facility briefing conference call with Ms. Nelson and Ken Popper of TNC on December 3, 2009. During the call, the Facility description, permitting timeline, study protocols, and other Facility details were discussed. The Applicant is in the process of scheduling a site visit with TNC.

P.7 BASELINE SURVEY OF HABITAT USE BY SENSITIVE SPECIES

(E) A baseline survey of the use of the habitat in the analysis area by species identified in (D) performed according to a protocol approved by the Department and ODFW.

The results of the field investigations are provided in the following sections.

P.7.1 Plants

The ORNHIC database had three records of non-listed, special-status plants within 5 miles of the Facility site boundary: gray cryptantha, Columbia bladderpod, Waston's desert-parsley, and woven spore lichen (see Attachment P-6). Columbia bladderpod was identified in the vicinity, but outside the Facility site boundary, during surveys for LJIIB (NWC, 2009a). In addition, two rare plant species, stalked-pod milk-vetch and Columbia milk-vetch, were identified within the Facility site boundary during surveys for LJIIB (NWC, 2009a). Additional information about the presence of state and federal special-status plants will be available after the supplemental 2010 botanical survey is completed, and the Applicant will provide this information to ODOE during the Application for Site Certificate (ASC) completeness period.

P.7.2 Wildlife

P.7.2.1 Avian Use Study

NWC conducted a full year of avian use surveys at five plots from September 4, 2008, through August 7, 2009 (NWC, 2009b; see Figure P-4 and Attachment P-7, Figure 3). Surveys in fall and winter seasons were previously reported as study plots in the "surrounding area within 5 miles" for the LJIIB amended site boundary wildlife baseline study (LJWP, 2009; NWC, 2009a).

NWC also initiated avian surveys at six additional plots, located within areas of the Facility site boundary that had not been covered by the 2008-2009 surveys, as shown in Figure P-4.

The overall objective of the studies was to collect baseline avian use information on the spatial and temporal use by birds at the Facility. Results from avian use surveys at adjacent and nearby sites were compared to results of the Facility avian use surveys, with the most emphasis on the seven study plots within the portion of the LJII site boundary for LJIIB because several of the LJIIB study plots actually intersect with the site boundary (Figure P-4) and results for the LJIIB avian use survey are assumed to be representative of the Facility because of the proximity and similar habitats of the two areas.

The assessment of avian impacts included comparisons with other wind facility sites where wildlife data were collected between 2004 and 2009 (LJI, LJII, and Pebble Springs wind facilities), as well as assessment of avian fatality monitoring data collected from several operational wind facilities in the immediate area and in the ecoregion (see Attachments P-7 and P-8). Following is a comparison of the results from each of the studies.

Table P-4 lists all species observed during a full year of avian baseline surveys within five plots. Details for the study that are not provided below are in Attachment P-7.

TABLE P-4
Species Observed Within 800 Meters at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons, September 4, 2008–August 7, 2009

	Fall		Winter		Spring		Summer	
Species/Groups	**# Grps**	**# Ind**	**# Grps**	**# Ind**	**# Grps**	**# Ind**	**# Grps**	**# Ind**
Waterfowl		0		5		0		0
Canada goose	0	0	1	5	0	0	0	0
Raptors		**6**		**4**		**11**		**25**
Harriers		2		0		5		3
Northern harrier	2	2	0	0	5	5	3	3
Buteos		2		3		6		18
Red-tailed hawk	1	1	0	0	1	1	3	3
Rough-legged hawk	0	0	1	1	0	0	0	0
Ferruginous hawk	0	0	1	1	0	0	2	2

TABLE P-4
Species Observed Within 800 Meters at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons, September 4, 2008–August 7, 2009

	Fall		Winter		Spring		Summer	
Species/Groups	**# Grps**	**# Ind**	**# Grps**	**# Ind**	**# Grps**	**# Ind**	**# Grps**	**# Ind**
Swainson's hawk	0	0	1	1	5	5	12	12
Unidentified buteo	1	1	0	0	0	0	1	1
Falcons		1		1		0		4
American kestrel	0	0	0	0	0	0	2	2
Prairie falcon	0	0	1	1	0	0	2	2
Unidentified falcon	1	1	0	0	0	0	0	0
Vultures		1		0		0		0
Turkey vulture	1	1	0	0	0	0	0	0
Shorebirds		**0**		**0**		**39**		**35**
Long-billed curlew	0	0	0	0	33	39	21	35
Game birds		**1**		**0**		**0**		**0**
California quail	1	1	0	0	0	0	0	0
Doves		**0**		**0**		**0**		**1**
Mourning dove	0	0	0	0	0	0	1	1
Passerines		**346**		**441**		**352**		**289**
Songbirds		286		315		313		267
American robin	0	0	2	6	0	0	0	0
Barn swallow	0	0	0	0	1	2	0	0
Brewer's blackbird	0	0	0	0	0	0	1	1
Dark-eyed junco	1	6	0	0	0	0	0	0
European starling	1	15	0	0	0	0	0	0
Grasshopper sparrow	0	0	0	0	0	0	2	2
House finch	2	2	3	3	1	1	1	2
Horned lark	110	156	207	244	147	178	120	168
Lark sparrow	0	0	0	0	1	1	2	3
Loggerhead shrike	0	0	0	0	1	1	0	0
Mountain bluebird	1	3	0	0	0	0	0	0
Red-winged blackbird	0	0	0	0	1	2	0	0
Savannah sparrow	0	0	0	0	2	2	2	2
Unidentified blackbird	2	26	0	0	0	0	0	0
Unidentified finch	0	0	1	4	0	0	0	0
Unidentified passerine	10	39	9	30	5	6	0	0
Unidentified sparrow	5	17	0	0	0	0	3	4
Vesper sparrow	0	0	0	0	4	4	4	4
Western kingbird	0	0	0	0	1	3	1	1
Western meadowlark	22	22	28	28	98	113	73	80
Corvids		60		126		39		22
American crow	0	0	0	0	1	1	0	0

TABLE P-4
Species Observed Within 800 Meters at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons, September 4, 2008–August 7, 2009

	Fall		Winter		Spring		Summer	
Species/Groups	**# Grps**	**# Ind**	**# Grps**	**# Ind**	**# Grps**	**# Ind**	**# Grps**	**# Ind**
Black-billed magpie	1	1	4	5	2	2	1	1
Common raven	29	59	48	121	22	36	15	21
Total	**191**	**353**	**307**	**450**	**331**	**402**	**272**	**350**

Ind = Number of individuals.
Grps = Number of groups.
Source: NWC, 2009b (Attachment P-7).

No federally or state-listed or candidate species were observed during the avian use surveys conducted from 2008–2009 study or during the fall 2009 study. Table P-5 summarizes non-listed, special-status species observed during the 2008-2009 and fall 2009 avian use studies. One special-status species, golden eagle (protected under the federal Bald and Golden Eagle Protection Act [BGEPA]) was observed while in-transit to 2008-2009 study plots. See Attachment P-7 for additional information about species observed in-transit to study plots.

One state sensitive-critical species, ferruginous hawk, was observed during winter and summer seasons at plots C, J, and K. Swainson's hawk (state sensitive-vulnerable) was the most abundant species of raptor detected during 2008–2009 surveys, with the highest use in summer season. Swainson's hawk was detected at all five 2008–2009 plots. Swainson's hawk was the only special-status species observed during fall 2009 surveys, and one individual was detected at plot FF. There were 11 additional detections of this species in transit to study plots during spring and summer seasons (Table P-6). Long-billed curlew was the fourth most abundant species observed overall in 2008–2009, with all detections during spring and summer seasons. This species was observed at all five study plots in 2008–2009.

Two special-status passerine species were detected in small numbers during 2008–2009 surveys: state sensitive-vulnerable loggerhead shrike and grasshopper sparrow. One loggerhead shrike was detected during spring season at plot K.

TABLE P-5
Special-status Avian Species Observed During Avian Use Surveys (including incidental observations and in-transit) at Montague Wind Power Facility (5 plots in 2008–2009 and 6 plots in fall season 2009), the Amended Site Boundary for Leaning Juniper IIB (7 plots); at Leaning Juniper IIA (6 plots) in All Four Seasons in 2004–2005; and at Pebble Springs in Spring Season 2006 (5 plots)

Species	Status	Montague	LJIIB	LJIIA	Pebble Springs
Burrowing owl	SC, BoCC			X	
Ferruginous hawk	SC, BoCC	X	X	X	
Golden eagle	EPA, BoCC	X		X	X
Grasshopper sparrow	SV	X	X	X	X

TABLE P-5
Special-status Avian Species Observed During Avian Use Surveys (including incidental observations and in-transit) at Montague Wind Power Facility (5 plots in 2008–2009 and 6 plots in fall season 2009), the Amended Site Boundary for Leaning Juniper IIB (7 plots); at Leaning Juniper IIA (6 plots) in All Four Seasons in 2004–2005; and at Pebble Springs in Spring Season 2006 (5 plots)

Species	Status	Montague	LJIIB	LJIIA	Pebble Springs
Loggerhead shrike	SV, BoCC	X	X	X	
Long-billed curlew	SV, BoCC	X	X	X	X
Swainson's hawk	SV, BoCC	X	X	X	X

Note: This table does not include sightings of special-status wildlife observed during ground transect surveys. For more details on all sightings of special-status wildlife, see Appendix C.

Status Key:

Oregon (ORNHIC, 2009):

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

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

Federal:

BoCC = USFWS Birds of Conservation Concern (USFWS, 2002; Table BCR 9, Great Basin Region).

EPA = Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668d), June 8, 1940, as amended 1959, 1962, 1972, 1978.

Source: NWC, 2009b (Attachment P-7)

There were three additional detections of loggerhead shrike in-transit to surveys, one during winter and two during spring (Table P-6). There were two detections of grasshopper sparrow during summer at plots B and C.

One species, golden eagle (does not have state status but is protected under the BGEPA) was observed while in transit to study plots (between plot J and K) during winter season (Table P-7). During fall 2009 surveys a golden eagle was also observed while in transit to plot BB, and one was detected during a point count survey of plot GG, but outside the plot radius (Tables P-7 and P-8).

Overall Use

Thirty-one avian species totaling 1,555 individuals in 1,101 flocks were observed during the four-season surveys of five plots (2008-2009 study). Fifteen species totaling 560 individuals in 120 flocks were observed during the surveys of six plots (2009 study). Overall mean use (number of birds per 20-minute survey) by season at the 2008–2009 plots ranged from 5.769 in winter season to 7.844 in fall season. Overall use was similar for fall, spring at 7.309, and summer season at 7.000 (Table P-6). During the fall 2009 surveys, mean use was higher overall, at 12.727, primarily because of higher use by passerines (Table P-7).

Passerines. Passerine use, including both songbirds and corvids, dominated during all seasons at the five 2008–2009 study plots; passerine use did not vary significantly among seasons. The lowest mean use was in winter and the highest mean use in fall. In all seasons, horned lark had the highest use of all passerines that were identifiable to species, with similar use in each of the four seasons.

Passerine use was higher at the six fall season 2009 plots than at the 2008-2009 plots. During the fall 2009 study, unidentified passerine had the highest use (because of large flocks of flying small birds) with horned lark representing the highest mean use of all passerines that were identifiable to species.[4] (See Attachment P-7 for additional details of passerine use.)

Shorebirds. Shorebird use, which was represented only by long-billed curlew, was the second highest group of birds observed during spring and summer seasons during the 2008–2009 study (Table P-6). No shorebirds were observed during fall and winter seasons 2008–2009.

No shorebirds were observed during the fall 2009 study; however, one wading bird was observed, great blue heron (Table P-7). (See Attachment P-7 for additional details of shorebird use.)

Raptors. Raptor use was higher in summer season than in any other season during the 2008-2009 study (Table P-6). Raptors overall had the second highest frequency of occurrence as a group in summer but were seen with less frequency in spring, fall, and winter seasons. The Swainson's hawk was the most abundant species of raptor during the 2008-2009 study, followed by northern harrier and red-tailed hawk, ferruginous hawk, American kestrel, and prairie falcon. Swainson's hawk and northern harrier also represented the highest use in spring season (Table P-6). Other raptors observed in 2008–2009 include rough-legged hawk and turkey vulture. Two additional species observed in transit to 2008–2009 avian use surveys were golden eagle and great-horned owl (Table P-6).

During the fall 2009 surveys, red-tailed hawk was the most abundant species, followed by rough-legged hawk, northern harrier, American kestrel, and Swainson's hawk (Table P-7). Golden eagle was observed in transit and also during one point count survey, but outside the 800-meter plot radius during the fall 2009 study.

All other avian groups. The remaining groups showed relatively low use overall (Tables P-6 and P-7). Waterfowl (i.e., Canada goose) was detected only during winter season. Game birds (i.e., California quail) were detected only during fall season 2008. Doves (i.e., mourning dove) were detected only during summer season.

[4] "Unidentified passerine" is a group of unidentified birds and probably does not represent any one species.

TABLE P-6
Mean Use, Percent Composition, and Percent Frequency of Occurrence for Avian Groups Observed at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Season[a]			
Species	**Fall**	**Winter**	**Spring**	**Summer**
Mean Use[b]				
Waterfowl	**0.000**	**0.064**	**0.000**	**0.000**
Canada goose	0.000	0.064	0.000	0.000
Raptors	**0.133**	**0.051**	**0.200**	**0.500**
Harriers	*0.044*	*0.000*	*0.091*	*0.060*
Northern harrier	0.044	0.000	0.091	0.060
Buteos	*0.044*	*0.038*	*0.109*	*0.360*
Red-tailed hawk	0.022	0.000	0.018	0.060
Rough-legged hawk	0.000	0.013	0.000	0.000
Ferruginous hawk	0.000	0.013	0.000	0.040
Swainson's hawk	0.000	0.013	0.091	0.240
Unidentified buteo	0.022	0.000	0.000	0.020
Falcons	*0.022*	*0.013*	*0.000*	*0.080*
American kestrel	0.000	0.000	0.000	0.040
Prairie falcon	0.000	0.013	0.000	0.040
Unidentified falcon	0.022	0.000	0.000	0.000
Vultures	*0.022*	*0.000*	*0.000*	*0.000*
Turkey vulture	0.022	0.000	0.000	0.000
Shorebirds	**0.000**	**0.000**	**0.709**	**0.700**
Long-billed curlew	0.000	0.000	0.709	0.700
Game birds	**0.022**	**0.000**	**0.000**	**0.000**
California quail	0.022	0.000	0.000	0.000
Doves	**0.000**	**0.000**	**0.000**	**0.020**
Mourning dove	0.000	0.000	0.000	0.020
Passerines	**7.689**	**5.654**	**6.400**	**5.780**
Songbirds	*6.356*	*4.038*	*5.691*	*5.340*
American robin	0.000	0.077	0.000	0.000
Barn swallow	0.000	0.000	0.036	0.000
Brewer's blackbird	0.000	0.000	0.000	0.020
Dark-eyed junco	0.133	0.000	0.000	0.000
European starling	0.333	0.000	0.000	0.000
Grasshopper sparrow	0.000	0.000	0.000	0.040
House finch	0.044	0.038	0.018	0.040
Horned lark	3.467	3.128	3.236	3.360
Lark sparrow	0.000	0.000	0.018	0.060
Loggerhead shrike	0.000	0.000	0.018	0.000
Mountain bluebird	0.067	0.000	0.000	0.000

TABLE P-6
Mean Use, Percent Composition, and Percent Frequency of Occurrence for Avian Groups Observed at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Season[a]			
Species	**Fall**	**Winter**	**Spring**	**Summer**
Red-winged blackbird	0.000	0.000	0.036	0.000
Savannah sparrow	0.000	0.000	0.036	0.040
Unidentified blackbird	0.578	0.000	0.000	0.000
Unidentified finch	0.000	0.051	0.000	0.000
Unidentified passerine	0.867	0.385	0.109	0.000
Unidentified sparrow	0.378	0.000	0.000	0.080
Vesper sparrow	0.000	0.000	0.073	0.080
Western kingbird	0.000	0.000	0.055	0.020
Western meadowlark	0.489	0.359	2.055	1.600
Corvids	*1.333*	*1.615*	*0.709*	*0.440*
American crow	0.000	0.000	0.018	0.000
Black-billed magpie	0.022	0.064	0.036	0.020
Common raven	1.311	1.551	0.655	0.420
Total	**7.844**	**5.769**	**7.309**	**7.000**
Percent Composition[c]				
Waterfowl	**0.00**	**1.11**	**0.00**	**0.00**
Canada goose	0.00	1.11	0.00	0.00
Raptors	**0.17**	**0.89**	**2.74**	**7.14**
Harriers	*0.57*	*0.00*	*1.24*	*0.86*
Northern harrier	0.57	0.00	1.24	0.86
Buteos	*0.57*	*0.67*	*1.49*	*5.14*
Red-tailed hawk	0.28	0.00	0.25	0.86
Rough-legged hawk	0.00	0.22	0.00	0.00
Ferruginous hawk	0.00	0.22	0.00	0.57
Swainson's hawk	0.00	0.22	1.24	3.43
Unidentified buteo	0.28	0.00	0.00	0.29
Falcons	*0.28*	*0.22*	*0.00*	*1.14*
American kestrel	0.00	0.00	0.00	0.57
Prairie falcon	0.00	0.22	0.00	0.57
Unidentified falcon	0.28	0.00	0.00	0.00
Vultures	*0.28*	*0.00*	*0.00*	*0.00*
Turkey vulture	0.28	0.00	0.00	0.00
Shorebirds	**0.00**	**0.00**	**9.70**	**10.00**
Long-billed curlew	0.00	0.00	9.70	10.00
Game birds	**0.28**	**0.00**	**0.00**	**0.00**
California quail	0.28	0.00	0.00	0.00

TABLE P-6
Mean Use, Percent Composition, and Percent Frequency of Occurrence for Avian Groups Observed at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Season[a]			
Species	**Fall**	**Winter**	**Spring**	**Summer**
Doves	**0.00**	**0.00**	**0.00**	**0.29**
Mourning dove	0.00	0.00	0.00	0.29
Passerines	**98.02**	**98.00**	**87.56**	**82.57**
Songbirds	*81.02*	*70.00*	*77.86*	*76.29*
American robin	0.00	1.33	0.00	0.00
Barn swallow	0.00	0.00	0.50	0.00
Brewer's blackbird	0.00	0.00	0.00	0.29
Dark-eyed junco	1.70	0.00	0.00	0.00
European starling	4.25	0.00	0.00	0.00
Grasshopper sparrow	0.00	0.00	0.00	0.57
House finch	0.57	0.67	0.25	0.57
Horned lark	44.19	54.22	44.28	48.00
Lark sparrow	0.00	0.00	0.25	0.86
Loggerhead shrike	0.00	0.00	0.25	0.00
Mountain bluebird	0.85	0.00	0.00	0.00
Red-winged blackbird	0.00	0.00	0.50	0.00
Savannah sparrow	0.00	0.00	0.50	0.57
Unidentified blackbird	7.37	0.00	0.00	0.00
Unidentified finch	0.00	0.89	0.00	0.00
Unidentified passerine	11.05	6.67	1.49	0.00
Unidentified sparrow	4.82	0.00	0.00	1.14
Vesper sparrow	0.00	0.00	1.00	1.14
Western kingbird	0.00	0.00	0.75	0.29
Western meadowlark	6.23	6.22	28.11	22.86
Corvids	*17.00*	*28.00*	*9.70*	*6.29*
American crow	0.00	0.00	0.25	0.00
Black-billed magpie	0.28	1.11	0.50	0.29
Common raven	16.71	26.89	8.96	6.00
Percent Frequency of Occurrence[d]				
Waterfowl	**0.00**	**1.28**	**0.00**	**0.00**
Canada goose	0.00	1.28	0.00	0.00
Raptors	**13.33**	**5.13**	**18.18**	**42.00**
Harriers	*4.44*	*0.00*	*9.09*	*6.00*
Northern harrier	4.44	0.00	9.09	6.00
Buteos	*4.44*	*3.85*	*10.91*	*28.00*
Red-tailed hawk	2.22	0.00	1.82	6.00
Rough-legged hawk	0.00	1.28	0.00	0.00
Ferruginous hawk	0.00	1.28	0.00	4.00

TABLE P-6
Mean Use, Percent Composition, and Percent Frequency of Occurrence for Avian Groups Observed at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Season[a]			
Species	**Fall**	**Winter**	**Spring**	**Summer**
Swainson's hawk	0.00	1.28	9.09	20.00
Unidentified buteo	2.22	0.00	0.00	2.00
Falcons	*2.22*	*1.28*	*0.00*	*8.00*
American kestrel	0.00	0.00	0.00	4.00
Prairie falcon	0.00	1.28	0.00	4.00
Unidentified falcon	2.22	0.00	0.00	0.00
Vultures	*2.22*	*0.00*	*0.00*	*0.00*
Turkey vulture	2.22	0.00	0.00	0.00
Shorebirds	**0.00**	**0.00**	**45.45**	**30.00**
Long-billed curlew	0.00	0.00	45.45	30.00
Game birds	**2.22**	**0.00**	**0.00**	**0.00**
California quail	2.22	0.00	0.00	0.00
Doves	**0.00**	**0.00**	**0.00**	**2.00**
Mourning dove	0.00	0.00	0.00	2.00
Passerines	**97.78**	**89.74**	**92.73**	**100.00**
Songbirds	*95.56*	*87.18*	*92.73*	*100.00*
American robin	0.00	2.56	0.00	0.00
Barn swallow	0.00	0.00	1.82	0.00
Brewer's blackbird	0.00	0.00	0.00	2.00
Dark-eyed junco	2.22	0.00	0.00	0.00
European starling	2.22	0.00	0.00	0.00
Grasshopper sparrow	0.00	0.00	0.00	4.00
House finch	4.44	3.85	1.82	2.00
Horned lark	95.56	83.33	87.27	92.00
Lark sparrow	0.00	0.00	1.82	2.00
Loggerhead shrike	0.00	0.00	1.82	0.00
Mountain bluebird	2.22	0.00	0.00	0.00
Red-winged blackbird	0.00	0.00	1.82	0.00
Savannah sparrow	0.00	0.00	3.64	4.00
Unidentified blackbird	4.44	0.00	0.00	0.00
Unidentified finch	0.00	1.28	0.00	0.00
Unidentified passerine	20.00	11.54	9.09	0.00
Unidentified sparrow	11.11	0.00	0.00	6.00
Vesper sparrow	0.00	0.00	5.45	6.00
Western kingbird	0.00	0.00	1.82	2.00
Western meadowlark	26.67	17.95	72.73	70.00

TABLE P-6
Mean Use, Percent Composition, and Percent Frequency of Occurrence for Avian Groups Observed at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Season[a]			
Species	**Fall**	**Winter**	**Spring**	**Summer**
Corvids	*37.78*	*42.31*	*38.18*	*32.00*
American crow	0.00	0.00	1.82	0.00
Black-billed magpie	2.22	5.13	3.64	2.00
Common raven	35.56	39.74	34.55	30.00
Total	**97.78**	**92.31**	**94.55**	**100.00**

[a] Seasons and number of surveys:

Fall: September 4–October 31, 2008; 9 visits to 5 sites (A, B, C, J, and K) = 45 surveys.
Winter: November 3, 2008–March 11, 2009; 16 visits to A & B, C, and 15 to J, K = 78 surveys.
Spring: March 17–May 25, 2009; 11 visits to 5 sites (A, B, C, J, and K) = 55 surveys.
Summer: May 31–August 7, 2009; 10 visits to 5 sites (A, B, C, J, and K) = 50 surveys.

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

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

[d] Frequency of occurrence: percentage of surveys in which a species was observed, with the survey plot providing an index of how often a species occurs in the Facility area.

Source: NWC, 2009b (Attachment P-7).

TABLE P-7
Species Observed, Mean Bird Use, Percent Composition, and Percent Frequency of Occurrence for Avian Species and Groups Observed Within 800 Meters During Fall Season 2009 Montague Wind Power Facility (6 Plots) Avian Use Surveys

Species/Group	Number of Groups	Number of Individuals	Mean Use[a]	Percent Composition[b]	Frequency of Occurrence (percent)[c]
Raptors		**12**	**0.273**	**2.14**	**25.00**
Harriers		*3*	*0.068*	*0.54*	*6.82*
Northern harrier	3	3	0.068	0.54	6.82
Buteos		*8*	*0.182*	*1.ost43*	*15.91*
Red-tailed hawk	4	4	0.091	0.71	6.82
Rough-legged hawk	3	3	0.068	0.54	6.82
Swainson's hawk	1	1	0.023	0.18	2.27
Falcons		*1*	*0.023*	*0.18*	*2.27*
American kestrel	1	1	0.023	0.18	2.27
Wading birds		**1**	**0.023**	**0.18**	**2.27**
Great blue heron	1	1	0.023	0.18	2.27
Passerines		**547**	**12.432**	**97.68**	**95.45**
Songbirds		*511*	*11.614*	*91.25*	*90.91*
American pipit	4	23	0.523	4.11	9.09
European starling	3	24	0.545	4.29	6.82

TABLE P-7
Species Observed, Mean Bird Use, Percent Composition, and Percent Frequency of Occurrence for Avian Species and Groups Observed Within 800 Meters During Fall Season 2009 Montague Wind Power Facility (6 Plots) Avian Use Surveys

Species/Group	Number of Groups	Number of Individuals	Mean Use[a]	Percent Composition[b]	Frequency of Occurrence (percent)[c]
Horned lark	49	191	4.341	34.11	79.55
Mountain bluebird	1	3	0.068	0.54	2.27
Townsend's solitaire	1	1	0.023	0.18	2.27
Unidentified passerine	18	255	5.795	45.54	36.36
Western meadowlark	4	10	0.227	1.79	9.09
White-crowned sparrow	1	3	0.068	0.54	2.27
Yellow-rumped warbler	1	1	0.023	0.18	2.27
Corvids		*36*	*0.818*	*6.43*	*52.27*
Common raven	25	36	0.818	6.43	52.27
Total	**120**	**560**	**12.727**	**-**	**95.45**

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

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

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

Fall season: September 10, 2009–October 30, 2009; 8 visits to AA, BB, EE, FF; 6 visits to GG, HH = 44 surveys.

Source: NWC, 2009b (Attachment P-7).

Spatial Use

During the 2008–2009 study, overall avian mean use ranged from lowest at plot J in winter season to highest at plot C in fall season; the high was attributable primarily to large numbers of horned larks (Table P-7. No single plot showed consistently higher use than others in all seasons, although plots B and C (NWC, 2009b; see Attachment P-7, Figure 3) both had relatively high use in several seasons. At the fall 2009 study plots, overall avian mean use ranged from lowest at plot AA and highest at plot GG (Table P-9).

Passerines. During the 2008-2009 study, no plot had consistently higher use by passerines (songbirds or corvids) in all seasons (Table P-8). At 2008-2009 study plot J, overall songbird abundance was lowest during spring season and highest in fall season (NWC, 2009b; see Attachment P-7, Figure 3). Higher use of 2009 study plot GG was attributable primarily to higher passerine use (Table P-9), particularly by unidentified passerines and European starlings. (See Attachment P-7 for additional details about passerine spatial use.)

TABLE P-8
Species Observed and Mean Use Within 800 Meters by Plot at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Study Plot									
	A		B		C		J		K	
Species/Season	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Waterfowl	**0**	**0.000**	**5**	**0.109**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	5	0.313	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Raptors	**7**	**0.152**	**9**	**0.196**	**12**	**0.261**	**7**	**0.156**	**11**	**0.244**
Fall	1	0.111	2	0.222	1	0.111	0	0.000	2	0.222
Winter	1	0.063	0	0.000	1	0.063	1	0.067	1	0.067
Spring	3	0.273	2	0.182	2	0.182	2	0.182	2	0.182
Summer	2	0.200	5	0.500	8	0.800	4	0.400	6	0.600
Shorebirds	**9**	**0.196**	**23**	**0.500**	**22**	**0.478**	**16**	**0.356**	**4**	**0.089**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	7	0.636	11	1.000	14	1.273	4	0.364	3	0.273
Summer	2	0.200	12	1.200	8	0.800	12	1.200	1	0.100
Gamebirds	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**
Fall	1	0.111	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Passerines	**271**	**5.891**	**318**	**6.913**	**302**	**6.565**	**264**	**5.867**	**273**	**6.067**
Songbirds	*233*	*5.065*	*230*	*5.000*	*242*	*5.261*	*239*	*5.311*	*237*	*5.267*
Fall	48	5.333	50	5.556	67	7.444	69	7.667	52	5.778
Winter	62	3.875	73	4.563	70	4.375	46	3.067	64	4.267
Spring	73	6.636	64	5.818	43	3.909	70	6.364	63	5.727
Summer	50	5.000	43	4.300	62	6.200	54	5.400	58	5.800
Corvids	*38*	*0.826*	*88*	*1.913*	*60*	*1.304*	*25*	*0.556*	*36*	*0.800*
Fall	19	2.111	23	2.556	16	1.778	0	0.000	2	0.222
Winter	14	0.857	51	3.188	33	2.063	16	1.067	12	0.800
Spring	2	0.182	8	0.727	9	0.818	3	0.273	17	1.545
Summer	3	0.300	6	0.600	2	0.200	6	0.600	5	0.500
Doves/Pigeons	**0**	**0.000**	**0**	**0.000**	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000

TABLE P-8
Species Observed and Mean Use Within 800 Meters by Plot at Five 2008–2009 Montague Wind Power Facility Avian Use Study Plots in Four Seasons

	Study Plot									
	A		B		C		J		K	
Species/Season	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	1	0.100	0	0.000	0	0.000
Total Fall All Groups	69	7.667	75	8.333	84	9.333	69	7.667	54	6.000
Total Winter All Groups	77	4.813	129	8.063	104	6.500	63	4.200	77	5.133
Total Spring All Groups	85	7.727	85	7.727	68	6.182	79	7.182	85	7.727
Total Summer All Groups	57	5.700	66	6.600	81	8.100	76	7.600	70	7.000
Overall All Groups (All Seasons)	288	6.261	355	7.717	337	7.326	287	6.378	288	6.400

Ind = Number of individual birds.

Seasons

Fall: September 4, 2008, through October 31, 2008; 9 visits to 5 sites = 45 surveys.

Winter: November. 3, 2008, through March 11, 2009; 16 visits to A, B, C, 15 visits to J, K = 78 surveys.

Spring: March 17, 2009, through May 25, 2009; 11 visits to 5 sites = 55 surveys.

Summer: May 31, 2009, through August 7, 2009; 10 visits to 5 sites = 50 surveys.

Overall (all seasons) visits to Plots: A – 46 surveys; B – 46 surveys; C – 46 surveys; J – 45 surveys; K – 45 surveys.

Source: NWC, 2009b (Attachment P-7).

Raptors. All 2008–2009 study plots had some raptor use in at least two seasons surveyed (Table P-8). Overall raptor use was relatively low at each plot. All plots in the 2009 study except study plot EE had some use by raptors, and the highest use for this group was found at plots AA and GG (Table P-9). (See Attachment P-7 for additional details about spatial use by raptors.)

All other avian groups. Waterfowl were detected only at 2008-2009 study plot B (NWC, 2009b; see Attachment P-7, Figure 3). Shorebirds were detected at all 2008-2009 study plots, with the highest use at plots B, C, and J (Table P-8). Game birds were detected only at 2008-2009 study plot A. Doves were detected only at 2008-2009 study plot C. (See Attachment P-7 for additional details about spatial use by other avian groups.)

TABLE P-9
Species Observed and Mean Use within 800 Meters by Plot during Fall Season 2009 Montague Wind Power Facility Avian Use Surveys (6 plots)

	Study Plot											
	AA		BB		EE		FF		GG		HH	
Species	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Raptors	**4**	**0.500**	**1**	**0.125**	**0**	**0.000**	**2**	**0.250**	**3**	**0.500**	**2**	**0.333**
Wading birds	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**1**	**0.167**	**0**	**0.000**
Passerines	**72**	**9.000**	**86**	**10.750**	**112**	**14.000**	**75**	**9.375**	**134**	**22.333**	**68**	**11.333**
Songbirds	*62*	*7.750*	*84*	*10.500*	*108*	*13.500*	*68*	*8.500*	*127*	*21.167*	*62*	*10.333*
Corvids	*10*	*1.250*	*2*	*0.250*	*4*	*0.500*	*7*	*0.875*	*7*	*1.167*	*6*	*1.000*
Total	**76**	**9.500**	**87**	**10.875**	**112**	**14.000**	**77**	**9.625**	**138**	**23.000**	**70**	**11.667**

Ind = Number of individual birds.
Fall Season: September 10, 2009–October 30, 2009.
8 visits to AA, BB, EE, FF; 6 visits to GG, HH.
Source: NWC, 2009b (Attachment P-7).

Comparison to Other Adjacent and Nearby Sites

Leaning Juniper IIB. At LJIIB, a total of 34 species were identified during 2008–2009 point count surveys of seven avian plots in four seasons (see Attachment P-7, Table 11). Species composition at LJIIB is relatively similar to the composition of 31 species identified during the 2008–2009 study and the composition of 15 species identified during the fall 2009 study. However, no waterfowl were observed during LJIIB surveys ,whereas waterfowl were observed at the Facility, and small numbers of other (non-status) species observed at the Facility plots were not observed at LJIIB (i.e., great-blue heron, Townsend's solitaire, yellow-rumped warbler, etc.). At the Facility plots, no goatsuckers or woodpeckers were observed during any season; however, these groups all had relatively low use at LJIIB overall.

In the LJIIB and Facility avian use surveys, there was a slight variation in species composition and use, but the same overall trends apply to both datasets. Seasonal use overall (dominated by passerines) at LJIIB was highest during fall season, similar to results of the Facility avian use surveys. The overall range of mean use for all species groups for all four seasons of the 2008-2009 study was very similar for the facilities (see Attachment P-7, Table 12; Table P-6). However, all bird use during the fall 2009 Facility study was slightly higher (Table P-7) than at LJIIB. Substantial differences in spatial use were not found for any of the LJIIB plots.

Raptor use was similar in the LJIIB and Facility surveys. The highest use was in summer at both facilities (see Attachment P-7, Tables 5, 6, and 12). Raptor species observed were almost identical for the two facilities (Table P-5; see Attachment P-7, Table 11). Use of Swainson's hawk at LJIIB was also highest in summer, but lower than at the Facility plots in summer.

Shorebird use was lower at LJIIB plots than at the Facility plots, but species composition and seasonal use was the same for both facilities. Doves showed higher use at LJIIB than at the Facility (see Attachment P-7, Table 12).

See Attachment P-7 for more information about avian use at the Facility relative to LJIIB.

Leaning Juniper IIA. Overall avian mean use was lower at the Facility and LJIIB 2008–2009 plots than during 2004–2005 LFJIIA study that covered both the LJI facility owned by PacifiCorp and LJIIA (avian use plots are shown in Figure 3 of Attachment P-7). Overall avian use for fall, winter, and spring seasons within the LJIIA study area was notably higher than at the Facility and LJIIB (Kronner et al., 2005; Tables P-6 and P-13). The highest use at LJIIA was found during winter season, followed by fall season (Kronner et al., 2005). The higher avian use in winter and fall at LJIIA is attributed to the presence of large groups of horned larks, which can vary in number greatly from year to year; large numbers of unidentified passerines, many of which were likely horned larks; greater numbers of common ravens, which occurred in large groups near the landfill adjacent to LJI; and higher use by Canada geese during winter (Kronner et al., 2005). The slightly higher use in spring at LJIIA was primarily associated with higher use by common ravens and ring-billed and unidentified gulls, both species that frequent the landfill adjacent to LJI. Fall season 2009 overall avian use at the Facility was higher than during the 2008-2009 study (Table P-6), primarily because of flocks of unidentified passerines; however, overall use was still lower than at LJIIA. The species with the highest use in all seasons was the same for LJIIA, LJIIB, and the Facility plots: the horned lark.

See Attachment P-7 for more information about avian use at the Facility relative to LJIIA.

Pebble Springs

At Pebble Springs, waterbirds were the most abundant group in spring (2006), the only season during which avian use surveys were conducted (PPM, 2006). Species that made up the waterbird group at Pebble Springs were ring-billed gull, unidentified gull, and Canada goose. No gull species were observed during any season at any Facility avian use plots; similarly, none were observed at LJIIB during any season. A small number (five detections) of Canada goose were observed at the Facility during the winter season of the 2008-2009 study, and one great-blue heron was observed during the fall 2009 study (Tables P-5 and P-7). The higher use by gull species at Pebble Springs is likely attributable to closer proximity to the Columbia River. As discussed above, ring-billed gulls and unidentified gulls were detected at LJIIA, possibly due to their presence at the landfill adjacent to the area. Passerines was the second largest group at Pebble Springs, and the overall mean use of passerines in spring was slightly higher than at the Facility and LJIIB avian use plots in spring season; however, the most common species were the same (horned lark, western meadowlark, and common raven). Raptor use at Pebble Springs was similar and slightly higher than at the Facility and LJIIB plots in spring season, and species composition was somewhat similar. Long-billed curlew use of Pebble Springs was higher than at the Facility and LJIIB in spring season.

See Attachment P-7 for more information about avian use at the Facility relative to Pebble Springs.

P.7.2.2 Raptor Nest Surveys

In 2009, part (approximately 35 percent) of the Facility 2-mile raptor survey area was surveyed during aerial raptor nest surveys for adjacent wind facilities (Attachment P-7). During the 2009 nest survey, 42 active raptor nests were identified within the portion of the Facility 2-mile raptor survey radius surveyed previously, including nests for Swainson's hawk (18), red-tailed hawk (11), ferruginous hawk (10), prairie falcon (2), long-eared owl (1), and common raven (9). In addition, 86 inactive stick nests were documented. Figure P-6 depicts the survey area as well as nest observations from 2009 for those species with established seasonal restrictions. While a large portion (more than one-third) of the overall Facility 2-mile raptor nest survey radius was surveyed in 2009 for various facilities; surveys of the remaining non-surveyed area are planned for spring of 2010.

P.7.2.3 Special-status Wildlife Surveys

Special-status Wildlife Species

Ground-based surveys for non-listed, special-status species were conducted in March 2008 within a portion of the proposed Facility. In addition, some areas within the site boundary were surveyed previously for Pebble Springs and LJIIB. Figure P-3 displays locations of the non-listed species recorded. Six non-listed, special-status species were identified within the Facility site boundary during previous studies for LJII and Pebble Springs or during the March 2008 special-status species surveys: sage sparrow (Oregon [state] sensitive-critical), loggerhead shrike (Oregon [state] sensitive-vulnerable), white-tailed jackrabbit (Oregon sensitive-vulnerable), long-billed curlew (Oregon sensitive-vulnerable), and sagebrush lizard (Oregon sensitive-vulnerable) (Figure P-3). Three additional special-status species, grasshopper sparrow, long-billed curlew, and sagebrush lizard (all Oregon sensitive-vulnerable), were identified within the site boundary in 2009 (Figure P-3). Based on suitable habitat within the site boundary and results from surveys conducted at nearby facilities, ferruginous hawk (state sensitive-critical) and Swainson's hawk (state sensitive-vulnerable) may also be found during the planned 2010 wildlife surveys. (See Attachment P-7 for additional details about special-status species surveys.)

Other Wildlife

Other mammals observed during the investigations included black-tailed jackrabbit, coyote, pronghorn antelope, and mule deer. A full list of wildlife observed during the investigations is in Attachment P-7, Appendices D and E.

P.8 DESCRIPTION OF SIGNIFICANT POTENTIAL IMPACTS

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

Response: This section describes potential adverse impacts of the proposed Facility on habitats and associated wildlife. The nature, extent, and duration of potential adverse impacts that could result from construction, operation, and retirement of the Facility were identified based on the existing values of each site that will be directly or indirectly affected by the proposed Facility.

P.8.1 Potential Impacts on Wildlife Habitat

Potential impacts on wildlife habitat from construction of the Facility include temporary and permanent habitat loss, and alteration and disturbance during construction and operation. Because the Applicant seeks micrositing flexibility for the Facility as described in Exhibit C, temporary and permanent impacts were calculated based on both the "current" proposed Facility and the "worst-case" Facility layout.

Impacts for the "current" scenario were calculated to demonstrate that potential impacts to wildlife habitat are expected to be significantly lower than those calculated for the "worst-case" scenario. When calculating the impacts from the "current" layout, the maximum turbine layout (269 turbines) was used based on the current Facility layout shown in Exhibit C in Figures C-4 and C-6, with a smaller disturbance area per turbine. Impacts by habitat type and category are described in Table P-10. As described in Exhibit B, at each tower, a circular area will be permanently affected by the tower itself and the surrounding graveled area, ranging up to approximately 1,660 square feet. During construction, a larger area would be used to lay down the rotors and to maneuver the cranes during turbine assembly. To calculate the temporary footprint for the area of disturbance around each tower for staging turbine blades, a circular impact area was used consisting of a 130-foot radius for 253-foot-diameter (77-meter-diameter) rotors, for a total area of approximately 51,437 square feet. The operations and maintenance (O&M) facility(s), substations, and transmission line route locations were used. Staging areas will be used to stage construction and store supplies and equipment. Additional temporary impacts include construction-related impacts associated with the staging areas, and the underground collection systems, as described in detail in Exhibit C. These areas will be temporarily disturbed during construction and will be restored to preconstruction condition after the construction-related activities are complete. Table P-10 summarizes the temporary and permanent impacts to wildlife habitat based on the "current" layout.

Impacts for the "worst-case" situation were calculated to demonstrate the worst-case impacts to wildlife habitat. When calculating the "worst-case" impacts, the current maximum turbine layout shown in Figures C-4 and C-6 was shifted into higher-rated habitats within the micrositing corridor as shown in Figure P-9. While the micrositing corridor overlaps with Category 1 habitat, in no instance would the facilities be moved into Category 1 habitat.

To calculate the "worst-case" acres of permanent impacts, the maximum turbine layout shifted into high-quality habitat was used, along with a permanent disturbance area measuring 1,660 square feet for each turbine. The area permanently disturbed during operations will be circular, with a radius of up to 23 feet, or up to 1,660 square feet. These dimensions include a turbine tower with a radius of up to 8 feet (16 feet in

diameter) and surrounding gravel area with a radius of up to 15 feet, which represent the 3.0-MW tower diameter and maximum graveled area (i.e., the "worst-case" situation). The "worst-case" locations for the O&M facilities and substations and other permanent facilities were used.

The preferred transmission line route was used in the calculations for the "worst-case" impacts similar to the calculations for "current" impacts. The preferred route measures 8.8 miles in length, while alternatives 1 and 2 measure 8.2 and 8.8 miles, respectively.

TABLE P-10
Habitat Types and Categories Within the Facility Site Boundary with Area of Impact—Current Layout

			Impacts (Current)	
Category and Habitat Description	**Habitat Subtype Code**	**Total Acres Within Site Boundary**	**Temporary[a] Facilities (acres disturbed)**	**Permanent[b] Facilities (acres disturbed)**
Category 1				
Developed – CRP or Other Planted Grassland	DC	88.27	0.00	0.00
Grassland – Exotic Annual	GA	59.29	0.00	0.00
Grassland – Native Perennial	GB	54.93	0.00	0.00
Shrub-steppe – Sagebrush (Big Sage)	SSA	107.51	0.00	0.00
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	199.09	0.00	0.00
Subtotal		**509.09**	**0.00**	**0.00**
Category 2				
Exposed Rock on Slopes – Escarpment	ESC	28.67	0.34	0.09
Grassland – Exotic Annual	GA	571.56	68.81	7.53
Grassland – Native Perennial	GB	429.10	21.66	2.25
Shrub-steppe – Sagebrush (Big Sage)	SSA	2,318.22	72.90	12.68
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	884.69	70.79	10.94
Woodland – Juniper	WJ	244.53	5.58	0.97
Woodland–Riparian	WR	2.49	0.00	0.00
Subtotal		**4,479.26**	**240.08**	**34.47**
Category 3				
Developed – CRP or Other Planted Grassland	DC	1,423.92	78.47	7.51
Grassland – Exotic Annual	GA	1,528.83	138.67	20.24
Grassland – Native Perennial	GB	3,137.61	88.71	12.23
Shrub-steppe – Sagebrush (Big Sage)	SSA	344.16	3.14	3.65
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	7,316.80	327.94	40.50
Woodland – Juniper	WJ	41.11	0.30	0.00
Subtotal		**13,792.43**	**637.23**	**84.12**
Category 4				
Developed – Old Field	DB	7.54	0.00	0.00

TABLE P-10
Habitat Types and Categories Within the Facility Site Boundary with Area of Impact—Current Layout

Category and Habitat Description	Habitat Subtype Code	Total Acres Within Site Boundary	Impacts (Current)	
			Temporary[a] Facilities (acres disturbed)	Permanent[b] Facilities (acres disturbed)
Grassland – Exotic Annual	GA	1,046.22	44.79	5.41
Grassland – Native Perennial	GB	193.24	4.82	0.48
Shrub-steppe – Sagebrush (Big Sage)	SSA	21.90	0.04	< 0.01
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	174.77	10.46	1.64
Subtotal		**1,443.66**	**60.10**	**7.53**
Category 5				
None				
Category 6				
Developed – Irrigated Agriculture	DI	270.76	6.32	2.77
Developed – Dryland Wheat	DW	12,660.54	759.59	81.76
Developed – Other	DX	246.57	13.35	9.48
Subtotal		**13,177.88**	**779.27**	**94.01**
Total for all Categories		**33,402.32**	**1,716.68**	**220.12**

[a] Table C-3 lists temporary facilities and their impacts.
[b] Table C-2 lists permanent facilities and their impacts.

CRP = Conservation Reserve Program

Note: Because some Facility impact areas overlap, the total Facility disturbance to habitat is less than the sum of all Facility impact areas, as represented in Tables C-2 and C-3. The total areas in Tables C-2 and C-3 are not exact estimates of the Facility's total impact to land and habitat, as they do not account for overlapping impact areas. Consequently, they show a larger overall impact than will occur. When calculatingthe impacts in the Exhibit P tables (Tables P-10 and P-11) using geographic information systems (GIS), overlapping impact areas were not double-counted. As a result, the tables in Exhibit P provide a more accurate total calculation of impact to habitat.

When calculating the "worst-case" temporary impacts, the maximum turbine layout was used, along with a maximum temporary disturbance area measuring 160,000 square feet for each turbine. The typical temporary disturbance area at each turbine location is equal to approximately 53,000 square feet around the 1.5-MW turbines (130-foot radius for the 77-meter/253-foot-diameter blades), or approximately 85,000 square feet around the 3.0-MW turbines (164-foot radius for the 100-meter/328-foot-diameter blades), as shown in Figure B-6. However, in some cases, construction contractors prefer a larger area measuring approximately 160,000 square feet to reduce construction costs.

For the "worst-case" impacts, the same number of staging areas was used as in the "current" layout.

Therefore, in order to provide a single "worst-case" analysis, the Applicant calculated the area of temporary and permanent impacts using the maximum number of turbines *and* the largest of the temporary and permanent footprints.

Table P-11 summarizes the temporary and permanent impacts to wildlife habitat based on the "worst-case" layout, as shown in Figure P-9.

TABLE P-11
Habitat Types and Categories Within the Facility Site Boundary with Maximum Possible Area of Impact—Worst-case Layout

		Impacts (Worst Case)		
Category and Habitat Description	**Habitat Subtype**	**Total Acres Within Site Boundary**	**Temporary[a] Facilities (acres disturbed)**	**Permanent Facilities[b] (acres disturbed)**
Category 1				
Developed – CRP or Other Planted Grassland	DC	88.27	0.00	0.00
Grassland – Exotic Annual	GA	59.29	0.00	0.00
Grassland – Native Perennial	GB	54.93	0.00	0.00
Shrub-steppe – Sagebrush (Big Sage)	SSA	107.51	0.00	0.00
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	199.09	0.00	0.00
Subtotal		**509.09**	**0.00**	**0.00**
Category 2				
Exposed Rock on Slopes – Escarpment	ESC	28.67	0.34	0.09
Grassland – Exotic Annual	GA	571.56	81.26	13.36
Grassland – Native Perennial	GB	429.10	21.66	2.25
Shrub-steppe – Sagebrush (Big Sage)	SSA	2,318.22	96.30	14.90
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	884.69	70.80	10.93
Woodland – Juniper	WJ	244.53	16.33	1.99
Woodland–Riparian	WR	2.49	0.00	0.00
Subtotal		**4,479.26**	**286.69**	**43.53**
Category 3				
Developed – CRP or Other Planted Grassland	DC	1,423.92	76.85	7.45
Grassland – Exotic Annual	GA	1,528.83	132.82	14.75
Grassland – Native Perennial	GB	3,137.61	91.10	12.35
Shrub-steppe – Sagebrush (Big Sage)	SSA	344.16	3.32	3.65
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	7,316.80	312.83	37.83
Woodland – Juniper	WJ	41.11	0.30	0.00
Subtotal		**13,792.43**	**617.22**	**76.03**
Category 4				
Developed – Old Field	DB	7.54	0.00	0.00
Grassland – Exotic Annual	GA	1,046.22	34.83	5.21

TABLE P-11
Habitat Types and Categories Within the Facility Site Boundary with Maximum Possible Area of Impact—Worst-case Layout

Category and Habitat Description	Habitat Subtype	Impacts (Worst Case)		
		Total Acres Within Site Boundary	Temporary[a] Facilities (acres disturbed)	Permanent Facilities[b] (acres disturbed)
Grassland – Native Perennial	GB	193.24	2.28	0.59
Shrub-steppe – Sagebrush (Big Sage)	SSA	21.90	0.04	< 0.1
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	174.77	12.96	1.64
Subtotal		**1,443.66**	**50.12**	**7.44**
Category 5				
None				
Category 6				
Developed – Irrigated Agriculture	DI	270.76	6.32	2.77
Developed – Dryland Wheat	DW	12,660.54	742.82	80.79
Developed – Other	DX	246.57	13.35	9.48
Subtotal		**13,177.88**	**762.49**	**93.04**
Total for all Categories		**33,402.32**	**1,716.51**	**220.04**

[a] Table C-3 lists temporary facilities and their impacts.

[b] Table C-2 lists permanent facilities and their impacts.

CRP = Conservation Reserve Program

Note: Because some Facility impact areas overlap, the total Facility disturbance to habitat is less than the sum of all Facility impact areas, as represented in Tables C-2 and C-3. The total areas in Tables C-2 and C-3 are not exact estimates of the Facility's total impact to land and habitat, as they do not account for overlapping impact areas. Consequently, they show a larger overall impact than will occur. When calculating the impacts in the Exhibit P tables (Tables P-9 and P-10) using geographic information systems (GIS), overlapping impact areas were not double-counted. As a result, the tables in Exhibit P provide a more accurate total calculation of impact to habitat.

During final Facility design, the Facility will be microsited to avoid and minimize both temporary and permanent impacts to high-quality native habitat where practicable to retain habitat cover in the general landscape. Areas temporarily disturbed during construction will be restored according to their preconstruction conditions, using approved seed mixes and restoration measures in the Revegetation Plan that will be similar to the Revegetation Plan for LJII. For permanent impacts that cannot be avoided, the Applicant will mitigate for those impacts by implementing a Habitat Mitigation Plan (HMP) similar to the one implemented for LJII.

If the Facility were to be retired, as described in Exhibit W, the certificate holder would restore the site using the measures and success criteria described in the Revegetation Plan. The certificate holder will ensure conversion of the operations areas back to a site condition similar to preconstruction conditions.

P.8.2 Summary of Potential Impacts to Wildlife

Potential impacts are discussed below for birds, bats, big game, other mammals, amphibians, and reptiles. Potential impacts to special-status/sensitive species are addressed as well. The detailed discussions that follow this section can be summarized as follows:

- The mean fatality estimates for all birds from 10 regional wind facilities have ranged from 0.9 to approximately 2.3 birds per MW per year[5] (see Table P-13). This suggests the range of regional averages could serve as a basis for fatality estimates at the Facility. Based on this information, and the Facility's similarities to LJI, the annual fatality estimate for the Facility would be 1 to 5 birds per MW per year.

- Raptor fatality rates for the Facility are anticipated to be similar to other operating wind energy facilities in the region, that is, approximately 0.01 to 0.21 fatality per MW per year [6] and, most likely, lower than the LJI rate of 0.21 per MW per year.

- Fatalities of members of passerine (songbird) species will constitute most of the avian fatalities. The number of predicted songbird fatalities annually is approximately 1 to 4.6 fatalities per MW per year, with the most common fatality probably being horned larks. No other species is expected to make up a large proportion of fatalities.

- Waterfowl and waterbird mortality is expected to be low, based on monitoring results of existing facilities in the region, relatively infrequent use of the Facility year-round by Canada geese, and the low level of known Canada goose collision fatalities at existing wind facilities.

- Results of bat fatality monitoring for operating wind energy facilities in the ecoregion indicate a mortality range from 0.4 to 2.5 bats per MW per year. Based on this range and on similar characteristics of the Facility site to these other facilities, it is anticipated that bat mortality will also be similar at the Facility and will primarily involve migratory silver-haired and hoary bats.

- Little risk is expected to nonmigratory bat populations at the Facility, given the lack of habitat and the fatality results documented at other wind power facilities in similar habitats. No impacts to threatened or endangered bat species are anticipated.

- Loss of native habitat may result in displacement or indirect impacts to grasshopper sparrows and other grassland or shrub-steppe, open low-shrub nesting birds. Native

[5] The fatality rate reported at LJI for all birds after the second year of monitoring was approximately 2.3 birds per MW per year and somewhat lower than the 3.2 birds per MW per year reported after the first-year of monitoring at the site (see Table P-13). While the 2.3 figure is not shown in Table P-13 due to challenges in calculating means from previously rounded figures, this higher fatality estimate is used for the purpose of predicting impacts at the Facility.

[6] The fatality rate reported at LJI for raptors after the second year of monitoring was 0.21 bird per MW per year and significantly higher than the 0.6 bird per MW per year reported after the first year of monitoring at the site (see Table P-13). While the 0.21 figure is not shown in Table P-13 due to challenges in calculating means from previously rounded figures, this higher fatality estimate is used for the purpose of predicting impacts at the Facility.

grassland-steppe constitutes approximately 11 percent of the habitat in the site boundary. Habitat loss will be mitigated by the Facility conservation easement, protecting otherwise unsecured habitat (vulnerable to alterations) for the life of the Facility. Displacement impacts to birds in grassland and shrub-steppe habitats are anticipated to be minimal with predicted reduced densities, depending on the affected species, occurring within less than 100 meters (328 feet) of facilities located in these habitats.

- No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation are likely to be limited to direct mortality as a result of vehicle collisions and are expected to be low and will likely consist mostly of two to three snake species such as bull snake, racer, and western rattlesnake.

- Facility construction may result in loss of foraging and breeding habitat for small mammals such as common deer mouse, Ord's kangaroo rat, and pocket gopher. Some small mammal fatalities may occur from vehicle activity during operations, but impacts are expected to be very low.

P.8.2.1 Potential Impacts to Birds

This section describes the potential impacts to birds from construction, operation, and retirement of the Facility.

Construction and Retirement

Facility construction could affect birds through loss of habitat, potential fatalities from operating construction equipment, and disturbance or displacement effects from construction activities. Impacts from the retirement of the Facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment. Potential mortality from construction equipment is expected to be very low. Equipment used in wind facility construction (for example, cranes) generally moves at slow rates or is stationary for long periods. The risk of direct mortality from construction to avian species is most likely limited to potential destruction of a nest for ground- and shrub-nesting species. Construction trucks traveling the site could collide with small birds using roads and road shoulders. Construction contractors will be instructed to travel at reasonable speeds for the site.

Disturbance-type impacts can be expected if construction activity occurs near an active nest or a primary foraging area. Birds displaced from these areas might move to areas with less disturbance, depending on availability of an unoccupied territory, the stage of pair bonding or nesting, or other factors. However, breeding effort and fledging success could be affected, and foraging opportunities might be altered during the construction period.

Construction may also disturb nesting raptors. There are currently 41 documented active hawk/other large bird nests within the Facility 2-mile raptor nest survey radius, including nests for Swainson's hawk (18), red-tailed hawk (11), ferruginous hawk (9),

prairie falcon (2), long-eared owl (1), and common raven (9). The red-tailed hawk and the common raven are not special-status species.

There is one known active ferruginous hawk nest and six Swainson's hawk nests within the site boundary. Based on the 2009 raptor nest survey and the March 2008 ground-based surveys, both species may be nesting near Facility construction zones. During construction, the Applicant will contract a qualified independent professional biologist to monitor the special-status raptor nests near construction, as further described in Sections P.8.2.3 and P.9.2.

Operation

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

The estimate of operational impacts to birds from wind facilities is based on the site-specific measures of bird use, bird behavior, nesting, habitat, and topography, in combination with existing information on these same metrics in other locations, in addition to direct measures of impact (for example, mortality and displacement). The proposed Facility is located in the ecoregion, a region where many wind facilities have been developed and studied. Baseline and/or monitoring studies have been conducted at most of these wind facility locations, providing an existing comprehensive data source for predicting impacts to wildlife species.

Substantial data on avian mortality at operational wind facilities are currently available (Erickson et al., 2004; Erickson et al., 2001; National Wind Coordinating Committee, 2004). Outside of existing California facilities, diurnal raptor fatalities comprised only 2 percent of wind-facility-related fatalities (Attachment P-8). Passerines (excluding house sparrows and European starlings) were the most common collision victims, comprising 82 percent of the 225 fatalities documented. No other group (for example, raptors, waterfowl) comprised more than 5 percent of these fatalities. Of 841 avian fatalities reported in California studies by Erickson et al. (2001)—more than 70 percent of which were at the Altamont Pass Wind Farm (Altamont Pass)—39 percent were diurnal raptors, 19 percent were passerines (excluding house sparrows and European starlings), and 12 percent were owls. Non-protected birds, including house sparrows, European starlings, and rock doves, comprised 15 percent of the fatalities. Other avian groups generally made up less than 10 percent of the fatalities.

Because of the differences in rotor swept area and nameplate MW output among turbines included in mortality studies, fatality rates are presented both in terms of estimated number of fatalities per MW per year and estimated number of fatalities per turbine per year. The estimated number of fatalities per MW per year is used as the basis for predicting direct impacts of the Facility. This MW approach assumes that the fatality rates are approximately proportional to the MW nameplate of the respective turbines,

and yields results similar to those from assuming that fatality rates are proportional to the turbine's rotor swept area. Although some research has suggested, for example, that larger turbines, with slower revolutions per minute (rpm) and larger ground clearance, might be safer for some bird groups, such as raptors (Smallwood and Thelander, 2004), this relationship has not been clearly defined, at least for different sizes of newer generation turbines. Therefore, the impacts assessment uses the conservative approach that impacts are proportional to the MW nameplate of turbines.

Facility and turbine characteristics of 12 Pacific Northwest regional wind facilities where standardized fatality monitoring has been conducted are described in Table P-12. Average fatality estimates from these facilities have ranged from 0.9 to 6.7 fatalities per MW per year [7] for all birds and 0.0 to 0.21 raptor fatalities per MW per year[8] (Table P-13). The only species representing more than 10 percent of the documented fatalities has been horned lark, the most commonly observed species at all of these facilities during daytime use preconstruction surveys (Table P-14).

TABLE P-12
Facility and Turbine Characteristics of 12 Regional Wind Energy Facilities

	Project Size		Turbine Characteristic		
Columbia Plateau Ecoregion Wind Power Facility[a]	**Number of Turbines**	**Megawatts**	**Rotor Diameter[b] (meters)**	**Tip Height (max. meters)**	**Megawatts**
Hopkins Ridge I, Washington	83	150	80	107	1.80
Wild Horse, Washington	127	229	80	107	1.80
Biglow Canyon, Oregon (Phase I)	76	125.4	90	121	1.65
Big Horn, Washington	133	199.5	77	118.5	1.50
Klondike I, Oregon	16	24	65	100	1.50
Klondike II, Oregon	50	75	77	118.5	1.50
Klondike III, Oregon (Phase I)	80/42	120/96.6	77/93	118.5/126.5	1.50/2.30
Leaning Juniper, Oregon	67	100.5	77	118.5	1.50
Nine Canyon I, Washington	37	48	62	91	1.30
Combine Hills I, Oregon	41	41	61	84	1.00
Stateline, Oregon/Washington	454	300	47	74	0.66
Vansycle Ridge, Oregon	38	25	47	74	0.66

[a] Projects are sorted by megawatt of turbine type.

[b] RD= turbine rotor diameter.

Source: NWC, 2009b (Attachment P-8).

[7] The high value shown (6.7) is reported from the final fatality monitoring report for LJI. This value replaces 3.2, which was reported by Johnson and Erickson (2008, see Attachment P-8) and relied on only the first year of monitoring at LJI.

[8] Johnson and Erickson (2008, see Attachment P-8).

TABLE P-13
Avian Use Estimates and Avian Fatality Estimates for Eleven Existing Wind Energy Projects in the Columbia Plateau Ecoregion

Wind Power Facility[a]	Mean Avian Use (number per 20- or 30-minute survey)		Annual Fatality Rate (number per megawatt per year)	
	Raptors[b]	All Birds	Raptors[c]	All birds
Combine Hills, Oregon	0.60	6.0	0	2.6
Klondike I, Oregon	0.47	17.5	0	0.9
Klondike II, Oregon	0.47	17.5	0.11	3.1
Vansycle Ridge, Oregon	0.41	13.1	0	1.0
Stateline, Oregon/Washington	0.41	13.1	0.09	2.9
Hopkins Ridge, Washington	0.96	8.4	0.14	1.2
Nine Canyon I, Washington[c]	0.26	9.4	0.05	2.8
Wild Horse, Washington[d]	0.40	7.5	0.09	1.6
Big Horn, Washington	0.90[e]	16.6[e]	0.15	2.5
Leaning Juniper, Oregon	0.52	23.6	0.06[f]	3.2[f]
Condon, Oregon	0.37	5.8	0.02[g]	0.05[g]
Mean	**0.50**	**12.4**	**0.07**	**2.1**

[a] References for facilities: Combine Hills (Young et al., 2003a; Young et al., 2006); Klondike I and II (Johnson et al., 2002; Johnson et al., 2003b; West and NWC, 2007); Vansycle Ridge (Erickson et al., 2000); Stateline I and II-partial (Erickson et al., 2004); Hopkins Ridge (Young et al., 2003b; Young et al., 2007); Nine Canyon (Erickson et al., 2001); Wild Horse (Erickson et al., 2003a; Erickson et al., 2003b; Erickson et al., 2008); Big Horn (NWC, 2008); Condon (Fishman Ecological Services, 2003).

[b] Raptor estimates include diurnal raptors and owls.

[c] Nine Canyon II monitored only part-year. Nine Canyon I presented here.

[d] Wild Horse estimates include only data and interim analysis for the first year of a 2-year study.

[e] Big Horn avian use study was not conducted for a full year. Partial spring and partial summer seasons presented in a separate report (Johnson et al., 2004) than the winter and fall data (Kronner et al., 2006a and b) and annual mean use estimates quoted here were calculated by Western EcoSystems Technology, Inc., to combine all seasons from the separate study years.

[f] Includes only the first year of a 2-year monitoring study. The final monitoring report calculated a mortality rate of 6.7 fatalities per MW per year for all birds and 0.21 fatality per MW per year for raptors. The revised mean of all bird fatalities rates would be approximately 2.3per MW per year.

[g] Not adjusted for searcher efficiency or scavenger removal; study methods differed from other facilities 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.

Source: NWC, 2009b (Attachment P-7).

Passerines have been the most abundant avian fatality at other wind facilities where studies have been completed (Table P-14), often comprising more than 80 percent of the avian fatalities. Both migrant and resident passerine fatalities have been observed. At the 11 regional wind facilities, approximately 69.5 percent of the fatalities were passerines and the vast majority of the avian observations during the baseline avian use study were passerines (Johnson and Erickson, 2008; see Attachment P-8). Therefore, it is expected that passerines will make up the largest proportion of fatalities. Species most

common to the study area and those most commonly observed at the regional facilities (similar habitats and bird use as for the Facility) are likely to be the most common fatalities. Horned larks and western meadowlarks will likely be the most commonly observed resident songbird fatalities. Horned larks have been the most commonly observed fatalities at several wind facilities, including Vansycle Ridge, Foote Creek Rim Wind Farm in Wyoming (Foote Creek Rim), Stateline, Nine Canyon Wind Farm (Nine Canyon) in Washington and Big Horn Wind Farm (Big Horn) (Erickson et al., 2000; Erickson et al., 2003a; NWC, 2008; Young et al., 2002).

TABLE P-14
Number and Species Composition of Bird Fatalities Found at Columbia Plateau Ecoregion Wind Facilities Where Fatality Monitoring Studies[a] Have Been Completed or Are in Progress (data obtained from public files)

Species	Percent Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals[b]
Horned lark	32.3	280	27
Golden-crowned kinglet	5.9	51	3
Gray partridge (n)	5.5	48	2
Ring-necked pheasant (n)	5.1	44	14
European starling (n)	3.2	28	3
Western meadowlark	3.2	28	1
Chukar (n)	3.0	26	4
Mourning dove	2.9	25	1
Unidentified passerine	2.9	25	3
American kestrel	2.8	24	6
Dark-eyed junco	2.3	20	5
White-crowned sparrow	2.2	19	3
Unidentified bird	1.8	16	2
Yellow-rumped warbler	1.5	13	1
Winter wren	1.4	12	0
Rock pigeon (n)	1.3	11	0
Townsend's warbler	1.3	11	0
Red-tailed hawk	1.2	10	8
Ruby-crowned kinglet	1.0	9	2
Northern flicker	0.9	8	0
Short-eared owl	0.9	8	1
American robin	0.8	7	2
Black-billed magpie	0.8	7	0
Red-breasted nuthatch	0.8	7	0
Savannah sparrow	0.8	7	0
Unidentified kinglet	0.8	7	0
House wren	0.7	6	0

TABLE P-14
Number and Species Composition of Bird Fatalities Found at Columbia Plateau Ecoregion Wind Facilities Where Fatality Monitoring Studies[a] Have Been Completed or Are in Progress (data obtained from public files)

Species	Percent Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals[b]
Golden-crowned sparrow	0.6	5	0
Unidentified sparrow	0.5	4	0
Brewer's sparrow	0.3	3	4
Canada goose	0.3	3	1
Common nighthawk	0.3	3	5
Great blue heron	0.3	3	0
Great-horned owl	0.3	3	0
Mallard	0.3	3	0
Song sparrow	0.3	3	1
American coot	0.2	2	0
American goldfinch	0.2	2	0
Cassin's vireo	0.2	2	0
Chipping sparrow	0.2	2	0
Common raven	0.2	2	0
Downy woodpecker	0.2	2	0
Ferruginous hawk	0.2	2	2
Northern harrier	0.2	2	1
Orange-crowned warbler	0.2	2	0
Rough-legged hawk	0.2	2	3
Sage thrasher	0.2	2	0
Spotted towhee	0.2	2	1
Swainson's hawk	0.2	2	5
Unidentified buteo	0.2	2	0
Unidentified warbler	0.2	2	0
Vesper sparrow	0.2	2	1
Virginia rail	0.2	2	0
Western tanager	0.2	2	0
Acorn woodpecker	0.1	1	0
American pipit	0.1	1	0
Barn owl	0.1	1	0
Black-throated sparrow	0.1	1	0
Brewer's blackbird	0.1	1	0
Brown-headed cowbird	0.1	1	0
California quail	0.1	1	0

TABLE P-14
Number and Species Composition of Bird Fatalities Found at Columbia Plateau Ecoregion Wind Facilities Where Fatality Monitoring Studies[a] Have Been Completed or Are in Progress (data obtained from public files)

Species	Percent Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals[b]
Common yellowthroat	0.1	1	0
Cooper's hawk	0.1	1	0
Golden eagle	0.1	1	0
Grasshopper sparrow	0.1	1	0
Hairy woodpecker	0.1	1	0
Hermit thrush	0.1	1	1
Horned grebe	0.1	1	0
House finch	0.1	1	1
House sparrow (n)	0.1	1	1
Killdeer	0.1	1	0
Lewis's woodpecker	0.1	1	0
Lincoln's sparrow	0.1	1	0
Long-billed curlew	0.1	1	0
Long-eared owl	0.1	1	0
Macgillivray's warbler	0.1	1	1
Merlin	0.1	1	0
Mountain bluebird	0.1	1	1
Pine siskin	0.1	1	0
Red-winged blackbird	0.1	1	0
Ruddy duck	0.1	1	0
Sharp-shinned hawk	0.1	1	0
Swainson's thrush	0.1	1	0
Townsend's solitaire	0.1	1	0
Tree swallow	0.1	1	0
Unidentified accipiter	0.1	1	0
Unidentified duck	0.1	1	0
Unidentified flycatcher	0.1	1	0
Unidentified owl	0.1	1	0
Unidentified thrush	0.1	1	0
Unidentified vireo	0.1	1	0
Varied thrush	0.1	1	0
Vaux's swift	0.1	1	1
Warbling vireo	0.1	1	0
Western grebe	0.1	1	1

TABLE P-14
Number and Species Composition of Bird Fatalities Found at Columbia Plateau Ecoregion Wind Facilities Where Fatality Monitoring Studies[a] Have Been Completed or Are in Progress (data obtained from public files)

Species	Percent Composition (Includes Scheduled Searches Only)	Number of Fatalities on Scheduled Searches	Number of Fatalities Found as Incidentals[b]
Western kingbird	0.1	1	0
Western wood-pewee	0.1	1	0
White-throated swift	0.1	1	1
Yellow warbler	0.1	1	0
American crow	0.0	0	1
Bufflehead	0.0	0	1
Gray catbird	0.0	0	1
Prairie falcon	0.0	0	1
Sage sparrow	0.0	0	1
Williamson's sapsucker	0.0	0	1
Total (93 species identified) (87 native identified, 6 non-native)	**100.0**	**868**	**126**

[a] With similar study protocols.

[b] Not all Facility data were verified. Includes most, but not all incidentals found during formal monitoring studies, and one incidental found after monitoring was complete.

(n) = non-native species

Sources: Vansycle Ridge (Erickson et al., 2000); Nine Canyon (Erickson et al., 2003); Stateline (Erickson et al., 2004; Erickson et al., 2007); Wild Horse (Erickson et al., 2008); Leaning Juniper (Gritski et al., 2008), White Creek I (Gritski et al., 2008b); Rattlesnake Road (Gritski, 2009b); Pebble Springs (Gritski, 2009a); Klondike III (Gritski et al., 2009); Elkhorn (Jeffrey et al., 2008a); Biglow Canyon (Jeffrey, et al., 2009); Klondike I (Johnson, et al., 2003b); Goodnoe Hills (Kidder, B. and D. Every. 2009); Big Horn (Kronner et al., 2008a); White Creek I (Kronner et al., 2009; Kronner, K. and S. Downes. 2009a. Kronner. K. and S. Downes. 2009b); Klondike II (NWC and WEST 2007); Combine Hills (Young et al., 2006); Hopkins Ridge (Young et al., 2007; Young et al., 2009)

Source: NWC, 2009b; see Attachment P-7.

A 2008 study of cumulative impacts on birds and bats predicted that annual bird mortality associated with wind power facilities in the ecoregion would be similar to mortality rates associated with other western wind facilities (excluding California) (Johnson and Erickson, 2008; see Attachment P-8). The study assumed that a total of 6,700 MW of wind power, including existing, proposed, and future facilities, would eventually be operational in the ecoregion. The proposed Facility would account for up to 404 MW or approximately 6 percent of the total predicted wind energy output in the ecoregion. Cumulative avian fatalities from existing and proposed wind facilities in the ecoregion are expected to be similar to reported fatalities at 11 area facilities.[9] Under this assumption, the fatalities would be distributed as 69.5 percent songbirds; 14.5 percent upland game birds; 8.6 percent raptors; 3.2 percent doves/pigeons; 1.7 percent waterfowl, waterbirds, and shorebirds; and 2.5 percent other (e.g., woodpeckers,

[9] Eleven facilities include Combine Hills, Klondike I and II, Leaning Juniper, Condon, Vansycle, Stateline, Hopkins Ridge, Nine Canyon, Wild Horse Wind Farm (in Washington), and Big Horn I.

nighthawks, and swifts) (Johnson and Erickson, 2008). Mean annual mortality for all birds in the ecoregion is estimated to be 2.2 fatalities per MW per year. Therefore, predicted annual mortality from turbine strikes would be highest for songbirds (1.5 fatalities per MW per year). By comparison, estimated number of fatalities per MW per year would be 0.32 for upland game bird; 0.19 for raptors; and <0.1 each for doves/pigeons, waterfowl/waterbirds/shorebirds, and other birds (Johnson and Erickson, 2008; see Attachment P-8).

Due to LJI's proximity to the Facility site boundary and similar topography, fatality estimates at LJI may provide a more reasonable basis for predicting fatality impacts at the Facility. Overall bird mean use at the Facility was lower than at LJI for all four seasons during the 2008-2009 and fall 2009 studies (Kronner et al., 2005; NWC, 2009b; see Attachment P-7). The final 2-year monitoring report for LJI reported 6.7 fatalities (all birds) per MW per year compared to the estimated mean[10] fatality rate for 11 ecoregion facilities of 2.3 fatalities (all birds) per MW per year (Johnson and Erickson, 2008; see Attachment P-8). Based on the fact that mean use at the Facility is lower than at LJI, and on the availability of reported mortality monitoring data from LJI and 10 other operating facilities in the ecoregion, a conservative prediction of annual fatalities for all birds at the Facility could be 1 to 5 fatalities per MW per year (NWC, 2009b; see Attachment P-7).

On the basis of this analysis, the Facility is not expected to contribute substantially to declines in local avian species, because the annual number of fatalities would be small and spread among numerous species and bird groups, as well as across seasons (Johnson and Erickson, 2008; see Attachment P-8). In addition, by using the latest turbine designs and micrositing wind turbines to avoid areas of high bird use, the Facility would minimize the risk of collision mortality to individual birds. For these reasons, the proposed Facility is not likely to contribute significantly to a cumulative impact on birds.

Detailed descriptions of impacts to bird groups including raptors, passerines, and waterbirds (waterfowl, shorebirds, and other waterbirds) are included in the following discussion.

Raptor Use

Altamont Pass Wind Resource Area (APWRA) has had a history of high raptor mortality (Orloff and Flannery, 1992, 1996; Smallwood and Thelander, 2004). APWRA consists of approximately 5,000 mostly small (< 200 kilowatts [kW]) old wind turbines located in an area of 60 square miles. It is estimated that approximately 500 to 1,300 raptors are killed annually at this site (Orloff and Flannery, 1992; Smallwood and Thelander, 2004), based on estimates of approximately 1 to 2.2 raptor fatalities per MW per year. The most common raptors killed include red-tailed hawks, American kestrels, burrowing owls,

[10] An estimated mean is provided because the mean provided by Johnson and Erickson (2008, Attachment P-9) did not include the second year of the LJI fatality monitoring results, which included significantly higher fatality estimates for all birds (combined) than reported during the first year of the study. The estimated mean is only an approximate value, as the data presented by Johnson and Erickson apparently were rounded after the mean was calculated.

golden eagles, and barn owls. Until recently, the largest operating turbines were 330-kW turbines with rotor diameters of 33 meters (108 feet).

Wind turbine design has changed significantly since the first large wind facilities, such as those in APWRA, were developed. Turbines are now typically installed on tubular steel towers instead of lattice towers, without open platforms at the top of the tower, substantially reducing perching and nesting opportunities for raptors and other birds. Raptors and ravens commonly nest on turbines within APWRA. No observations have been made of raptors perched on the new turbine types during studies at Foote Creek Rim (Johnson et al., 2000a), Buffalo Ridge in Minnesota (Buffalo Ridge) (Johnson et al., 2000a), Vansycle Ridge (Erickson et al., 2000), and Stateline (Nelson, 2008), suggesting that new turbines are not a perch attractant for birds. However, a rough-legged hawk was observed in 2008 perched on a Vestas 660 turbine during a Stateline site tour with WDFW and NWC.

Collisions with wires and electrocutions have been a common source of mortality at Altamont Pass (Orloff and Flannery, 1992), and other older wind facilities, whereas electrical collector lines between turbines in new generation wind facilities are typically buried underground to eliminate perching opportunities, collisions with wires, and electrocutions. Overhead lines within new wind facilities are typically designed to be raptor-safe from electrocution, and anti-perching devices are often installed (for example, at Stateline and Nine Canyon).

Turbines are now much larger, with blades moving at lower rpm, and are therefore presumably more visible to raptors than blades on the older, smaller turbines. For example, the blades of the 1.5-MW turbines installed at Klondike I, II, and III projects turn at approximately 20 rpm, compared to more than 60 rpm for the Kenetech 56-100 downwind turbine, the most common turbine at Altamont Pass. Blade tip speeds are similar for both new generation and old generation wind turbines. Although the relationship between blade tip speed and mortality is unknown, it is presumed that rpm is a factor in avian mortality, because avian ability to distinguish blade speed and blade position decreases as rpm increases.

The concern for raptor collisions at wind facilities arises largely from the fact that red-tailed hawks, northern harriers, golden eagles, American kestrels, prairie falcons, and turkey vultures have all collided with wind turbines at Altamont Pass, although most of the raptor fatalities were red-tailed hawks (Erickson et al., 2001). Comparisons with only Altamont Pass would be misleading, however, because it contains many older generation wind turbines, and many newer generation wind turbines have caused fewer raptor fatalities. For example, the mean raptor fatality estimate from eight new generation wind facilities in the Midwest and West (Stateline, Vansycle Ridge, Klondike, Nine Canyon, Foote Creek Rim, Buffalo Ridge, and the Buffalo Mountain Wind Project (Buffalo Mountain) in Tennessee) was 0.04 per MW per year, compared to up to approximately 1 per MW per year (i.e., 25 times greater) at older-generation wind facilities such as Altamont Pass (NWC, 2004). At the High Winds Power Project (High Winds) in Solano County, California, raptor use estimates were high compared to other areas studied, particularly for American kestrels and red-tailed hawks. Corresponding

to the high use by these species at High Winds, and despite newer turbine technology, the avian species with the greatest number of recorded fatalities in the 2 years after construction were American kestrel (n=45) and red-tailed hawk (n=18) (Kerlinger et al., 2006). Overall, based on regression analysis conducted by others (WEST and others, using various datasets), it appears that for raptors there is some correlation between avian use metrics from preconstruction surveys and avian fatalities during post-construction surveys (Strickland and Johnson, 2006).

Raptor Nests

A full survey of the entire raptor nest survey area has not yet been completed and, therefore, raptor nest density for the Facility has not yet been calculated. Raptor nest densities at adjacent LJIIA and LJIIB are slightly above the regional average; however, the nest density for the 2009 Pebble Springs raptor survey was just below average. Reported nest densities for the LJIIA, LJIIB, and Pebble Springs facilities raptor nest survey areas, which occur in all or part of the Facility 2-mil raptor nest survey area, as well as nest densities of other regional wind facilities, are shown in Table P-15. Swainson's hawk nest densities at Pebble Springs, LJIIA, and LJIIB were higher compared to most other regional facilities; it could be expected that this species' nest density at the Facility may also be near the high end of the range for the region. In addition, existing nest data from 2009 in the area near the Facility indicates a cluster of ferruginous hawk nests in the Eightmile Canyon vicinity (Figure P-6); it could be expected that nest density for this species for the Facility nest study (the site plus 2 miles) may also be near the higher end of the range for the region.

Raptor species most at risk of turbine collision at the Facility include locally nesting species such as Swainson's hawk, ferruginous hawk, red-tailed hawk, and American kestrel, as these species, which have been observed within the 2009 survey area, have been reported as fatalities at other wind facilities in the ecoregion (see Attachment P-7, Table 18), and have been found as fatalities at LJI (Gritski et al., 2008). Six active Swainson's hawk nests (and another just on the boundary), one active ferruginous hawk nest (and two others just on the boundary), and three active red-tailed hawk nest (and two others just on the boundary), were located within the site boundary during spring season 2009 (as well as other nests outside the site boundary but within the 2-mile survey area; Figure P-6). Swainson's hawk was the raptor with the highest mean use of the Facility in spring and summer seasons 2009, and several red-tailed hawks, ferruginous hawks, and American kestrels were observed during the avian use surveys of the Facility. These four species are the four raptor species with the highest exposure indices during preconstruction avian use analyses conducted for LJIIA (Kronner et al., 2005).

Average annual fatality estimates for raptors (including owls) at the 12 ecoregion wind energy facilities mentioned above, range from 0 per MW per year to 0.21 per MW per year (Table P-13). This estimated range from completed avian fatality monitoring studies in the ecoregion provides a fair basis for predicting fatality impacts at the Facility. However, LJI was on the high end of the regional range in terms of both raptor use and raptor fatalities. Winter raptor mean use at LJIIA and LJI was higher than for all seasons studied at the Facility. At LJI, seven raptor fatalities (including three incidentals) were

observed during the 2-year fatality monitoring study (Gritski et al., 2008), representing the high end of the range listed for the ecoregion. Despite proximity and similar habitat features at the operating LJI facility and the Facility, fatality rates for the Facility would be expected to be lower than fatality rates recorded at LJI, based on lower raptor use in all seasons studied in 2008–2009 at the Facility. Fall season 2009 avian use surveys at the six 2009–2010 plots showed raptor use that was higher than for fall 2008 at the five 2008–2009 Facility plots, but still lower than for fall season at LJIIA. When the remaining three seasons of avian use studies are completed at the 2009–2010 study plots, results will be compared to 2008–2009 data from the Facility and from LJIIA to determine whether the pattern of use holds for plots in all areas of the Facility. Raptor use was similar for LJIIB and the Facility for the full year of avian use surveys from 2008–2009, with almost identical species composition for the two facilities (NWC, 2009b; see Attachment P-7).

TABLE P-15
Estimated Raptor Nest Densities from Regional Proposed and Operating Wind Facilities Located Primarily in Columbia Basin Environments Comparable to Montague Wind Power Facility[a]

	Raptor Nest Density (number per square mile), rounded							
	All Raptor Species Combined	Buteos				Eagle	Falcon	Owl
Wind Power Facility[b]		SWHA	RTHA	FEHA	UNBU	GOEA	PRFA	GHOW
Willow Creek, Oregon	0.80	0.44	0.07	0.25	0.00	0.00	0.00	0.04
Rattlesnake Road, Oregon	0.45	0.19	0.13	0.05	0.00	0.00	0.08	0.00
Hopkins Ridge, Washington	0.42	0.01	0.27	0.01	0.05	0.00	0.00	0.08
Leaning Juniper IIA, Oregon	0.41	0.18	0.16	0.03	0.00	0.00	0.02	0.02
Leaning Juniper IIB, Oregon	0.40	0.19	0.13	0.06	0.00	0.00	0.02	0.00
Wheat Field, Oregon	0.26	0.06	0.12	0.03	0.00	0.00	0.06	0.00
Golden Hills, Oregon	0.25	0.04	0.16	0.00	0.00	0.00	0.00	0.05
Pebble Springs, Oregon	0.24 (2009 Project area only[c])	0.18	0.06	0.00	0.00	0.00	0.00	0.00
Klondike I and II, Oregon	0.23 (5-mile radius survey area)	0.07	0.11	0.00	0.00	0.01	0.00	0.04
Stateline Oregon/ Washington	0.21	0.03	0.08	0.03	0.00	0.00	0.00	0.07
Klondike III, Oregon	0.20	0.04	0.11	0.00	0.01	0.00	0.00	0.03
Wild Horse, Washington	0.16	0.00	0.12	0.00	0.00	0.00	0.02	0.02
Klickitat County, Washington	0.12	0.00	0.09	0.00	0.00	0.00	0.01	0.03
Big Horn, Washington	0.11	0.00	0.06	0.00	0.00	0.00	0.01	0.04
Average	0.30							

TABLE P-15
Estimated Raptor Nest Densities from Regional Proposed and Operating Wind Facilities Located Primarily in Columbia Basin Environments Comparable to Montague Wind Power Facility[a]

	Raptor Nest Density (number per square mile), rounded							
	All Raptor Species Combined	Buteos				Eagle	Falcon	Owl
Wind Power Facility[b]		SWHA	RTHA	FEHA	UNBU	GOEA	PRFA	GHOW

Note: American kestrel, short-eared owl, and burrowing owl are omitted because of difficulty in determining nesting of these species with the raptor nest survey method (helicopter survey) employed in this and other studies.

Codes:

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

[a] Studies with similar study methods. Arid grassland and shrub-steppe environments with extensive dryland wheat, non-native grassland (CRP), and narrow riparian corridors in some drainages.

[b] References for facilities: Big Horn (Johnson and Erickson, 2004), Leaning Juniper II (LJWP, 2006; Kronner et al., 2005), Klondike I and II (Johnson et al., 2002a), Klondike III (Mabee et al., 2005), Golden Hills (Jeffrey et al., 2008b), Stateline (Erickson et al., 2004; NWC and WEST, 2001), Klickitat County (Johnson et al., 2003b), Hopkins Ridge (Young et al., 2003b), Wild Horse (Erickson et al., 2003b), Rattlesnake Road (Kronner et al., 2007a), Wheat Field (Kronner et al., 2008b); Pebble Springs (Gritski, 2009a); Willow Creek (Kronner et al., 2007b).

[c] Post-construction study of operating facility

Other data not listed above:

Shepherd's Flat Wind Farm nest densities from ground-based field surveys:

For 122-square-mile 2003 study area: all raptor species combined – 0.11, red-tailed hawk – 0.057, ferruginous hawk – 0.0082, great-horned owl – 0.016, golden eagle – 0.016, Swainson's hawk – 0.0082. E-mail letter from Pilz and Co. to Oregon Department of Energy dated October 25, 2007. Shepherd's Flat Wind Farm Application Supplement dated November 19, 2007.

Saddle Butte Wind Park:

"Eight occupied raptor nests found on the facility or in its vicinity. One, a Swainson's hawk nest (SWHA) is within the site boundary (page G-18). Two nests are outside of the boundary but within the study area – one SWHA and one red-tailed hawk (RTHA). The remaining five nests are all RTHA." Notice of Intent to Apply for a Site Certificate for the Saddle Butte Wind Park dated August 4, 2009.

Source: NWC, 2009b (Attachment P-7).

Passerines/Songbirds

Passerines, often referred to as songbirds, have suffered the most avian fatalities at wind facilities outside California, often comprising more than 65 percent of the total avian fatalities (NWC, 2009b; see Attachment P-7). Passerines are also the birds most commonly observed during point-count surveys at all of these sites. Both migrant and resident passerine fatalities have been observed.

Songbird mortality at operating wind facilities in Eastern Oregon and Eastern Washington has been reasonably consistent. Horned larks have been the most commonly observed resident songbird fatality at agriculture and grassland facilities in the Pacific Northwest, and have been the most abundant songbird observed during point-count surveys at these sites. Based on U.S. Geological Survey (USGS) Breeding

Bird Survey (BBS) data, horned larks are probably one of the most common birds in the Columbia Plateau. No other resident songbird species has constituted a large proportion of the fatalities observed at the facilities in the Pacific Northwest.

Passerines were the most abundant avian group observed during the Facility avian use surveys in 2008 and 2009 in all seasons, similar to the adjacent LJIIB findings for passerines (NWC, 2009b; see Attachment P-7)). Passerine use at the Facility was notably lower than at LJIIA (Kronner et al., 2005. The largest percentage (78 percent) of documented fatalities and the largest percentage (91 percent) of estimated fatalities at LJI were passerines (Gritski et al., 2008). The annual fatality estimate for passerines at LJI is higher than the range of estimates at other regional facilities (NWC and WEST, 2007; Erickson et al., 2004; Erickson et al., 2003a; Johnson et al., 2003b). Because of proximity and similar habitat features (excluding the large operating landfill), fatality estimates and species composition of the fatalities for the Facility may be expected to be similar or less than for LJI. Because overall mean use of birds at the Facility was lower than at LJI, a conservative prediction of the annual fatality estimate for passerines (inclusive of non-native species) at the Facility could be 1 to 4.6 fatalities per MW per year. Of the passerine fatalities, it is expected that approximately 5 percent will be non-native species (e.g., European starlings), based on the fatality results at LJI.

On the basis of results from LJI and LJIIA and the fact that horned lark was the most abundant species observed at the Facility, it could be expected that horned lark would represent the greatest fatality risk at the Facility. Common ravens, although they were calculated to have a high exposure indices at LJIIA and were one of the three most abundant species at the Facility, may have lower levels of fatalities because their use was lower at the Facility than at LJIIA, and they appear far less susceptible to collision than would be expected based on their level of use. Only two common ravens have been found as fatalities at wind facilities in the ecoregion (Gritski et al., 2008; Gritski, 2009a; Attachment P-7, Table 18).

Actual numbers and species composition of passerine fatalities may be higher or lower for each year during the life of the Facility because of fluctuation in weather patterns and other environmental events influencing avian activity levels and distribution patterns within the Facility site.

Waterfowl and Other Waterbirds

Wind facilities with year-round waterfowl use have shown the highest waterfowl mortality, although levels of waterfowl and waterbird mortality appear insignificant compared to use of the sites by these groups. Two Canada goose fatalities were documented at Klondike I, although several Canada goose flocks were observed during preconstruction surveys (Johnson et al., 2003b). Few Canada goose or other waterbird fatalities have been observed as fatalities at Stateline (Erickson et al., 2004) or at other regional wind facilities in the U.S. (Erickson et al., 2004). Other waterfowl and waterbirds found as fatalities at regional wind facilities include bufflehead, great blue heron, American coot, mallard, horned grebe, ruddy duck, western grebe, and Virginia rail (NWC and WEST, 2007; Erickson et al., 2003a; Erickson et al., 2004; NWC, 2009a; see Attachment P-7, Table 18).

The Top of Iowa Wind Farm (Top of Iowa), comprising 89 turbines with tip heights of 97.5 meters (320 feet), is located in cropland among three wildlife management areas (WMAs) with historically high bird use, including migrant and resident waterfowl, shorebirds, raptors, and songbirds. During a recent study, approximately 1 million total goose-use days and 120,000 total duck-use days were recorded in the WMAs during the fall and early winter, yet no waterfowl fatalities were documented during concurrent and standardized wind facility fatality studies (Koford et al., 2004).

One waterfowl/waterbird species was found as a fatality at LJI during the 2-year monitoring study; an unidentified duck (feather spot) was found in March (Gritski et al., 2008). In general, low numbers of fatalities of this group have been found regionally, and since waterfowl use at the Facility was relatively low during the season when their presence would be most likely, and the estimated fatalities for this group were low at LJI, waterfowl/waterbirds in general are expected to have a low risk of collision at the Facility.

The waterbird species with the highest exposure index at LJIIA was Canada goose (Kronner et al., 2005). Since this was the waterbird species observed at the Facility, this species would likely be most at risk or collision. One other species of waterbird, a great blue heron, was observed at the Facility during the fall 2009 study. Results of winter–summer avian use surveys at the six Facility plots studied during fall 2009 will be evaluated when completed to determine whether waterfowl/waterbird use follows similar patterns to 2008–2009 avian use data.

Shorebirds

The only shorebird observed at the Facility was the long-billed curlew, a state sensitive species. Shorebirds as a group are rarely killed at wind facilities; of 1,036 avian fatalities collected at U.S. wind facilities, only one was a shorebird (a killdeer found at Buffalo Ridge) (Erickson et al., 2001), even though shorebirds have been recorded at virtually every wind facility evaluated. No long-billed curlew collision fatalities have been found at any existing wind facilities, even though some have been constructed at sites where long-billed curlews were recorded during baseline avian-use studies (FPLE, 2000, 2002; NWC, 2000; URS, et al., 2001). However, none of these studied sites had high long-billed curlew use. Because long-billed curlew was the one species of shorebird observed at the Facility to date, it is the most likely species of shorebird that could be found as a fatality at the Facility. (See Section P.8.2.3 for a risk assessment of this species.) Small numbers of other shorebird species may be found as fatalities. A single killdeer fatality was reported at LJI (Gritski et al., 2008).

Actual numbers and species composition of shorebird fatalities may be higher or lower for each year during the life of the Facility because of fluctuation in weather patterns and other environmental events influencing avian activity levels and distribution patterns within the Facility site.

Upland Gamebirds

Some upland game bird mortality has been documented at wind facilities (Erickson et al., 2001; Erickson et al., 2004). It is not clear whether these mortalities were caused by striking turbine towers or blades, but there are also likely some strikes with vehicles traveling through the wind facilities. Based on habitat conditions, results from other regional wind facilities, and the presence of a few gamebirds (i.e., California quail) at the Facility, there is potential for mortality of some upland gamebirds to occur; however, it is expected to be infrequent. During the 2 years of fatality monitoring at LJI, one chukar and one ring-necked pheasant were found as fatalities (Gritski et al., 2008).

Actual numbers and species composition of upland gamebird fatalities may be higher or lower for each year during the life of the Facility because of fluctuation in weather patterns and other environmental events influencing avian activity levels and distribution patterns within the Facility site.

Other Avian Groups

Small numbers of other avian groups, including doves and woodpeckers, could be expected to be found as fatalities at the Facility. At LJI, three doves and one woodpecker were found as fatalities (Gritski et al., 2008). The primary species at risk in these groups would be mourning dove, as this species was found as a fatality at LJI and observed during the fall 2009 surveys at the Facility.

Displacement Effects

The presence of wind turbines and associated access roads can alter the landscape so as to change wildlife habitat use patterns, thereby displacing wildlife from wind energy facilities. "Displacement" means that birds tend to avoid an area. However, avoidance of an area does not necessarily imply impacts on population parameters; although displacement effects have been documented for some species or groups in the U.S. and Europe, there is little information on whether displacement effects have any real impacts on population size, population trends, and reproduction.

Several studies have been conducted in the U.S. examining the potential displacement effects on birds. Most of the studies focused on grassland bird and raptor species (Erickson et al., 2004; WEST and NWC 2007; Leddy et al., 1999; Osborn et al., 1998; Usgaard et al., 1997). The only published report of avoidance of wind turbines by raptors is for Buffalo Ridge, where no raptor nests were documented within the facility site boundary, despite otherwise similar conditions to occupied habitat outside the site boundary (Usgaard et al., 1997). However, the analysis assumed that raptor nests are evenly distributed across the landscape. Similarly, no red-tailed hawks or golden eagles are known to nest within APWRA, suggesting that the large numbers of turbines in this area may discourage nesting by raptors, or that collision mortality prevents nesting there. At Foote Creek Rim, one pair of red-tailed hawks nested within 0.3 mile of the turbine strings; seven red-tailed hawk, one great horned owl, and one golden eagle nest located within 1 mile of the facility successfully fledged young (Johnson et al, 2000a).

At Foote Creek Rim, results of a long-term mountain plover monitoring study showed that mountain plover use of the area declined during and immediately after construction of the facility. Mountain plover use slowly increased following onset of operation of the facility, although not to the same level as existed prior to construction. While it is possible that construction of the wind energy facility resulted in some displacement of plovers, a regional decline in mountain plover populations may also have contributed to the decline (Johnson and Erickson, 2008; see Attachment P-8). Some mountain plovers have apparently become habituated to the turbines, as several mountain plover nests have been located within 75 meters (246 feet) of turbines, many of which were successful (Young et al., 2005).

At a large wind plant on Buffalo Ridge, the abundance of shorebirds, waterfowl, upland game birds, woodpeckers, and several groups of passerines was found to be statistically significantly lower at survey plots with turbines than at plots without turbines. There were fewer differences in avian use as a function of distance from turbines, however, suggesting that the area of reduced use was limited primarily to those areas within 100 meters (328 feet) of the turbines (Johnson et al., 2000a). Some proportion of these displacement effects is likely to be the result of direct loss of habitat near the turbine for the turbine pad and associated roads. These results are similar to those of Osborn et al. (1998), who reported that birds at Buffalo Ridge avoided flying in areas with turbines. Also at Buffalo Ridge, Leddy et al. (1999) found that densities of male songbirds were significantly lower in CRP grasslands containing turbines than in CRP grasslands without turbines. Grasslands without turbines and grasslands located at least 180 meters (591 feet) from turbines had bird densities four times greater than did grasslands located near turbines. Reduced avian use near turbines was attributed to avoidance of turbine noise and maintenance activities and to reduced habitat effectiveness because of the presence of access roads and large gravel pads surrounding turbines (Leddy, 1996; Johnson et al., 2000b).

Preliminary results from Stateline suggest a relatively small-scale impact of the wind facility on grassland nesting passerines, with a large part of the impact related to direct loss of habitat from turbine pads and roads, and to temporary disturbance of habitat between turbines and road shoulders (Erickson et al., 2004). In 2006, none of the grassland passerines exhibited a statistically negative change in use after construction (Erickson et al., 2007). Horned larks appeared least affected, with some suggestion of displacement of grasshopper sparrows, although sample sizes were limited.

European research summaries have indicated that displacement impacts have been less on breeding waterbirds, shorebirds, and waterfowl than on nonbreeding birds. European studies suggest variable levels of disturbance for feeding and roosting birds (Spaans et al., 1998). Based on this European summary, Spaans et al. concluded that, with the exception of lapwings, black-tailed godwits, and redshanks, species used areas for breeding that were close to the wind farms. In general, the displacement effects (reduced population densities) rarely exceeded 100 meters (328 feet) for breeding birds. During the nonbreeding season, many bird species inhabiting open landscapes did not approach wind parks closer than a few hundred meters, and this avoidance behavior was especially noted for waterfowl and shorebirds. Displacement effects (reduced

densities) of up to 600 meters (1,969 feet) from wind turbines have been reported for some waterfowl species (e.g., pink-footed goose and European white-fronted goose). However, a study in the U.S. did not document such a large-scale displacement impact. Preliminary analysis at the large Top of Iowa facility indicated that no large-scale displacement of Canada geese was apparent, based on counts and behavior observations of geese in areas with and without turbines (Koford and Jain, 2004).

P.8.2.2 Potential Impacts to Bats

Construction and Retirement

Because foraging habitat and water sources are limited within the Facility site boundary, and because construction and retirement activities generally occur during daylight hours when bats are generally absent, the construction and retirement of the Facility is not anticipated to result in the loss or degradation of bat roosting and foraging habitat within the Facility site boundary.

Operation

Areas used by bats for roosting and foraging are typically not the same areas conducive to development of wind energy generation facilities, which are usually constructed in open areas to take advantage of the wind. Therefore, construction of the Facility would not result in the loss or degradation of bat roosting and foraging habitat within the Facility site boundary. The primary impact to bats would be collision mortality. Available evidence indicates that collision mortality is confined primarily to the migratory species, especially for open agriculture and grassland projects in the West. Although 46 species of bats occur in the U.S., only 11 species are included in all known bat fatalities at U.S. wind plants (Johnson, 2005), despite the fact that wind facilities exist in several regions of the country in a variety of habitats. The three most common species of migratory bats in the U.S. (hoary, eastern red, and silver-haired bats) constituted 73 percent of the bat fatalities identified to species at U.S. wind facilities (Kunz et al., 2007). At several wind facilities evaluated in the U.S., bat collision mortality during the breeding season was virtually nonexistent, despite the fact that relatively large populations of resident bats of several species were documented breeding in proximity to the wind plant (see Johnson et al., 2003b; Johnson, 2004). Based on these studies, it appears that wind facilities would pose little risk to nonmigratory bat populations in the study area.

Bat research at other wind plants, including several in the Columbia Basin (Table P-16), indicates that migratory bat species are at some risk of collision with wind turbines, mostly during the fall migration season (Johnson et al., 2003a; see Attachment P-7, Table 19). It is likely that some bat fatalities will occur at the Facility site. Most bat fatalities found at wind plants have been tree-dwelling bats, with hoary and silver-haired bats being the most prevalent fatalities. Both hoary bats and silver-haired bats are likely to migrate through the general area that includes the Facility. Some mortality of mostly migratory bats, especially hoary and silver-haired bats, is anticipated during operation of the Facility. At Buffalo Ridge, based on a 2-year study, bat mortality was estimated to be 2.05 per turbine per year (Johnson et al., 2003a). At Foote Creek Rim,

based on more than 3 years of study, bat mortality was estimated at 1.34 per turbine per year (Young et al., 2003b). At Klondike, bat mortality was estimated at 1.16 per turbine per year (Johnson et al., 2003b). At Vansycle Ridge, bat mortality was estimated at 0.74 per turbine for the first year of operation (Erickson et al., 2000).

Bat mortality at the Facility will likely be similar to that reported at LJI; annual bat mortality at LJI was reported to be 1.98 per MW per year (Gritski et al., 2008). This estimate is slightly higher than mortality estimates reported at most other wind energy facilities in the ecoregion (Table P-16). However, overlapping confidence intervals indicate that the differences are not significant.

Silver-haired and hoary bats, both migratory species, have been the most common fatalities recorded at wind energy facilities in the ecoregion (Johnson and Erickson, 2008; see Attachment P-8). At LJI, these two bat species (both Oregon sensitive-vulnerable) constituted most of the fatalities (Gristki et al., 2008). At Pebble Springs, one silver-haired bat was found as a fatality (incidental) in late April and one in late May; two bats were found in mid-June at Pebble Springs, a hoary bat and an unidentified bat (Gritski, 2009a). During the 2009 wildlife monitoring study, through August 12 no bat fatalities were found at nearby Rattlesnake Road (Gritski, 2009b). Bat fatalities at the Facility would be expected to be highest during the fall migration period for hoary and silver-haired bats, which peaks in September, with a few fatalities possible during spring (NWC, 2009b; see Attachment P-7).

The results of fatality monitoring for 12 regional Columbia Basin wind facilities are described in Table P-16. It is anticipated that bat mortality will also be similar at the Facility and will primarily involve migratory silver-haired and hoary bats (NWC, 2009b; see Attachment P-7).

TABLE P-16
Annual Bat Mortality Estimates at Existing Wind Facilities in the Columbia Plateau Ecoregion with Completed Fatality Monitoring Studies (data obtained from public files)

Wind Power Facility[a,b]	Number of Bat Fatalities Found	Annual Fatality Estimate (number of bats)	Number of Bat Fatalities per Turbine per Year (mean)	Number of Bat Fatalities per MW per Year (mean)
Nine Canyon I, Washington[c]	27	119	3.21	2.47
Biglow Canyon, Oregon (Phase I)[d]	39	250	3.29	1.99
Leaning Juniper, Oregon[e]	20	199	2.97	1.98
Big Horn, Washington[e]	59	380	2.86	1.90
Combine Hills, Oregon	21	77	1.88	1.88
Stateline I and II, Washington/ Oregon	128	500	1.12	1.70
Hopkins Ridge I, Washington 2008	23	208	2.50	1.39
Klondike III, Oregon (Phase I)[d, e]	24	289	2.37	1.33
Vansycle Ridge, Oregon	10	28	0.74	1.12
Klondike I, Oregon	6	19	1.16	0.77

TABLE P-16
Annual Bat Mortality Estimates at Existing Wind Facilities in the Columbia Plateau Ecoregion with Completed Fatality Monitoring Studies (data obtained from public files)

Wind Power Facility[a,b]	Number of Bat Fatalities Found	Annual Fatality Estimate (number of bats)	Number of Bat Fatalities per Turbine per Year (mean)	Number of Bat Fatalities per MW per Year (mean)
Hopkins Ridge I, Washington, 2006	19	94	1.13	0.63
Klondike II, Oregon	5	31	0.63	0.41
Wild Horse, Washington[d]	17	89	0.70	0.39
Mean			**1.89**	**1.38**

[a] Listed in order of highest to lowest bat fatality rate per MW per year (last column).

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

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

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

[e] Huso estimator used to determine fatality estimates (Gritski et al., 2009; Kronner et al., 2005, 2008a).

Source: NWC, 2009b (Attachment P-7).

P.8.2.3 Potential Impacts to Non-listed Special-Status Species

Impacts to non-listed, special-status species are addressed in this section.

Special-status Raptors

Golden Eagle. The golden eagle, protected by the BGEPA, is considered at *low risk* of collision with wind turbines at the Facility (NWC, 2009b; see Attachment P-7). One golden eagle was observed in transit during the winter season (plot J and K), and another in the fall season (plot BB). A third detection of a golden eagle was recorded during fall 2009 surveys at plot GG, but outside the plot radius. Golden eagles were observed infrequently during the avian use studies conducted for the nearby LJI, Pebble Springs, Willow Creek, and elsewhere in the vicinity (Kronner et al., 2005; Kronner et al., 2007a; PPM, 2006). Two historic nests for this species are located approximately 1.9 and 5 miles from the Facility, and one additional historic nest is within 10 miles (undisclosed location) of the Facility; the nest closest to the Facility was not active in 2009, but the area will be aerially surveyed and checked in spring 2010 for raptor activity.

Golden eagles are one of the most common fatalities at Altamont Pass. It is thought that the small size and high rpm of most of the turbines at Altamont Pass, combined with the presence of a large prey base, contribute to the high eagle mortality observed there. One golden eagle fatality was reported at the Goodnoe Hills Wind Farm (Goodnoe Hills) in Washington (Kidder and Every, 2009). However, at the Foote Creek Rim Phase II Wind Farm, where there is year-round golden eagle use and nesting, only one fatality was

documented during a study conducted from July 1999 to December 2000 (Young et al., 2003a). In addition, no golden eagle fatalities were found during a 1-year carcass survey at the Condon Wind Farm (Condon) in Oregon (Fishman, 2003) or incidentally after the formal survey, even though 25 detections were recorded during the 1-year formal preconstruction surveys and nesting occurred in the John Day River Basin within 10 to 12 miles of that facility (URS and WEST, 2001). Based on relatively low use of the Facility by golden eagles to date, and low eagle mortality at operating wind energy facilities in the ecoregion, it is considered unlikely that the Facility will have any significant impact on golden eagle populations in the area. After a final Facility layout and construction schedule are known, and all avian use, special-status wildlife surveys, and raptor nest surveys are complete, data and construction plans will be reviewed to attempt to minimize any potential impacts.

Ferruginous Hawk. The ferruginous hawk, an Oregon sensitive-critical species, would be considered at *moderate to high risk* of collision, depending on the final turbine placements and nest distribution on the landscape (NWC, 2009b; see Attachment P-7). This species was documented during avian use surveys conducted in winter (one observation) and summer (two observations). Individual ferruginous hawks were also documented flying during the March 2008 special-status species surveys. The ferruginous hawk nests in the general area (NWC, 2009a; Gritski et al., 2008), Kronner et al., 2007a; CSF, 2007; Wing, 2009) and within the Facility site boundary. Two active nests were located within the Facility site boundary (one of the two nests was very close to the boundary), and two nests were located on the site boundary. An additional six ferruginous hawk nests were found within surveyed portions of the 2-mile raptor nest survey area (Figure P-6). There are also three inactive, large-sized stick nests within the site boundary that could have been used by ferruginous hawks in the past and/or could be used by this species in the future. Although raptor nest surveys of the southeastern portion of the Facility raptor nest buffer have not yet been completed, existing nest data from 2009 for the Eightmile Canyon vicinity (Figure P-6) indicate core ferruginous hawk nesting along Eightmile Canyon (in canyon cliffs, juniper trees); it could be expected that nest density for this species within the Facility nest study area may be near the higher end of the range for the region.

One ferruginous hawk fatality was reported at Willow Creek during July 2009 (Invenergy, 2009). This species had the third highest turbine exposure index at Willow Creek, and nest density for this species was higher than at other wind energy facilities in the ecoregion (Kronner et al., 2007b). Several ferruginous hawk nests are present in the LJI area; in April 2008, one individual was observed colliding with an operating turbine by a maintenance worker at LJI (Gritski et al., 2008). The 2004-2005 preconstruction avian use study analysis for LJI showed this species to have relatively high exposure for the site (Kronner et al., 2005). At Big Horn, one ferruginous hawk fatality was found in early July 2007, and this species is not known to nest within the lease boundary for that wind facility (Kronner et al., 2008a). At Stateline, one ferruginous hawk fatality was detected during the fatality monitoring period from July 2001 through December 2003. The nearest nest was 0.8 kilometer (0.5 mile) from the turbine, but it was not known whether the fatality was an adult from that nest. A 1-year fatality monitoring study was conducted for part of the full Stateline facility in 2006; one ferruginous hawk fatality was

found in that year as well. In summary, from 2001 through 2009, there are five known ferruginous hawk fatalities at wind facilities in the ecoregion.

After the 2010 raptor nest, avian use, and special-status wildlife surveys are complete and a final Facility layout is known, turbine placement and construction plans for areas near known nests or suspected nests will be reviewed to avoid the sensitive nesting period, March 15 through August 15 (ODFW, 1994), to avoid or minimize potential impacts. As part of the avoidance and minimization measures, the Applicant would contract a qualified independent professional biologist to flag the nest and monitor the special-status raptor nests near construction, as further described in Section P.9.2.1.

Swainson's hawk. The Swainson's hawk, an Oregon sensitive-vulnerable species, is considered at *moderate to high risk* of collision, depending on the final turbine placements and nest distribution on the landscape. A total of six active Swainson's hawk nests were found in 2009 within the site boundary. One additional nest was located just on the site boundary, and 11 other nests for this species were located within the surveyed portion of the 2-mile raptor nest survey area. Swainson's hawk was detected onsite during avian use surveys for the Facility at all plots and seasons, with the greatest use in summer. This species has also been documented nesting at LJIIB, LJI, Pebble Springs, Rattlesnake Road, and elsewhere in the vicinity of the Facility (Gritski et al., 2008; NWC, 2009a; Kronner et al., 2005; PPM, 2006; CSF, 2007; Saddle Butte Wind, LLC [SBW], 2009; ORNHIC, 2009; Wing, 2009). Nest density for this species was high at wind facilities with nest survey buffers that intersect with the 2-mil raptor nest survey area, including Pebble Springs, LJIIA, and LJIIB. Nest density was also high at two other wind energy facilities in the area surrounding the Facility: Rattlesnake Road and Willow Creek. However, Swainson's hawk nest density was lower in other areas within the ecoregion (Table P-15). Based on higher nest densities for this species in the immediate area, and the number (18) of nests of this species found in surveyed areas of the 2-mile raptor nest survey radius, it could be expected that Swainson's hawk nest density at the Facility may be near the high end of the range for the region.

Two Swainson's hawk fatalities were documented at LJI in August 2007 (Gritski et al., 2008). Swainson's hawks nest within the LJI area, had been observed hunting near turbines, and were observed attempting to nest very close to a turbine where nesting had not been observed in the 2 years prior to construction of LJI. The preconstruction avian use study analysis conducted at LJI showed that the Swainson's hawk had relatively high risk exposure (Kronner et al., 2005). At Stateline, one Swainson's hawk fatality was detected; the fatality was recorded more than 2 miles away from the nearest known nest for the species. It is not known whether the fatality was a locally nesting bird or a migrant. Also at Stateline, an injured Swainson's hawk was found at the base of a turbine. It was captured, treated, and successfully released (Erickson et al., 2004). At Klondike I, a Swainson's hawk fatality was reported after the formal monitoring study was complete. Recently, a Swainson's hawk fatality was recorded at Klondike III (Gritski, 2009b), at Pebble Springs (Gritski, 2009a), and at the Hopkins Ridge Wind Farm (Hopkins Ridge) (Young et al., 2009), making the regional total seven fatalities and one injured Swainson's hawk (includes incidental findings). After the 2010 raptor nest, avian use, and special-status wildlife surveys are complete and a final facility layout is known,

turbine placement and construction plans for areas near known nests or suspected nests will be reviewed to accommodate the sensitive nesting period, April 1 through August 15 (ODFW, 1994), to avoid or minimize potential impacts. As part of the avoidance and minimization measures, the Applicant would contract a qualified independent professional biologist to flag the nest and monitor the special-status raptor nests near construction, as further described in Section P.9.2.1.

Peregrine Falcon. The peregrine falcon, an Oregon sensitive-vulnerable species, is considered at very *low risk* of collision. This species was not observed during surveys of the Facility or within the immediate area but has been reported in the Arlington area (Morgan, 2004). Basalt cliffs along the Columbia River are potentially suitable for peregrine nesting, but are less suitable than habitat along the Columbia River further to the west, where there is a traditional nesting area for this species. Historic nest sites are located approximately 8 to 50 miles from the Facility site boundary (Cherry, 2007). No peregrine falcons have been found as fatalities at any of the operational wind facilities in the ecoregion.

Burrowing Owl. The burrowing owl, an Oregon sensitive-critical species, is considered at *low risk* of collision (NWC, 2009b; see Attachment P-7). This species has not been confirmed within the site boundary to date, but nesting has been documented at LJIIB, LJIIA, Pebble Springs, Rattlesnake Road, and in the surrounding area (NWC, 2009a; PPM, 2006; Kronner et al., 2005; Kronner et al., 2007a; ORNHIC, 2009). One active burrowing owl nest was observed at LJI (Kronner et al., 2005); however, no burrowing owls were observed as fatalities there (Gritski et al., 2008). Fatalities of burrowing owl have been found at Altamont Pass (Orloff and Flannery, 1992; Smallwood and Thelander, 2004). One such fatality was documented at Stateline, although not near wind turbines; the owl collided with an operations maintenance truck (Dominick, 2009). No other fatalities burrowing owl at facilities in the ecoregion have been documented (NWC, 2009b, Attachment P-7).

The HMP will include conservation of suitable habitat and habitat enhancement projects that will increase habitat quality for foraging raptors and provide habitat with low or no human activity during sensitive periods.

Special-status Passerines

Loggerhead Shrike. The loggerhead shrike represents a *low risk* of collision mortality at the Facility (NWC, 2009b; see Attachment P-7). This species was observed within the site boundary in suitable habitat during the March 2008 special-status species surveys and during avian use surveys in spring and winter. Loggerhead shrikes were also recorded during ground transect surveys at LJIIB where the Montague Facility site boundary overlaps with the LJIIB site boundary. In addition, nesting activity was recorded at LJIIA and LJIIB (Kronner et al., 2005; NWC, 2009a). Despite the species' presence at many wind energy facilities across the U.S., only two loggerhead shrike fatalities have been reported at wind energy facilities (Erickson et al., 2001). A more in-depth analysis of risk to this species may be identified after 2010 surveys are complete and a final turbine layout and construction schedule is known, and opportunities will be explored to avoid construction during the sensitive nesting and brood-rearing period.

The HMP will include conservation of suitable loggerhead shrike habitat and habitat enhancement projects.

Sage sparrow. The sage sparrow, an Oregon sensitive-critical species, is considered to be at *very low risk* of collision with turbines because observations of this species in the immediate area have been limited (NWC, 2009b; see Attachment P-7). There was one detection of this species in March 2008 onsite during special-status vertebrate wildlife surveys. Sage sparrows are known to nest in the general area in larger patches of sagebrush and are seen occasionally in smaller patches during migration (Kronner, 2001 and 2009). This species needs extensive sagebrush shrub habitat to support breeding populations and, although this habitat is present, suitable nesting areas within the site boundary are limited. One sage sparrow was observed in the northern portion of the Shepherds Flat facility in Eightmile Canyon in June (CSF, 2007). If this species is detected in greater numbers or found to nest within the site boundary during the 2010 special-status wildlife surveys, risk assessment for this species may be reevaluated.

Grasshopper Sparrow. *Grasshopper sparrow* (state sensitive-vulnerable) is considered to be at *low risk* of collision with turbines because of its low-level flight characteristics (NWC, 2009b; see Attachment P-7). This species was detected (two detections) during summer avian use surveys at the Facility. There was also one grasshopper sparrow detection found within the site boundary during the 2009 special-status wildlife surveys for LJIIB (NWC, 2009b; see Attachment P-7, Figure 5). This species has also been observed at LJIIA (Kronner et al., 2005). The grasshopper sparrow occurs throughout much of the ecoregion on and near wind energy sites, but only one grasshopper sparrow fatality has been documented at any of the facilities in the ecoregion (Table P-14). The main concern to grasshopper sparrows is the impact of habitat loss and potential displacement during the nesting season. As previously discussed, displacement study data from Stateline and the South Dakota Wind Energy Center suggest that grasshopper sparrows are displaced during their season of use (nesting season) near turbines, although the displacement may be a temporary effect related to construction disturbance (NWC and WEST, 2007; Johnson and Shaffer, 2008; NWC, 2009b; see Attachment P-7).

Construction of the Facility will result in some temporary and permanent habitat loss. Disturbance to nesting birds could occur if construction occurs during the sensitive period (May 1 through June 30). However, grasshopper sparrows could be expected to temporarily relocate to other suitable grassland habitat in the general Facility vicinity, in areas with no occupied territories. In addition, during final Facility design, the Facility will be microsited to avoid and minimize both temporary and permanent impacts to high-quality native habitat, where practicable, to retain habitat cover in the general landscape. Localized impacts to nesting grasshopper sparrows are not expected to affect breeding populations in the general area because the affected area is small in comparison to areas within the vicinity with breeding birds and to areas in the immediate vicinity with suitable habitat and/or documented breeding birds; no habitat alterations are imminent in the near future for these sites. The HMP will include conservation of suitable grasshopper sparrow habitat for the life of the Facility, ensuring availability of undisturbed habitat for the species. Therefore, overall impacts to this species are expected to be less than significant.

Special-status Shorebirds

Long-billed Curlew. The long-billed curlew, an Oregon sensitive-vulnerable species, appears to be at *low to moderate risk* of collision mortality (NWC, 2009b; see Attachment P-7). This species has been observed at all avian use study plots surveyed at the Facility. Mean use during spring season at the Facility was slightly lower than at LJI and Pebble Springs; however, frequency of occurrence was higher at the Facility plots in spring than at the other two facilities (Kronner et al., 2005; PPM, 2006). Data for neighboring LJIIB show slightly lower use than at the Facility. The Facility spring and summer 2010 avian use data will be compared to spring and summer 2009 avian use data for a better understanding of long-billed curlew use of the Facility. The northeastern portion of the Facility is adjacent to part of the U.S. Department of Interior, Bureau of Land Management (BLM) Horn Butte Area of Critical Environmental Concern (ACEC) established for nesting long-billed curlews. The Horn Butte Curlew ACEC is approximately 6,000 acres in area, contains curlew nesting habitat (some of it is being restored or enhanced), and is located 5 miles east of Arlington (USDOI BLM, 2008; USDOI BLM, 1989).

No long-billed curlew nests have been confirmed within the site boundary, however, ground transect surveys have not yet been completed during the species breeding season and because of the timing of observations, it is expected that this species nests on or near the Facility. If long-billed curlews nest in the Facility site boundary, construction of the Facility could result in some temporary and permanent habitat loss, and the presence of turbines and human activity during and after construction may displace curlews from some areas. However, other portions of the site boundary are suitable for curlew nesting and staging, and curlew use is expected to occur there. Localized impacts to nesting and staging curlews would not likely affect breeding populations in the general area. This species has been recorded as occurring, and some nests have been documented in the vicinity (NWC, 2009a; Kronner et al., 2005; Kronner et al., 2007a and b; PPM, 2006; ORNHIC, 2009; CSF, 2007; SBW, 2009; Wing, 2009). After special-status wildlife surveys have been completed in 2010 and the final layout and construction schedule has been determined, further analysis of impacts for this species will be conducted and opportunities will be explored to avoid construction during the sensitive nesting and brood-rearing period.

Special-status Mammals

White-tailed Jackrabbit. The white-tailed jackrabbit, an Oregon sensitive-vulnerable species, was recorded within the Facility site boundary during the 2008 special-status wildlife surveys. This species has also been recorded at adjacent wind energy facilities and in the general area (NWC, 2009a; Kronner et al., 2005; ORNHIC, 2009; Wing, 2009). Only a small amount of suitable habitat for this species would be affected by development of the Facility. Impacts to high-quality native grassland habitats will be avoided or minimized where practicable through Facility design. A temporary and permanent loss of native grassland will not adversely affect this species because this habitat type is extensive on sites where additional jackrabbits may be present. The HMP will include conservation of suitable jackrabbit habitat for the life of the Facility,

ensuring availability of undisturbed habitat for the species. Therefore, it is unlikely that the Facility would have any significant impact on this species.

Other Special-status Wildlife

Sagebrush lizard. The sagebrush lizard, an Oregon sensitive-vulnerable species, was detected within the site boundary in Juniper Woodland habitat during ground transect surveys conducted for LJIIB in spring 2009 (NWC, 2009b; see Attachment P-7). This species may also occur in other portions of the Facility in suitable habitat where special-status species surveys are planned for 2010. This species has also been observed in the vicinity (Kronner et al., 2005; PPM, 2006). No adverse impacts are expected to the regional population.

Western toad. The ORNHIC reported one record of a western toad, an Oregon sensitive-vulnerable species, within 5 miles of the site boundary. However, this species was not observed within the Facility site boundary, and there is no aquatic habitat and very limited potential for upland movements during wet periods. If present, they are likely restricted to more mesic habitats around ranch yards. Impacts are not expected for this species. No adverse impacts are expected to the regional population.

Other Special-status Fish and Wildlife

Fish. Seven non-listed, special-status fish species may be present in the general Facility vicinity. In the Walla Walla River basin these species include Middle Columbia River chinook salmon ESU (*Oncorhynchus tshawytscha),* interior redband trout (*O. mykiss*), Westslope cutthroat trout (*O. clarki lewisi*), Pacific lamprey (*Lampetra tridentata*), river lamprey (*L. ayresi*), Western brook lamprey (*L. richardsoni*), and margined sculpin *(Cottus marginatu*s). The nature of the Facility site, situated on ridgelines lacking perennial stream channels, precludes the presence of any of these species. No habitat for non-listed, special-status fish would be affected by the Facility. Therefore, no impacts will occur to these species or their required habitats.

Plants. The Facility site boundary contains potentially suitable habitat for one non-listed, special-status plant species, woven spore lichen (Table P-1). If any woven spore lichen populations are identified during the appropriate bloom period in 2010, the Facility will be microsited to minimize both temporary and permanent impacts to these populations as well as high-quality native habitat in order to retain habitat cover in the general landscape.

P.8.2.4 Potential Impacts to Other Wildlife

Potential impacts to other wildlife, including non-listed, special-status mammals, amphibians, and reptiles, are expected to be less than significant. No measurable impacts are anticipated to big game from Facility operations. Road and Facility construction may result in loss of foraging and breeding habitat for non-listed small mammals. Ground-dwelling mammals will lose the use of the permanently affected areas; however, these animals are expected to repopulate the temporarily affected areas. Some small mammal fatalities could occur from vehicle activity during operations, but

impacts are expected to be very low. No impacts to amphibians are anticipated during operations. Impacts to reptiles during operation are likely to be limited to direct mortality as a result of vehicle collisions and are expected to be low. Aquatic species and fish will also be protected through the implementation of erosion control measures in accordance with the Facility National Pollutant Discharge Elimination System (NPDES) permit (see Exhibit I). Potential impacts to the WGS and other protected species are discussed in Exhibit Q.

P.9 MEASURES TO AVOID, REDUCE, OR MITIGATE IMPACTS

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

Response: This section describes the avoidance, minimization, and mitigation measures that will be implemented to avoid, reduce, or mitigate potential adverse impacts to non-listed, special-status species and wildlife habitat, and discusses how the proposed measures achieve the ODFW habitat mitigation goals. For the impacts that cannot be avoided or minimized, mitigation will be developed by means of reliable methods and in compliance with ODFW habitat mitigation rules (OAR 635-415-0025). The Applicant will implement a Wildlife Monitoring and Mitigation Plan, a Revegetation Plan, and an HMP, as required by the site certificate. The plans will be developed in consultation with ODFW and ODOE and will be similar to the plans implemented for nearby facilities such as LJF and Shepherds Flat.

P.9.1 Avoidance Prior to Construction

P.9.1.1 Avoidance in Facility Design

The Facility will be microsited during the final design to avoid impacts on sensitive species, riparian areas, and shrub-steppe habitat.

General Measures

- Turbine locations, staging areas, and roads located near threatened or endangered populations will be sited during micrositing to avoid sensitive areas such as WGS sites, as further described in Exhibit Q.

- During final Facility design, the Facility will be microsited to avoid and minimize both temporary and permanent impacts to high-quality native habitat where practicable to retain habitat cover in the general landscape.

- Existing roads will be used to the maximum extent possible, except where use of such roads would affect sensitive species.

- All turbine towers and permanent meteorological (met) towers will be un-guyed.

- Collector lines will be buried in the temporarily disturbed road shoulder, where feasible, or placed overhead to avoid impacts to wetlands, canyons, or rugged terrain that would prevent the safe use of underground trenching technology.

- Overhead collector lines will be constructed in accordance with the recommendations of the Avian Power Line Interaction Committee for raptor protection on power lines (including minimum conductor spacing and the use of anti-perch guards).

As a result of these measures, no Facility component footprint will be located within Category 1 habitat.

P.9.1.2 Avoidance During Micrositing

After the final layout has been better defined, additional plant and wildlife surveys will be conducted to field-verify the habitat mapping and categorization and to identify state and federally listed species. These surveys will be conducted prior to construction, and the Applicant has committed to designing and micrositing the Facility to avoid any Category 1 habitat and threatened or endangered species locations such as WGS colonies found during these clearance surveys.

Before beginning construction, the Applicant will provide ODOE a map showing the final design locations and areas that would be disturbed during construction. The Applicant will hire qualified personnel to conduct a field investigation of the final layout and will provide a written report of the field investigation to ODOE to detail any identified state and federally listed wildlife species or Category 1 habitat. If any state or federally listed plant species or Category 1 habitat are identified during the field investigation, the Applicant will ensure that construction and operation of the Facility will have no impact on individuals or populations or Category 1 habitat. The Applicant will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources.

In addition, during final Facility design, the Facility will be microsited to avoid and minimize both temporary and permanent impacts to high-quality native habitat to retain habitat cover in the general landscape.

P.9.2 Avoidance and Minimization During Construction

The following protective measures will be implemented during construction of the Facility to avoid and minimize impacts. These measures and the proposed mitigation (see Section P.9.3.2) are similar to measures described for previously approved facilities, including LJII and Helix.

P.9.2.1 Construction Monitoring

The Applicant will use an onsite manager and will require the construction contractors to designate a Field Contact Representative (FCR) to oversee their compliance with protective measures and coordination in accordance with requirements of the county and other regulatory agencies.

Qualified biologists will provide environmental training and environmental monitoring during construction. The qualified biologists will visit the site before site development to flag sensitive resource areas, including sensitive raptor nests. The qualified biologist will periodically visit the site during construction to maintain flagging, monitor nesting birds, and oversee construction and permit compliance.

If sensitive raptor nests are located in proximity to construction areas, the qualified biologists will monitor specific raptor nests during construction. The biologists will monitor raptor nesting behaviors during construction site visits to quantify any nest site abandonment and will record number of young fledged where possible without disturbing the birds.

P.9.2.2 Exclusion Flagging

Qualified biologists will mark wetlands, sensitive raptor nests, WGS sites, and any Laurent's's milk-vetch, sessile mousetail, or other threatened and endangered or candidate species occurrences with brightly colored pin flags or wooden lathes and signing, and instruct the contractor to work outside these boundaries, as described below:

- WGS colonies will be surveyed prior to construction and the boundaries flagged for avoidance.

- Confirmed populations of Laurent's milk-vetch, sessile mousetail, and other listed or candidate special-status plant species within 200 feet of proposed construction areas will be marked with orange exclusion fencing or other marking. The contractor will be instructed to work outside these boundaries at all times.

- Wetlands and streams near or within the site boundary that should not be affected during construction will be marked with brightly colored pin flags or wooden lathes. The qualified biologists will work with the onsite manager and the FCR to ensure that exclusion flagging is in place prior to construction in that area.

- If any sensitive raptor nests such as Swainson's hawks or ferruginous hawks are found within 1,300 feet of transmission line poles or other Facility components, these would be flagged and avoided. The Applicant would not engage in high-impact construction activities (activities that involve blasting, grading, or other major ground disturbance) or allow high levels of construction traffic within 1,300 feet of these nest sites.

- For other raptor nests, such as the red-tailed hawk nests, the qualified biologists will flag the raptor nests within approximately 0.25 mile or in proximity to construction zones (depending on best judgment of topography and level of anticipated disturbance) with an appropriate sign. The qualified biologists will also work with the Applicant and the construction contractor to minimize construction work in these areas to the extent feasible.

P.9.2.3 Dust Control

The Applicant proposes to mitigate impacts from dust deposition through water applications to disturbed ground during construction, by graveling of permanent roadways, by erosion control, by revegetation, and by imposition of construction and operation speed limits of 20 miles per hour. Spraying of water on disturbed ground is an effective dust deterrent, as is reduction of speeds on graveled roads. These measures 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. The existence of these roads should significantly reduce traffic on the many unimproved roads and four-wheel-drive tracks now within the site boundary. It is likely that overall post-construction dust production from vehicular traffic on the site will be reduced from current conditions.

P.9.2.4 Erosion Control

To minimize impacts to the Facility habitat, the Applicant will prepare an Erosion and Sediment Control Plan in accordance with a NPDES 1200-C permit and will require the contractor to install erosion and siltation controls near riparian areas and other appropriate locations as designated in this plan. The FCR or a designated person under the FCR will monitor the erosion and siltation controls onsite to ensure that they are in working condition.

P.9.2.5 Environmental Training

The Applicant will provide an environmental training course for the construction contractors that will provide information on the sensitive species present onsite, the exclusion flagging/signing, permit requirements, and other environmental issues.

The training will also cover proper protocol for responding to dead or injured wildlife as will be described in the Wildlife Monitoring and Mitigation Plan. Construction and operations personnel will be required to report any injured or dead wildlife detected while on the site to the qualified biologists during construction or to the appropriate onsite manager during operations.

All construction site personnel will be required to attend the environmental training in conjunction with hazard and safety training prior to working onsite. The Applicant's construction contractor will maintain a list of onsite construction personnel who have received the training.

P.9.2.6 Limited Work Areas

Construction work will be limited to the approved and surveyed areas shown on Facility constraints maps. No working or driving cross-country within the site boundaries as shortcuts or for any other purposes will be permitted without prior approval from appropriate authorities.

P.9.2.7 Speed Limits

All construction personnel will be instructed to observe caution when driving through the Facility site and to maintain reasonable driving speeds of 20 miles per hour (particularly during the period from 1 hour before sunset to 1 hour after sunrise) so as not to harass or accidentally strike wildlife. Speed limits will be posted throughout the Facility construction area.

P.9.2.8 Fire Control

The Applicant will be prepared for a quick response to wildfires that could affect the natural environment (wildlife habitat) during construction.

P.9.3 Minimization and Mitigation After Construction

After construction is complete, the Applicant will work to restore the habitat to preconstruction standards. These efforts are discussed below.

P.9.3.1 Habitat Restoration

The Applicant will implement a Revegetation Plan. In order to reestablish plant communities of most value to wildlife, native species will be used in nonagricultural areas to the maximum extent possible.

P.9.3.2 Habitat Conservation

For the impacts that cannot be avoided or minimized, mitigation will be developed by means of reliable methods and in compliance with ODFW habitat mitigation rules (OAR 635-415-0025). The Applicant will implement an HMP for the Facility, and the HMP will include the preservation and enhancement of a conservation area to mitigate for the impacts of the Facility on wildlife habitat. The property will be protected under a conservation easement for the life of the Facility. The HMP will be implemented on a portion of the same 440-acre parcel identified for mitigation of habitat impacts from the LJII (see Figures P-10 and P-11). The parcel is located in a relatively remote setting 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.

P.9.3.3 Fire Control

The Applicant will be prepared for a quick response to wildfires that could affect the natural environment (wildlife habitat).

P.9.4 Mitigation for Wildlife Habitat Impacts

Section P.9 describes the avoidance, minimization and mitigation measures that will be implemented to avoid, reduce, or mitigate potential adverse impacts to special-status/sensitive species and wildlife habitat. For the impacts that cannot be avoided or minimized, mitigation will be developed by means of reliable methods and in compliance with ODFW habitat mitigation rules (OAR 635-415-0025). The Applicant will implement an HMP for the Facility as described above.

P.9.4.1 Mitigation for Impacts to Non-listed, Special-status Species

Plants

There are no anticipated impacts to non-listed, special-status plants; therefore, no mitigation is required.

Wildlife

Construction and operation of the Facility is not expected to cause significant impacts to non-listed, special-status wildlife species. Nevertheless, the HMP is expected to result in conservation of suitable habitat for non-listed, special-status wildlife species, including sensitive raptors; grasshopper sparrows, long-billed curlews, and other grassland nesting birds; white-tailed jackrabbits; and other species, ensuring availability of undisturbed native habitat for non-listed, special-status species for the life of the Facility. In addition, the Applicant will provide an Avian and Bat Protection Plan as described below.

The Applicant recently adopted its Avian and Bat Protection Plan, the first in the wind industry. The plan is modeled in part after the 2005 Avian Protection Plan template developed by some 30 electric utility companies, electric cooperatives, and rural utilities in partnership with USFWS to address impacts of transmission and distribution lines on birds. The Applicant's plan will be implemented across its entire wind fleet and contains a corporate policy about wildlife protection to evaluate and mitigate any potential avian or bat issues early in the development process. The plan also establishes internal policies for pre- and post-construction monitoring and proper site design, impact assessment, permit compliance, nest management, and employee training. In addition, the plan supports the Applicant's ongoing efforts in wildlife research, quality control, and public awareness. A copy of the plan can be found on the Applicant's web site: http://www.iberdrolarenewables.us/rel_08.10.29.html

P.9.5 Compliance with ODFW OAR 635-415-0025

Temporary impacts to wildlife habitat will be restored consistent with OAR 635-415-0025, which will be described in the Revegetation Plan. For permanent impacts that cannot be avoided, the Applicant will implement an HMP similar to that implemented for nearby Facilities including LJII and Shepherd's Flat.

During final Facility design, the Facility will be microsited to avoid impacts to Category 1 habitat, and to avoid and minimize both temporary and permanent impacts to high-quality native habitat where practicable in order to retain habitat cover in the general landscape. However, because the Applicant seeks micrositing flexibility for the Facility as described in Exhibit C, temporary and permanent impacts were calculated based on the largest disturbance area and shifting the layout into the highest-quality habitat to show the "worst-case" situation. To ensure compliance with ODFW wildlife habitat mitigation goals and standards, the Applicant will work with ODOE and ODFW to confirm that the conservation easement (Figures P-10 and P-11) is large enough to achieve, within a reasonable time, the ODFW habitat mitigation goals and standards described in OAR 635-415-0025 for those "worst-case" impacts, as described in the HMP.

Before beginning construction, the Applicant will determine the final size and boundaries of the conservation easement in consultation with ODFW and the affected landowners and subject to the approval of ODOE. The final mitigation area will 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 4 through appropriate enhancement actions.

P.10 PROPOSED SITE CERTIFICATE CONDITIONS

The Applicant proposes that site certificate conditions such as conditions 45, 84, 85, 86, 87, and 89 from the *First Amended Site Certificate for the Leaning Juniper II Wind Power Facility* (November 20, 2009) be included in the site certificate for the proposed Montague Facility. Specifically, the Applicant proposes the following conditions:

Condition 45

Before beginning construction, the certificate holder shall provide to the Department a map showing the final design locations of all components of the Facility and areas that would be disturbed during their construction and also showing the areas that were surveyed for state and federally listed plant species or Category 1 habitat as described in the site certificate application. If areas to be disturbed during construction lie outside of the surveyed areas, the certificate holder shall hire qualified personnel to conduct field investigation of those areas. The certificate holder shall provide a written report of the field investigation to the Department and to the Oregon Department of Fish and Wildlife (ODFW). If any state and federally listed plant species or Category 1 habitat are found during the field investigation, the certificate holder shall ensure that construction and operation of the Facility will have no impact on the resources. The certificate holder shall instruct all construction personnel to avoid the areas where species or habitat were identified and shall implement other appropriate measures to protect the resources.

Condition 84

The certificate holder may construct turbines and other facility components within the site boundary as described in the Final Order on the Application, subject to the following requirements addressing potential habitat impact:

(a) The certificate holder shall not construct any facility components within areas of Category 1 habitat and shall avoid temporary disturbance of Category 1 habitat.

(b) The certificate holder shall design and construct facility components that are the minimum size needed for safe operation of the energy facility.

(c) In the final design of the facility within micrositing areas, the certificate holder shall reduce impact on essential or important habitat (Category 4 and above) to the extent practical.

(d) As a protective measure during construction, if populations of sessile mousetail, Laurent's milk-vetch or other special-status plants are identified, the certificate holder shall install exclusion fencing around these confirmed populations. The certificate holder shall not install facility components or cause temporary disturbance within these areas. Before beginning construction, the certificate holder shall verify the protected status of sessile mousetail and/or Laurent's milk-vetch and notify the Department. If the species have been upgraded to threatened or endangered

under State or federal law, the certificate holder shall take appropriate mitigation actions, subject to Department approval.

(e) If construction would affect locations within the micrositing areas that were not previously surveyed for the occurrence of State or federal threatened or endangered species, as described in the Final Order on the Application, the certificate holder shall conduct additional pre-construction surveys of those locations, notify the Department of the findings, and implement appropriate avoidance or mitigation measures for any threatened or endangered species detected, subject to Department approval.

Condition 85

The certificate holder shall implement measures to mitigate impacts to sensitive wildlife habitat during construction and operation including, but not limited to, the following:

(a) Preparing maps to show sensitive areas, such as nesting or denning areas for sensitive wildlife species, that are off limits to construction personnel.

(b) Before beginning construction, the certificate holder shall have a qualified biologist place exclusion markers around sensitive wildlife habitat areas, including Category 1 Washington ground squirrel (WGS) areas and an appropriate buffer around these areas. The certificate holder shall maintain the exclusion markings until construction has been completed.

(c) Ensuring that a qualified person instructs construction and operations personnel to be aware of wildlife in the area and to take precautions to avoid injuring or destroying wildlife or sensitive wildlife habitat.

(d) Avoiding unnecessary road construction, temporary disturbance, and vehicle use.

(e) Posting and maintaining speed limit signs (not to exceed 20 miles per hour) on access roads throughout the site. The certificate holder shall ensure that all construction and operations personnel are instructed to observe caution when driving in the Facility area to avoid injury or disturbance to wildlife enforce and for personal safety.

Condition 86

During construction, the certificate holder shall protect the area within a 1,300-foot buffer around active nests of the following species during the sensitive period, as provided in this condition:

Species	Sensitive Period	Early Release Date
Swainson's hawk	April 1 to August 15	May 31
Ferruginous hawk	March 15 to August 15	May 31
Burrowing owl	April 1 to August 15	July 15

During the year in which construction occurs, the certificate holder shall use a protocol approved by the Oregon Department of Fish and Wildlife (ODFW) to determine whether there are any active nests of these species within a half-mile of any areas that would be disturbed during

construction. If a nest is occupied by any of these species after the beginning of the sensitive period, the certificate holder shall not engage in high-impact construction activities (activities that involve blasting, grading, or other major ground disturbance) or allow high levels of construction traffic within 1,300 feet of the nest site. In addition, the certificate holder will flag the boundaries of the 1,300-foot buffer area and shall instruct construction personnel to avoid any unnecessary activity within the buffer area. The certificate holder shall hire an independent qualified biologist to observe the active nest sites during the sensitive period for signs of disturbance and to notify the Department of any non-compliance with this condition. If the qualified biologist observes nest site abandonment or other adverse impact to nesting activity, the certificate holder shall implement appropriate mitigation, in consultation with ODFW and subject to the approval of the Department, unless the adverse impact is clearly shown to have a cause other than construction activity. The certificate holder may begin or resume high-impact construction activities before the ending day of the sensitive period if any known nest site is not occupied by the early release date. If a nest site is occupied, then the certificate holder may begin or resume high-impact construction before the ending day of the sensitive period with the approval of ODFW, after the young are fledged. The certificate holder shall use a protocol approved by ODFW to determine when the young are fledged (the young are independent of the core nest site).

Condition 87

The certificate holder shall conduct wildlife monitoring as described in the Wildlife Monitoring and Mitigation Plan that is incorporated in the Final Order on the Application *as Attachment A and as amended from time to time.*

Condition 89

The certificate holder shall acquire the legal right to create, enhance, maintain, and protect a habitat mitigation area as long as the site certificate is in effect by means of an outright purchase, conservation easement, or similar conveyance and shall provide a copy of the documentation to the Department. Within the habitat mitigation area, the certificate holder shall improve the habitat quality as described in the Habitat Mitigation Plan *that is incorporated in the* Final Order on the Application *as Attachment C and as amended from time to time.*

These six proposed conditions ensure that appropriate actions are undertaken to adequately protect wildlife and habitat during the Facility's construction and operation.

P.11 MONITORING PROGRAM

(H) A description of the applicant's proposed monitoring plans to evaluate the success of the measures described in (G).

Response: The Applicant will implement a Wildlife Monitoring and Mitigation Plan, a Revegetation Plan, and an HMP, as required under the site certificate. The plans will be developed in consultation with ODFW and ODOE and will be similar to the plans implemented for nearby facilities such as LJF and Shepherds Flat.

The WMMP will be implemented for the operational phase of the Facility to evaluate both direct and indirect impacts of the Facility on wildlife and habitat.

Aspects and objectives of the WMMP will include avian and bat standardized casualty searches, training of Facility personnel on emergency response for discovered injured animals, tracking and reporting of incidental finds (whether reported by Facility employees or the qualified biologists), searcher efficiency trials, and carcass removal trials. Post-construction monitoring of WGS sites will also be conducted.

Temporarily disturbed habitats will be restored according to the Revegetation Plan. For the impacts that cannot be avoided or minimized, mitigation will be developed by means of reliable methods and in compliance with OAR 635-415-0025, and will be implemented as part of the HMP.

P.12 CONCLUSION

As part of the Facility siting process, all of the fish and wildlife habitats within the site boundary were identified and categorized pursuant to OAR 635-415-0025. During final Facility design, the Facility will be microsited to avoid all impacts to Category 1 habitat, and to avoid and minimize both temporary and permanent impacts to high-quality native habitat where practicable. Temporary habitat impacts will be mitigated consistent to OAR 635-415-0025 per the Revegetation Plan. For permanent impacts that cannot be avoided, the Applicant will implement an HMP.

Therefore, based on the information provided in this Exhibit, there is sufficient evidence upon which the Council may find that the design, construction, and operation of the Facility, taking into account the proposed mitigation measures, are consistent with the fish and wildlife mitigation goals and standards of OAR 635-415-0025. Accordingly, the Applicant demonstrates compliance with OAR 345-022-0060.

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Figures

Figures P-2, P-2a through P-2c, P-3, P-3a, P-6, and P-6a through P-6d are confidential and not for public distribution.

ATTACHMENT P-1

Letter from Oregon Department of Fish and Wildlife to FPL Energy Clarifying Habitat Category 1 for the Washington Ground Squirrel

ATTACHMENT P-2

Letter from Rose Owens, Oregon Department of Fish and Wildlife, September 15, 2008

ATTACHMENT P-3

Oregon Wind Siting Guidelines

ATTACHMENT P-4

Letter from Oregon Department of Fish and Wildlife to Department of Energy Clarifying Mitigation for Category 5 Habitat

ATTACHMENT P-5

Memo from Oregon Department of Fish and Wildlife on Category 5 Habitat

ATTACHMENT P-6

Species Occurrence Data from U.S. Fish and Wildlife Service and Oregon Natural Heritage Information Center

ATTACHMENT P-7

Montague Wind Power Facility 2009 Biological Investigations Report

ATTACHMENT P-8

Final Report—Avian and Bat Cumulative Impacts Associated with 6100 Megawatts of Wind Energy Development in the Columbia Plateau Ecoregion of Eastern Washington and Oregon

Oregon
John A. Kitzhaber, M.D., Governor

Department of Fish and Wildlife
Pendleton District Office
73471 Mytinger Lane
Pendleton, OR 97801
(541) 276-2344
FAX (541) 276-4414

March 15, 2002

Peter D. Mostow, attorney
Stoel Rives, LLP
900 SW Fifth Avenue, Suite 2600
Portland, Oregon 97204-1268

Subject: Washington Ground Squirrel Habitat Categories

Dear Mr. Mostow:

As part of the discussion with wind energy developers the Oregon Office of Energy (OOE) and Oregon Department of Fish and Wildlife (ODFW) were asked to clarify habitat categories for the Washington ground squirrel (WGS) in relation to the ODFW Habitat Mitigation Policy. The following description of habitat categories is entirely in reference to WGS and should be considered as guidelines to respond to site-specific circumstances in application of the Habitat Mitigation Policy.

Essential and limited habitat for WGS is any habitat that is necessary for WGS colonies including the associated WGS use area for those colonies or habitat that provides necessary movement (connectivity) between existing colonies, previously documented colonies and suitable habitat for future colonies. This would include:

1. Habitat that contains a currently occupied WGS colony and the colony's associated WGS use area; or

2. Habitat that historically contained a documented WGS colony site (not currently occupied) and the associated WGS use area unless the area is no longer suitable for a WGS colony because the habitat has been altered; or

3. Habitat that is within the historic geographic range of the WGS and has the potential to support a WGS colony and its associated WGS use area. This determination will be made on a site-specific basis using best professional judgment based on the best available scientific information and considering the following habitat attributes:

   a) The proximity of the potential habitat to currently or previously documented WGS colonies and their associated WGS use areas;

   b) The likelihood for connectivity between the potential habitat and currently or previously documented WGS colonies and their associated WGS use areas considering factors including, but not limited to, distance, topography and land use;

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c) The presence of habitat characteristics (e.g. vegetation, topography, aspect, soils, and degree of habitat alteration) that are similar to the characteristics of currently or previously documented WGS colonies;

or

4. Habitat that provides for dispersal and movement of WGS (connectivity) between currently occupied WGS colonies, previously documented WGS colonies and potential habitat for WGS colonies. This determination will be made on a site-specific basis using best professional judgment based on the best available scientific information and considering the following habitat attributes:

a) The proximity of the habitat to currently occupied, previously documented or potential habitat for WGS colonies and their associated WGS use areas;

b) The likelihood for connectivity between the potential habitat and currently or previously documented WGS colonies and their associated WGS use areas considering factors including, but not limited to, distance, topography and land use;

c) The amount and availability of alternative habitats that provides equivalent potential for dispersal and movement of WGS between currently occupied previously documented or potential habitat for WGS colonies.

"Essential and limited habitat" for WGS is Category One if the habitat is irreplaceable when considering the consequences of a proposed development action. "Essential and limited habitat" for WGS is Category Two if the habitat is replaceable when considering the consequences of a proposed development action.

Sincerely,

Kevin L. Blakely
John Day Watershed District Manager

C: Tom Meehan, OOE

Gail McEwen, ODFW

Russ Morgan, ODFW

Andy Linehan, Ch2M Hill

Karen Kronner, NW Wildlife Consultants

September 15, 2008

Mr. John White
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97301-3737

RE: Comments on the Preliminary Application for a Site Certificate for the Proposed Helix Wind Project

Dear John:

The Oregon Department of Energy (ODOE) has asked the Oregon Department of Fish and Wildlife (ODFW) to provide comments on the Preliminary Application for a Site Certificate for the proposed Helix Wind Project. ODFW's comments are listed below in the following order: (1) contact information; (2) ODFW's responsibilities according to applicable Oregon Revised Statutes (ORS) and Oregon Administrative Rules (OAR); (3) general comments; and (4) specific comments on the preliminary application for a site certificate.

1. Contacts

The main contact person for ODFW for this wind energy project is Rose Owens. Rose's contact information is: 3406 Cherry Ave. NE, Salem, OR 97303, phone (503) 947-6085. Rose will coordinate with Mark Kirsch, District Wildlife Biologist in Pendleton. Please be sure to send one copy of any future information to Rose Owens, and one copy to Mark Kirsch at 73471 Mytinger Lane, Pendleton, OR 97801. Mark's phone number is (541) 276-2344.

2. ODFW's Responsibilities and Expertise

ODFW will base its review and recommendations for the proposed project on the following applicable statutes and rules.

ORS 496.012 Wildlife Policy
ORS 496.171 through 496.192 Threatened and Endangered Wildlife Species
ORS 506.109 Food Fish Management Policy

OAR Chapter 635, Division 100 provides authority for adoption of the State Sensitive Species List and the Wildlife Diversity Plan, and contains the State list of threatened and endangered fish and wildlife species.

OAR Chapter 635, Division 415 classifies habitat into six categories and establishes a mitigation goal for each category. The application for a site certificate for this project must identify the appropriate habitat category for all project areas, provide the basis for each category selection, and then propose appropriate mitigation for the project-impacted areas, all subject to ODFW and ODOE review. ODOE adopted this rule into OAR 345-022-0060 as an energy facility siting standard.

ODFW also provides technical review and recommendations in compliance with Oregon Energy Facility Siting Council (EFSC) rules OAR 345-021-0010(1)(p) and (q) and 345-022-040, 060 and 070.

3. General Comments

For the applicant's information, fish and wildlife species listed under the State Endangered Species Act can be found on ODFW's website at: http://www.dfw.state.or.us/wildlife/diversity/species/threatened_endangered_candidate_list.asp. The application for a site certificate will need to address the potential for the project to adversely affect threatened and endangered species that are in or close to the project area. Also, for the applicant's information, the State Sensitive Species List for fish and wildlife is available on ODFW's website at: http://www.dfw.state.or.us/wildlife/diversity/species/docs/senspecies1997.pdf.

4. Specific Comments

In section P.4.1.2 Grassland Steppe on pages 21 and 22, Washington ground squirrel habitat is identified as Category 1 if the habitat is essential and irreplaceable when considering the consequences of a proposed development

action. The discussion further indicates habitat for Washington ground squirrels is considered Category 2 if the habitat is considered essential and replaceable when considering the consequences of a proposed development action. The discussion indicates the "foraging area" for Washington ground squirrels, which is a 785-foot ring around the outside edge of clustered squirrel holes, is considered Category 2 habitat since it is essential and replaceable. Section P.4.1.2 indicates this interpretation stems from guidance received from ODFW while preparations were being made to permit and construct the Leaning Juniper II wind facility in 2005.

ODFW staff have searched their documentation and have found no written guidance that was given during the Leaning Juniper II permitting timeframe pertaining to habitat categorization of the 785-foot ring of Washington ground squirrel habitat. ODFW's direction to categorize this habitat as Category 2 would have overturned the clear precedent established in June of 2003 when the Energy Facility Siting Council reviewed and approved an Application for a Site Certificate for Stateline, Amendment 2. This amendment sought to construct a turbine string through Category 1 habitat for Washington ground squirrels, most of which was in the 785-foot ring outside the area of clustered squirrel holes. Had the interpretation in P.4.1.2 been in place when Stateline, Amendment 2 was considered, the balancing option would have been unnecessary in order for construction to be allowed under the Energy Facility Siting Council's fish and wildlife habitat siting standard and ODFW's Fish and Wildlife Habitat Mitigation Policy.

Since there appears to be some confusion as to the extent of Category 1 habitat in relation to the needs of Washington ground squirrels, ODFW requests that applicants utilize the following guidance when establishing polygons for habitat categorization for this project as well for future projects.

Habitat for Washington ground squirrels is considered to be Category 1 habitat when it is essential, limited and irreplaceable when considering the consequences of a proposed development action. The cluster of holes where the squirrels are burrowing during the time of a survey is considered Category 1 habitat since any development through the burrowing area is likely to have a negative effect on the squirrels residing there. The area that ODFW will henceforth call "required habitat for squirrel survival" and as depicted by a 785-foot ring around the outside of the cluster of holes where the Washington ground squirrels are residing, is also considered essential, limited and irreplaceable to that squirrel colony. Therefore, this habitat is also Category 1 habitat when considering the consequences of a proposed wind development action since disturbance and reclamation of the required habitat for squirrel survival is not

achievable between the time squirrels go underground in mid to late June and when they emerge above ground in late February or early March of the next year.

The Category 1 required habitat for squirrel survival can be less than 785 feet from the outer edge of clusters of holes when interrupted by habitat types not suitable for foraging or burrow establishment. Examples of habitat breaks that would cause the 785-foot area to shrink would be tilled field edges or unvegetated, continuous vertical drop rim rock which has no burrowing or food value to Washington ground squirrels choosing to explore a given area. If the resulting turbine pad and associated road would provide no less habitat quality than what is currently at a site, the habitat category would be some category other than Category 1.

Habitat adjacent to a Washington ground squirrel colony (as defined as the cluster of holes as well as the required habitat for squirrel survival), but not occupied by any squirrels either for burrowing or foraging, which is of a similar habitat type and quality to the area occupied by the Washington ground squirrels on a development area, should be considered Category 2 habitat. This area will henceforth be termed as an area of potential Washington ground squirrel use.

Thank you for the opportunity to comment on the preliminary application for a site certificate for the Helix Wind Project. ODFW looks forward to working with you and the applicant further on this project. If you have questions regarding any of the above comments, please feel free to call me at (503) 947-6085.

Sincerely,

Rose Owens
Habitat Special Projects Coordinator

cc: Mark Kirsch, Pendleton
Russ Morgan, La Grande
Steve Cherry, Heppner

Oregon Columbia Plateau Ecoregion Wind Energy

Siting and Permitting Guidelines

September 29, 2008

In the fall of 2007, representatives from the wind energy industry, counties, environmental organizations, consultants and state and federal resource agencies (the Taskforce) convened to collaboratively develop wind energy siting and permitting guidelines for the Columbia Plateau Ecoregion[1] (Guidelines). For almost a year the Taskforce compiled and synthesized current industry practices, agency recommendations, environmental concerns, and supportive science. These Guidelines apply to the five counties where the majority of Oregon's wind energy development is ongoing.

The Taskforce believes these Guidelines represent a successful balance between environmental protection and future development of renewable wind energy resources in the Oregon Columbia Plateau Ecoregion. The intention of the Taskforce is that wind project developers, resource agencies, permitting authorities and other stakeholders consistently apply these Guidelines. The success of these Guidelines requires training and understanding by relevant agencies, counties, and other stakeholders.

The Taskforce recognized that while the expansion of wind power resources has the potential to significantly impact wildlife and habitat, it also provides significant environmental and economic benefits. Maximizing the Ecoregion's wind energy generation potential will be an important factor in achieving Oregon's renewable energy and climate change targets. These guidelines seek to support future wind energy development, thereby achieving multiple environmentally beneficial goals, while providing careful guidance towards protection and conservation of important biological resources.

As wind energy development expands to other areas within Oregon outside the Columbia Plateau Ecoregion, the Taskforce hopes to amend these Guidelines to provide regionally specific guidance. Until separate regional guidelines can be developed, the Taskforce recommends using these Guidelines as a roadmap during each step of a potential wind project's development, construction, and operation.

These Guidelines do not expand or alter any of the existing laws, regulations, or other authorities under which local, state and federal agencies and permitting authorities operate. However, to fulfill the intent of these Guidelines, modifications to wind project developer and permitting authority practices and procedures may be necessary. It is expected that wind project developers and relevant permitting authorities will use all their means to implement these Guidelines, in a unified, consistent fashion.

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[1] As defined in the ODFW wildlife conservation strategy. See Appendix for a map of the Ecoregion.

Participant List

Renewable Northwest Project

United States Fish & Wildlife Service

Oregon Department of Fish & Wildlife

Oregon Department of Energy

Washington Department of Fish & Wildlife

Sherman County

Morrow County

Klickitat County

Iberdrola Renewables

Horizon Wind Energy

Portland General Electric

Eugene Water & Electric Board

Audubon Society of Portland

Lane County Audubon

The Nature Conservancy

Stoel Rives, LLP

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Appendix 28

Map of Columbia Plateau Ecoregion

Table 1: ODFW Fish & Wildlife Habitat Categories

Table 2: Fish & Wildlife Habitat Mitigation Policy, Habitat Categorization

Table 3: Mitigation Goals and Standards of ODFW's Fish and Wildlife Habitat Mitigation Policy

Cumulative Wildlife and Habitat Impacts Review and Recommendations

Introduction

In the fall of 2007, the Oregon Department of Fish and Wildlife (ODFW), the Oregon Department of Energy (ODOE) and the United States Fish and Wildlife Service (USFWS) initiated a stakeholder Taskforce (Taskforce) to assess current and future project facility siting and permitting in Oregon's Columbia Plateau Ecoregion[2](Ecoregion). The Taskforce included conservation and environmental organizations, wind project developers, local governments, and representatives of USFWS, ODFW, ODOE, and Washington Department of Fish and Wildlife (WDFW). As wind project development continues to rapidly expand in the Ecoregion, the Taskforce is charged with developing regionally consistent, voluntary siting and permitting guidelines that allow for additional wind power development while avoiding or minimizing impacts to wildlife resources. Consistent application of these guidelines by all wind developers, permitting authorities, resource agencies, and interested stakeholders is essential to successfully balance expansion of wind power resources in the region with conservation of wildlife resources. It is the Taskforce's view that while these guidelines were developed for specific application on the Oregon side of the Ecoregion, the guidelines process and approach can be adapted to other Oregon ecoregions and across state lines, and that a coordinated, consistent approach across the region is desirable.

The Taskforce recognized that while the expansion of wind power resources has the potential to significantly impact wildlife and habitat, it also provides significant environmental benefits. The Oregon legislature has acknowledged the environmental benefits of the wind industry through the passage of related legislation. Oregon law requires utilities to provide 25% renewable energy to their customers by 2025. In addition, Oregon has established goals to reduce greenhouse gas emissions by 75% below 1990 levels by 2050. Maximizing the Ecoregion's wind energy generation potential will be an important factor in achieving Oregon's renewable energy and climate change targets. These guidelines seek to support future wind energy development, thereby achieving multiple environmentally beneficial goals, while providing careful guidance towards protection and conservation of important biological resources.

The purpose of the guidelines is to ensure that wind project siting and permitting for all project sizes within the Ecoregion in Oregon, at **all permitting jurisdictional levels** (both county-level conditional use permitting and the Oregon Energy Facility Siting Council (EFSC) site certification process[3]) is protective of important biological resources. While these Guidelines were designed to help wind project developers comply with state and federal wildlife regulations and policy, they do not in any way supersede or delegate current regulation at the state and federal level.

The regulatory environment for the siting of wind projects in the Ecoregion is governed by multiple agencies at the Federal, State and Local levels. Each of these agencies can apply requirements to a wind project. Wind project developers should meet with regulators and

[2] A map of the Columbia Plateau Ecoregion of Oregon is included in the Appendix.

[3] http://www.oregon.gov/ENERGY/SITING/index.shtml

potentially interested stakeholders such as non-governmental organizations with wildlife expertise and tribal governments early in the wind project planning process to understand those regulatory requirements and wildlife impact concerns that may be applicable for the project.

At the Federal level, applicable laws include, but are not limited to, the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), the Endangered Species Act (ESA), and the Clean Water Act. The MBTA prohibits the taking of migratory birds except when specifically authorized by the Department of Interior (16 USC 703). Most native songbirds, wading birds, waterfowl and birds of prey are protected under the MBTA. The USFWS encourages proactive consultation between USFWS, other resource agencies, wind project developers and the permitting authority regarding the applicability of federal wildlife laws to a wind project.

At the state level, all wind projects in Oregon over 105 megawatts (MW) are reviewed and approved through a formal process coordinated by the ODOE. Wind projects smaller than 105 MW may opt into the state siting process. The formal process leads to a site certificate issued by the Oregon Energy Facility Siting Council (EFSC). Oregon EFSC guidelines state "to issue a site certificate, the [Energy Facility Siting] Council must find that the design, construction and operation of the facility, taking into account mitigation, are consistent with the fish and wildlife habitat mitigation goals and standards of OAR 635-415-0025 in effect as of September 1, 2000." Early consultation with ODFW can clarify those fish and wildlife mitigation goals and standards (see Appendix, Table 3).

At the local level, wind projects less than 105 MW are approved through a local land use procedure requiring a conditional use permit. Counties which review wind project proposals less than 105 MW in the Oregon portion of the Columbia Plateau include Wasco, Sherman, Gilliam, Morrow and Umatilla counties. Each county may have a different set of local energy facility siting criteria as some counties have adopted criteria of varied nature and complexity.

These Guidelines include specific recommendations for each phase of facility site selection, development, and operation. These wind project recommendations include consistent strategies to avoid key wildlife habitat, minimize other wind project-related impacts to habitat and wildlife, and mitigate strategies for unavoidable wind project impacts. A key recommendation that is continually stressed herein is the value of the wind developer seeking early consultation with local, state, and federal natural resource agencies. Consistent application of these Guidelines across the Ecoregion will be critical to their effectiveness. These Guidelines are designed to develop best wildlife and habitat conservation practices for wind development by (in part) creating incentives to direct wind farm development away from the highest value wildlife habitat (avoid habitat categories 1, 2,) and towards sites of lower biological value (target development on habitat categories 4, 5 and 6).

These Guidelines recommend five sequential phases: the first phase, macrositing, identifies conflicts that may make a wind project prohibitively difficult to permit from a wildlife perspective before significant investment is made by wind project developers. The second phase, pre-project assessment, identifies and assesses wildlife and habitat resources on the potential wind project site and identifies micrositing corridors that will be utilized to locate specific turbines and associated infrastructure. The third phase, micrositing, determines the final wind project design

(i.e., the final placement of turbines, roads, transmission lines, other wind project features). The fourth phase, construction, seeks to avoid and minimize impacts to wildlife by following protective measures. The fifth phase, operational monitoring, determines the actual direct mortality impacts of the wind project on wildlife and involves working with a Technical Advisory Committee (TAC) to review the results of monitoring data and make suggestions regarding the need to adjust mitigation and monitoring requirements. For projects regulated by EFSC, the project proponent should work with the USFWS, ODFW and ODOE and EFSC will determine appropriate actions. Next, these Guidelines describe mitigation strategies to compensate for unavoidable temporary and permanent impacts to habitat and wildlife species due to wind project development and operation. Finally, the Guidelines include programmatic recommendations, particularly three recommendations of high priority.

Included in the Appendix is a summary of information regarding the currently known cumulative wildlife and habitat impacts of wind energy development in the Columbia Plateau Ecoregion. Recommendations included in this summary are intended to inform future wind project planning and development within the Columbia Plateau Ecoregion, as well as direct resources to more fully understand indirect cumulative effects.

A table displaying the sequence of the five wind development and operation phases and relationship to project permitting is provided below.

Phase	Timing	Task
1 - Macrositing	Early evaluation of potential wind project site	Information/desktop review of habitat, wildlife, plants, and cumulative impacts; review of regulatory requirements; preliminary scoping of potential issues with resource agencies and permitting authorities
2- Pre-Project Assessment	During preparation of permit application	Identification of micrositing corridors, habitat mapping; early coordination with resource agencies regarding survey protocols; undertake raptor surveys; avian use surveys; T/E species and other wildlife surveys; assessment of project impacts; presentation of habitat mitigation proposal and initial calculation of habitat mitigation acreages to resource agencies.
Submit Permit Application for Agency and Public Review		
	Permit application review	Review of application by resource agencies and permitting authority for completeness. Scoping/public

		comment period. Wind project developers are encouraged to engage stakeholders with wildlife expertise.
Phase	Timing	Task
Permit Issued		
3 - Micrositing	Can occur prior to or after permit issuance, and continues through construction.	Initial micrositing to minimize habitat and wildlife impacts. Continuation of discussions with resource agencies.
4- Construction	After permit is issued, prior to and during construction.	Identification of key compliance staff; environmental training; flagging and micrositing to avoid sensitive resources; implementation of construction best management practices (BMPs).
5- Operation	After construction, during operations.	Implementation of habitat mitigation prior to wind project operation start date; site revegetation; operational monitoring; engagement with the TAC; determine potential additional mitigation with resource agencies and permitting authority as necessary.

Wind Project Development and Operations Phases

1.0 Macrositing – Preliminary Site Review

Macrositing is a proactive process for identifying potentially significant wildlife and habitat conflicts early on in the site selection process for new wind farm projects. Macrositing should be viewed as a coarse wind project siting filter based primarily upon pre-existing information of the natural resource values located on and in close proximity to the proposed development site. This initial step in siting a project is meant to identify conflicts that may make a project prohibitively difficult to permit from a wildlife perspective before significant investment is made by project developers. Pursuing wind projects on sites where there are significant wildlife concerns should trigger elevated pre- and post-construction surveying and monitoring requirements, longer review processes, increased site development restrictions, and higher mitigation ratios compared to development of wind power projects on previously disturbed sites with lower wildlife habitat value where these requirements may be significantly reduced.

The macrositing assessment should consist of a preliminary reconnaissance field survey and a desktop review of existing information about the proposed development site. Recommended components of a macrositing review process for the proposed wind project site include broad habitat, wildlife, plant, cumulative effects, and agency/stakeholder interviews. Not all of the individual elements listed below will be prohibitive of development, but each of the elements should be considered individually and collectively to develop a preliminary understanding of wildlife impact-related project feasibility.

Wind Resource Review

1. Temporary meteorological towers (met towers) are deployed to determine if adequate wind resources occur on potential wind project sites. To the extent feasible, temporary met towers for potential wind project sites should be deployed in locations that avoid likelihood of wildlife collisions. Project developers should remove all temporary met towers and associated equipment after they are no longer needed, including removal of temporary met towers from potential wind project sites where no additional development effort is expected to be undertaken.

Habitat Review

1. Identification of habitat types and habitat categorization as per ODFW's Fish and Wildlife Habitat Mitigation Policy (Oregon Administrative Rules [OAR] 635-415-0000 through 635-415-0025, http://www.dfw.state.or.us/lands/mitigation_policy.asp) for the potential wind project development site. These habitat types and categories should be determined on a site specific basis through consultation with ODFW[4]. ODFW considers Category 1 habitats irreplaceable. These Guidelines recommend that wind developers, under all circumstances, should avoid Category 1 habitats. These Guidelines strongly discourage

[4] See Appendix for additional detail.

wind developers from pursuing project development activities on Category 2 habitat, and strongly encourage wind developers to pursue project development activities on categories 4, 5, and 6 habitats.
2. Review of ODFW Conservation Opportunity Areas, Strategy Habitats and Strategy Species, as described within the Oregon Conservation Strategy (ODFW February 2006 – http://www.dfw.state.or.us/conservationstrategy/).
3. Review of other existing wildlife and habitat data systems including Oregon Natural Heritage Database, Defenders of Wildlife Conservation Registry, Partners in Flight Bird Conservation Areas, Audubon Important Bird Areas, The Nature Conservancy Conservation Areas, etc.
4. Review of potential ecological impacts to proximal protected, public and private wildlife refuges and wildlife areas.
5. Evaluation of the presence of habitat types of specific concern, including native grasslands, shrub-steppe, oak-pine woodlands, riparian woodlands, cliffs, Washington ground squirrel burrow complexes and required adjacent habitat for squirrel survival, big game winter range, and riparian corridors.
6. Evaluation of potential impacts on proximal recognized or probable migratory corridors or existence of topographic features, such as ridges or peninsulas that could funnel migratory species towards a wind power facility.
7. Review of occurrence of seasonal weather conditions, such as dense fog or low cloud cover, which may increase risk of bird and bat collisions with wind towers.

Wildlife Review

1. Presence of state or federally listed Endangered, Threatened or Sensitive Species, designated Critical Habitat, or other important wildlife habitat.
2. Presence of priority Strategy wildlife species identified in the Oregon Conservation Strategy for the Columbia Plateau Ecoregion, including but not limited to, brewer's sparrow, ferruginous hawk, grasshopper sparrow, Lewis' woodpecker, loggerhead shrike, long-billed curlew, sage sparrow, Swainson's hawk, burrowing owl, pallid bat, Townsend's big-eared bat, Washington ground squirrel, and northern sagebrush lizard.
3. Proximity to known bat colonies or important bat habitat.
4. Presence of species vulnerable to habitat loss or displacement.

Plant Review

1. Presence of state or federally listed plant species.
2. Presence of priority Strategy plant species identified in the Oregon Conservation Strategy.

Cumulative Impacts Review

1. Presence of existing proximal wind power developments.
2. Presence of other proximal causes of wildlife mortality.

Tabletop Review with Agencies and Stakeholders

1. Preliminary scoping conversations with state and local natural resource agencies, permitting entities, land managers and conservation organizations.
2. Preliminary consideration of laws and regulations (MBTA, ESA, BGEPA, Clean Water Act, Oregon Fill-Removal Law, and State Endangered Species Act).

In certain instances, where wildlife and/or habitat conflicts are identified via the macrositing process, it may be possible to design a project to avoid or minimize impacts to biological resources. In other instances wildlife and habitat priorities (e.g. listed species, Category 1 habitat) may make it prohibitively difficult to develop acceptable mitigation plans. In either situation, early knowledge of potentially significant wildlife and/or habitat conflicts should serve as a strong caution to project developers considering further investment in exploration of wind farm development on these areas of concern. If a project in an area of high natural resources concern does proceed beyond macrositing to the permitting stage and eventual wind project construction, extensive additional pre-development site-specific surveying and operational monitoring may be necessary (described in the Pre-project Assessment and Operational Monitoring sections) to identify, quantify, and mitigate specific wildlife and habitat impacts.

2.0 Pre-Project Assessment

When a potential wind project moves past the broad macrositing stage and wind resources prove to be adequate, onsite field study is necessary to further assess the site's suitability for wind energy development and, if appropriate, determine the general location of facilities within the specific parcels. The objective of this phase is to identify and assess micrositing corridors that will be utilized to locate specific turbines and associated infrastructure. The components of this phase include field studies and coordination with the permitting authority and resource agencies (i.e. state and federal wildlife agencies).

Recommended pre-project assessment components are discussed below. The pre-project assessment should be designed in consultation with the permitting authority, resource agencies and interested stakeholders with wildlife expertise. The site-specific components and the duration of the pre-project assessment should depend on the size of the project, the availability and extent of existing and applicable information in the vicinity of the project, the habitats potentially affected, the likelihood and timing of occurrence of Threatened and Endangered and other Sensitive-Status (TES) species at the site, and other factors identified during early resource agency coordination. If applicable pre-existing information is available, the project developer, permitting authority, and resource agencies should take this information into consideration when designing (and potentially modifying) the baseline studies identified below. Conversely, in areas where pre-existing information is not available or in areas of unique biological significance and/or high quality habitat, additional study may be required. The results of the information review and baseline studies should be reported to and discussed with the permitting authority and resource agencies in a timely fashion.

Identify Micrositing Corridors

Micrositing corridors represent a surveyed area within which turbines, associated access roads, collector cables and other project facilities are proposed. The micrositing corridors are centered on the preliminary project layout, and range in width depending on site and habitat conditions and the need for micrositing flexibility. The project developer should identify the micrositing corridors early in the development process, map the habitat and habitat categories within and adjacent to these corridors, and conduct all biological resource surveys, as described below. This information would be used for the project impact assessment and included in permit application materials. After the project is permitted, the turbines and other project facilities are sited within the micrositing corridors identified. These facilities may be located slightly outside the micrositing corridors if they have been adequately surveyed for biological and cultural resources before construction. Final project feature locations should comply with all applicable permit conditions. Final facility micrositing, where specific locations of project features are determined, is discussed further in Section 4.0, Micrositing – Final Project Design.

Habitat Mapping

Information about general vegetation and land cover types, wildlife habitat, habitat quality, extent of noxious weeds, and physical characteristics within the project site[5] should be collected and compiled using best available standards.

All habitat within the project site should be mapped into specific, clearly defined habitat types, such as grassland, shrub-steppe, woodland, cropland, and Conservation Reserve Program (CRP). These broad habitat types should be further defined within the micrositing corridor into subtypes based on additional field surveys, and rated according to the ODFW habitat categories (as defined by the ODFW Fish and Wildlife Habitat Mitigation Policy; see Appendix for further information).

Raptor Nest Surveys

One full season of raptor nest surveys should be conducted, using best available standards. Consult with the local resource agency biologist as to the species to survey near the boundaries of the micrositing corridors and the appropriate timing of surveys for the applicable species. Survey(s) should determine the species and nest location(s) that will potentially be disturbed by construction activities. The survey(s) should also identify active, potentially active, and alternate or historic (active within the past five years) nest sites with the highest likelihood of impacts from the operation of the wind project. A larger survey area outside the boundaries of the micrositing corridors may be necessary if there is a likelihood of nesting or other use by state and/or federally protected or sensitive raptor species (e.g., ferruginous hawk, Swainson's hawk, bald eagle, golden eagle). A larger survey area will also be useful if the wind project is implementing site-specific studies on wildlife displacement impacts (see Wildlife Displacement Section,

[5] Site – a project "site" is defined as the project area bounded on all sides by the furthest most external perimeter of any ground disturbing activity and includes gravel sites used for construction, overhead and underground electrical routes, and new and upgraded substations. When EFSC is the permitting authority, wind developers should refer to EFSC site boundary definitions.

below). Additional surveys may be required depending on resource agency guidance, site-specific conditions, and preliminary findings.

All potential and confirmed raptor nests should be recorded, regardless of activity status. If possible, inactive nests (without sign of use) should be assessed for nest age, species of use, and estimation of last season used.

General Avian Use Surveys

In general, one full year of avian (including raptors, passerines, etc.) use surveys should be conducted in the project site, using best available standards. Surveys should be designed by species group and by season, as appropriate for the wind project area and its habitat types. Two or more years of seasonal data is recommended in the following cases: 1) use of the project site by the avian groups of concern is estimated to be high, 2) there is little existing relevant data regarding seasonal use of the wind project site or on nearby areas of similar habitat type, and/or 3) the wind project is especially large and/or complex. This additional avian use data should be collected to refine impact predictions and make decisions on project design. Survey durations may also be reduced dependent upon availability of pre-existing relevant survey data.

Survey protocol and duration should be discussed with the permitting authority and resource agencies prior to commencement of surveys. Best available standards should be used to design survey protocols. Good references for designing survey protocols are the National Wind Coordinating Collaborative Guidance Documents (www.nationalwind.org), listed below. Please note that these documents undergo frequent revisions.

Anderson et al. 1999 *Studying Wind Energy/Bird Interactions: A Guidance Document Metrics and Methods for Determining or Monitoring Potential Impacts On Birds At Existing And Proposed Wind Energy Sites*. National Wind Coordinating Committee http://www.nationalwind.org/publications/wildlife/avian99/Avian_booklet.pdf

Anderson et al. 2003.*The Proper Use Of "Studying Wind Energy/Bird Interactions: A Guidance Document*."(addendum to the 1999 document) National Wind Coordinating Committee http://www.nationalwind.org/publications/proper-use_mm.pdf

Kunz et al. 2007. *Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats: A Guidance Document*. National Wind Coordinating Committee http://www.nationalwind.org/pdf/Nocturnal_MM_Final-JWM.pdf

Surveys for Threatened, Endangered and Sensitive Species

If existing information suggests the probable occurrence of state and/or federal TES species in the micrositing corridor (e.g., presence of suitable habitat or past sightings on-site or in the vicinity), surveys using best available standards are recommended during the appropriate season to determine the presence or likelihood of presence of the TES species. For example, if bald eagles are expected to concentrate in or near the project vicinity during winter, targeted surveys to estimate bald eagle use of the site would be appropriate. If the project is located in the known range of the state-endangered Washington ground squirrel, surveys using best available standards should be conducted in suitable Washington ground squirrel habitat. Other

multi-species surveys may also be appropriate. Survey protocol should be discussed with the permitting authority and resource agencies prior to commencement of the surveys.

Bat Surveys

Conduct bat surveys using best available standards if determined to be necessary after consultation with resource agencies. Appropriate methods, survey periods and locations depend on local environmental conditions and elevation, and vary by species and/or life stage.

Additional Wildlife Surveys

If additional species of concern (e.g., mammals, fish, reptiles, amphibians, invertebrates, etc.) may be in the project area, appropriate surveys using appropriate species-specific protocols may be conducted if determined to be necessary after consultation with resource agencies. Discuss appropriate methods, survey periods and locations with the permitting authority and resource agencies prior to commencement of the surveys.

Cumulative Impacts Report

Wind developers should summarize existing available data on wildlife impacts associated with existing wind projects proximal to proposed wind projects. This information should include habitat, displacement and mortality data and an estimation of how the new proposed wind project may affect those impacts.

Coordination

The permitting authority and resource agencies should be involved in site visits, study design, review of study results, and application of these results as they inform project design.

3.0 *Micrositing – Final Project Design*

Final project design (i.e., the final locations of wind turbines, roads, transmission lines, other wind project features) within the micrositing corridor is determined in this phase, and is informed by the constraints identified in the habitat mapping and other studies from Pre-Project Assessment and the subsequent conditions of permit approval. As appropriate, final wind project design should occur in consultation with the permitting authority and resource agencies and seek to avoid and/or minimize biological resource concerns, based on their input and issues of constraint identified during pre-project assessment. If further engineering design requires the wind project developer to seek to locate facilities outside of the previously surveyed micrositing corridors, the wind project developer should consult with the permitting authority and resource agencies to determine additional survey requirements.

Final wind project design should be an iterative process that should involve considerations and trade-offs between engineering, constructability, and natural resource considerations. Final wind project design should consider biological resource surveys, resource agency input, and associated permit conditions such as avoidance criteria. For instance, final location of wind project facilities may be limited by topography, meteorology and geotechnical considerations.

During final wind project design, the wind project developer and their biology consultant, working with the permitting authority and resource agencies, should continually evaluate tradeoffs among: locations of turbines, crane paths, roads, collector cables (overhead vs. underground), and other facilities; potential impacts to habitat and species that may occur; and mitigation that may be required.

Below are considerations for avoiding and/or minimizing impacts to biological resources when finalizing wind project design. These considerations should also be addressed in the permitting process and permit conditions.

Within micrositing corridors, where feasible:

- Encourage siting on agricultural lands, including using existing transmission corridors and roads where feasible.

- Protect specifically identified key habitat sites, such as raptor nests, flight routes, cliffs, high bird or bat concentration areas (especially concentration areas of sensitive status species), breeding sites, contiguous habitat where area-dependant species are present, and core habitat areas for displacement-sensitive species.

- Use tubular turbine towers to reduce perching ability and to reduce the risk of avian collision. Avoid the use of lattice turbine towers, particularly those with horizontal cross-members.

- Avoid use of guy-wired permanent meteorological towers.

- .Discourage overhead collector lines[6], unless underground collector lines are not feasible to construct (e.g., soil conductivity), the overhead collection line option has lower environmental impact, or the cost of overhead collector lines would make the wind project commercially infeasible. Overhead collector lines should be constructed in accordance with the recommendations of the Avian Power Line Interaction Committee[7] for raptor protection on power lines, including minimum conductor spacing. Anti-perching devices should be installed on transmission pole tops and cross arms where the poles are located within 0.5 mile of turbines.

Wind Project Lighting

These Guidelines recommend minimizing wind project lighting wherever possible, except where required by the FAA. Wind project lights may attract wildlife and increase the potential for wildlife mortality.

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[6] Collector lines are lower voltage underground or overhead power lines that deliver electricity from the turbine strings to the project substation. Collector lines do not include grid transmission lines.

[7] www.aplic.org

Wind Turbine Lighting Plan & Implementation

In general not all wind turbines within a wind project require Federal Aviation Administration (FAA) lighting. Before beginning construction the project proponent should submit a Notice of Proposed Construction or Alteration to the FAA identifying the locations of the turbines and permanent meteorological towers over 200 feet in height and a proposed lighting plan. The proposed lighting plan should minimize use of lights on towers, while complying with the FAA lighting requirements. These Guidelines recommend proposing the following in the project lighting plan to FAA:

- Use of standard white turbine paint as daylight marking, rather than daytime white flashing lights.
- Where lights are necessary, use red, flashing, synchronized lights
- Propose lighting of turbines on the periphery of the wind project and every half mile;
- Set lights at the minimum beam spread and the maximum off-phase between light pulses/bursts. Currently, the FAA requires the beam spread on turbine lighting to be between 6 and 20 degrees wide and that red lights flash between 20 and 40 times per minute. Therefore, lights should be set to a 6-degree beam spread and should flash at 20 flashes a minute.

Other Project Lighting

For any lighting at project facilities that is not regulated by the FAA, these Guidelines recommend the following best management practices to minimize potential for wildlife impacts:

- Ground lighting/outbuilding lighting should operate only on motion-sensing devices such that lights remain off unless triggered.
- Security lighting should be shielded or directed downward to reduce glare.

4.0 Construction

During project construction, project developers should continue to avoid and/or minimize impacts to wildlife and habitat by following these Best Management Practices (BMPs):

Identify Key Compliance Staff

- Each project should identify a Field Contact Representative (FCR) to be on-site to oversee compliance during construction and provide environmental training to on-site personnel. The FCR is responsible for overseeing compliance with all protective measures and coordination in accordance with the permitting authority and resource agencies and should have the authority to issue a “stop work order” if deemed necessary.

- The FCR should coordinate with a qualified biologist who should be available as needed to assist with specific issues of biological concern that are identified either prior to or arise during construction.

Environmental Training

- Develop a compliance matrix describing permit conditions for use as a reference and tracking tool for the FCR.
- Provide maps of environmental constraints (sensitive areas) to contractors to ensure sensitive sites are avoided.
- Environmental training should be provided for all on-site construction personnel, including:
    - permit requirements
    - exclusion flagging
    - sensitive species present onsite
    - protocol for responding to wildlife discoveries
    - protocol for responding to dead or injured wildlife (see Operational Monitoring Section reference to a Wildlife Handling and Reporting System)
    - any other protocols related to avoiding and/or minimizing impacts to wildlife

Sensitive Resource Avoidance

Sensitive areas to be avoided during construction, such as occupied Washington ground squirrel burrow complexes and required adjacent habitat for squirrel survival, riparian areas, and sensitive raptor nests, should be identified near planned construction areas, as described below:

- Mark sensitive habitat or species areas with orange exclusion fencing, brightly colored pin flags, wooden lathes or other marking. The contractor(s) will be instructed to work outside these boundaries at all times. The FCR should ensure that exclusion flagging is in place prior to construction in that area.
- Sensitive raptor nest trees should be flagged. The FCR should work with the construction contractor to minimize construction work in these areas to the extent feasible during periods when the nests are active.
- Avoid constructing during avian nesting season, wherever possible. If previously unknown active nests are discovered during construction, the project developer should consult with resource agency(s).

Construction Compliance

- Avoid introduction of noxious weeds as a result of disturbance from construction and operation by implementing a weed control plan developed in accordance with local guidelines.

- Minimize the risk of fire as a result of construction and operation activity by developing a fire protection plan established in conjunction with permitting authority and in accordance with local guidelines. Train all onsite personnel in the application of the fire protection plan. A wildfire can significantly impact the natural (wildlife habitat) environment.

- Undertake the restoration of wildlife habitat temporarily disturbed during the construction, maintenance or repair of the project, using a revegetation plan developed with the recommendation of the permitting authority and resource agency(s).

- Instruct all construction personnel to observe caution when driving through the project area and to maintain reasonable driving speeds (particularly during the period from 1 hour before sunset to 1 hour after sunrise) so as not to harass or accidentally strike wildlife. Post speed limits on project roads (not public roads) throughout the project construction area.

- As required under Clean Water Act National Pollutant Discharge Elimination System (NPDES) regulations, develop an Erosion and Sediment Control Plan for the project site to be implemented and monitored during construction. The plan will require the contractor to install erosion and siltation controls near riparian areas and other appropriate locations as designated in the plan. The plan should be implemented until the wind project restoration is complete and no additional erosion or sediment loss is occurring.

Minor Construction Layout Changes

Minor layout changes may occur within and outside the micrositing corridors during construction, typically as a result of landowner feedback and recommendations from the construction contractor. The project developer should continue ongoing communication with the permitting authority and resource agencies to ensure they are aware of minor changes outside the micrositing corridors or in areas previously restricted by the permitting authority within the micrositing corridors and seek to ensure any minor project changes do not adversely affect wildlife or their habitats.

5.0 Operational Monitoring

Monitoring studies, such as avian and bat carcass surveys using best available standards are required to determine the actual direct impacts of the wind farm on wildlife mortality. Wildlife displacement surveys or other specialized surveys for species of concern may also be necessary (see the Wildlife Displacement section of the Mitigation section, below). The duration and scope of the monitoring should depend on the size of the project, and the availability of existing monitoring data at nearby projects in comparable habitat types. Wildlife species most closely monitored should be state and federal TES species, and declining species.

Operational monitoring should be designed in consultation with the permitting authority, resource agencies and interested stakeholders with wildlife expertise. A good resource for designing survey protocols is the National Wind Coordinating Collaborative Wildlife/Wind

Interaction Publications website (http://www.nationalwind.org/publications/wildlife.htm). A minimum of two full years of operational avian and bat fatality monitoring (not necessarily consecutive) should be conducted on the wind project site, using best available standards. Shorter study duration may be recommended if mortality information exists from immediately adjacent projects on similar habitat types. Conversely, longer study duration may be recommended in the following cases: 1) use of the project site by the avian and bat groups of concern is estimated to be high; 2) there is little existing data regarding avian and bat fatalities in the project area; 3) the project is especially large and/or complex; and/or 4) initial fatality monitoring identifies unexpectedly high incidence of mortality or locally or regionally significant impacts to avian and bat species of concern.

Wind project operators should also develop a Wildlife Handling and Reporting System. This system is a monitoring program set up for responding to and handling avian and bat casualties found by construction and maintenance personnel during construction and operation of the facility. This monitoring program should include the initial response, the handling and the reporting of bird and bat carcasses discovered incidental to construction and maintenance operations. Construction and maintenance personnel should be trained in the methods needed to carry out this program.

The wind project operator is strongly encouraged to establish and/or participate in a Technical Advisory Committee (TAC), which will be responsible for reviewing results of monitoring data and making suggestions to the permitting authority and resource agencies regarding the need to adjust mitigation and monitoring requirements based on results of initial monitoring data and available data from other projects. For projects regulated by EFSC, the project proponent should work with the USFWS, ODFW, ODOE, and the EFSC will determine appropriate actions.

Potential members to the TAC include stakeholders such as state and federal wildlife agencies, environmental organizations, landowners, permitting agencies and county representatives. The TAC needs to be comprised of an equal number of individuals with vested (monetary) and non-vested interests in the project. The project developer should make all information generated by the pre-project assessment and operational monitoring of the wind project available to the public, except where necessary to keep confidential for species protection purposes. Protocols for conducting the operational monitoring studies and procedures for reporting and handling, and rehabilitating injured wildlife should be reviewed by the TAC. Progress reports summarizing the monitoring results should be reported to the TAC on a quarterly basis.

During a wind project's post-construction monitoring, review the results and consult with the permitting authority, resource agencies and the TAC. If the results of the operational monitoring or the wildlife handling and reporting system in place for the project life indicate mortalities to bird and bat species populations or other wildlife species populations are at a level of biological concern[8], the project developer should review and discuss these impacts with the proper

[8] Events of biological concern could include:

- Mortalities involving endangered, threatened or sensitive and declining species and species of concern identified in the ODFW Conservation Strategy
- Large individual mortality events involving any species

regulatory agency (e.g., USFWS for ESA-listed species) and the TAC for input on a course of action. Discussions may result in the recommendation for additional conservation actions (e.g. habitat conservation, raptor nest platforms, donations to wildlife rehabilitation centers), and other options. Additional monitoring may also be required. Any impacts to state or federally-listed species require immediate consultation with the ODFW and USFWS.

Mitigation

These Guidelines strongly recommend consistent application of the following mitigation recommendations regardless of the jurisdiction in which the wind project is permitted.

These Guidelines are designed to help avoid and minimize impacts to wildlife habitat and wildlife populations during development and operations of wind power projects. However, in some cases, development and operation of wind projects will result in direct and indirect impacts to wildlife and habitat that cannot be avoided. Wind project developers should be responsible to mitigate for temporary and permanent impacts to wildlife habitat, significant displacement of wildlife populations, and other wildlife impacts that result from wind project development and operations.

These Guidelines strongly recommend that the counties' wind project permitting process rely on ODFW's Fish and Wildlife Habitat Mitigation Policy for guidance on mitigation strategies, as does Oregon's EFSC permitting process. Close and early coordination with ODFW, and other resource agencies, is therefore critical. The mitigation described in this section is designed to correlate directly with wind project impacts to wildlife and habitat. Wind power developers should hire a qualified professional biologist (generally an external consultant under contract to the wind project developer) to assess potential project impacts to wildlife habitat and wildlife populations. Wind power developers also should coordinate with resource agencies throughout the wind project development process to ensure that direct and indirect impacts to wildlife resources are accurately identified, avoided and minimized to the degree possible and completely mitigated where avoidance cannot be accomplished. Working with qualified, professional, external consultants and undertaking consultation with resource agencies will maximize transparency, credibility and efficacy of the wind project development process.

Wherever possible, mitigation should replace or provide comparable habitats. However, the proximity of mitigation activities to site of impact needs to be balanced with maximizing the efficacy of mitigation. In some instances the best mitigation solution may occur by aggregating mitigation responsibilities and activities from multiple dispersed wind projects into one larger, strategically placed mitigation activity.

Habitat Impacts

- Long-term high mortality levels for any species

Wind project developers should be responsible for mitigation of temporary and permanent impacts to habitat due to project development. Differing mitigation ratios should apply based on the habitat type and category that is impacted. These guidelines strongly recommend early coordination with the permitting authority and resource agencies regarding habitat typing and categorization for the proposed project site as well as for the proposed mitigation site.

Habitat types should be rated into categories based on ODFW's Fish and Wildlife Habitat Mitigation Policy. For purposes of these guidelines, habitat should be categorized based on consideration of the habitat's current condition. Permitting authorities should be aware of the potential for situations in which land has been deliberatively converted to avoid or reduce mitigation responsibilities. See Tables 1, 2 and 3 in the Appendix for a description of the six habitat categories and mitigation goals and standards as defined in ODFW's Fish and Wildlife Habitat Mitigation Policy. These guidelines are designed to develop best wildlife and habitat conservation practices for wind development by (in part) creating incentives to direct wind farm development away from the highest value wildlife habitat (avoid habitat categories 1, 2, and higher quality category 3) and towards sites of lower biological value (target development on habitat categories 5 and 6). Habitat typing and categorization work for the proposed project site and the proposed mitigation site should be done by a qualified professional biologist (generally an external consultant under contract to the wind project developer).

Wind project developers, in conjunction with their consultants, and in coordination with resource agencies and the permitting authority, should develop a habitat mitigation plan that:

(a) Describes how the mitigation plan meets the mitigation goals and standards listed in Table 3 of the Appendix in order to mitigate for the habitat impacts at the project site;

(b) Describes and maps the location of the development action and the mitigation actions including the county, latitude and longitude, township, range, section, and quarter section;

(c) Provides performance measures for habitat enhancements and long-term habitat conservation, including success criteria with timelines for the mitigation site, and;

(d) Provides, at a minimum, for life of project protection and management of the mitigation site.

These guidelines recommend that all wind project mitigation funds target habitat conservation and enhancement towards higher quality habitat (i.e., Categories 1 – 4). Any mitigation habitat conserved and/or enhanced should be:

- Where possible, protected in perpetuity.
- At minimum, protected for the life of the wind project[9] or longer through the following avenues:

[9] The life of the wind project includes the post-operation project decommissioning and habitat restoration.

1. Fee title acquisition with conservation easement held by ODFW or a third party;
2. Conservation easement with landowner;
3. Provision of funds by the project developer towards a third party purchase, habitat enhancement and management action (e.g. a land trust). The intent of this option is to have the land protected in perpetuity.

- At some risk of development or conversion.
- Protected from degradation to improve habitat function and value over time (i.e. be subject to a habitat management plan and provided legal protection).
- In the same geographical ecoregion as the impacted habitat unless an area outside the geographical area is agreeable to resource agencies and permitting authorities.
- Formally agreed upon by the wind developer, resource agencies and permitting authorities.
- Transparent to the public.[10]

The following table provides Guidelines to implement the ODFW Fish and Wildlife Habitat Mitigation Policy's habitat categories and mitigation goals and standards. These guidelines provide corresponding examples of habitat for each ODFW habitat category and recommended mitigation for permanent and temporary impacts for each habitat category. Some especially sensitive habitat subtypes such as areas with lithosol soils or biotic crusts do not fit easily into this table's habitat categorization and mitigation and should be addressed on a case-by-case basis.

ODFW Habitat Categories and Mitigation Goals and Standards	**Examples of Habitat Categories**	**Mitigation for Permanent Impacts**	**Mitigation for Temporary Impacts**
1 – Irreplaceable, limited, and essential habitat. Goal of no loss of habitat quantity or quality. The standard by which to achieve the mitigation goal is	Washington ground squirrel burrow complexes and required adjacent habitat for squirrel survival Federally or	No example provided. Project developers should avoid impacts to this habitat, as it is irreplaceable.	No example provided. Project developers should avoid impacts to this habitat, as it is irreplaceable.

[10] Mitigation costs may be excluded for proprietary reasons.

avoidance.	State listed or Sensitive-critical raptor nests (e.g. bald eagle, golden eagle, peregrine falcon, ferruginous hawk, burrowing owl) Mature oak woodlands Critical bat habitat (which includes roost, maternity colony and hibernaculum sites – these can be found in mines, caves, rock crevices, trees, buildings or bridges, depending on the bat species)		
ODFW Habitat Categories and Mitigation Goals and Standards	**Examples of Habitat Categories**	**Mitigation for Permanent Impacts**	**Mitigation for Temporary Impacts**
2 – Essential and limited habitat. Goal of no net loss of habitat quantity or quality and to provide a net benefit of habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of in-kind and in-	Quality native grassland that provides habitat for sensitive wildlife and plant species (e.g. long-billed curlew, burrowing owl, grasshopper sparrow) Unoccupied but potential	Project developers are strongly encouraged to avoid impacts to this habitat.	Project developers are strongly encouraged to avoid impacts to this habitat. If impacts are unavoidable, temporary impacts should be mitigated for by implementing an approved restoration plan for the temporarily-impacted habitat that assures an overall net benefit of habitat quantity or quality at the site. For habitat restoration anticipated to be difficult or long-term (greater than 5 years), an additional 0.5 acres of

proximity mitigation.	Washington ground squirrel habitat adjacent to an existing colony Quality native shrub-steppe (e.g., mature sagebrush) with sensitive wildlife and plant species (e.g. sage sparrow, loggerhead shrike)Key waterfowl use areas, quality wetlands, streams and riparian areas		restoration/acre of impact should be negotiated. In all cases, a good faith effort should be made to restore the temporarily impacted area.
ODFW Habitat Categories and Mitigation Goals and Standards	**Examples of Habitat Categories**	**Mitigation for Permanent Impacts**	**Mitigation for Temporary Impacts**
3 – Essential or important and limited habitat. Goal of no net loss of either habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of in-kind and in-proximity mitigation.	Medium-quality native grassland or shrub-steppe. Functional but small or fragmented grassland or shrub-steppe habitat.	The quality of Category 3 habitat can vary considerably. Avoidance, where possible, is desirable. Mitigation can vary relative to habitat quality. These Guidelines recommend a 2:1 compensatory ratio when avoidance is not feasible. A 1:1 ratio may be considered where a developer can	If impacts are unavoidable, temporary impacts should be mitigated for by implementing an approved restoration plan that assures no net loss of habitat quantity or quality. For habitat restoration anticipated to be difficult or long-term (greater than 5 years), an additional 0.5 acres of restoration/acre of impact could be negotiated. In all cases, a good faith effort should be made to restore the temporarily impacted area.

		demonstrate a significant opportunity to enhance a mitigation site to achieve no net loss of habitat quality or quantity.	
ODFW Habitat Categories and Mitigation Goals and Standards	**Examples of Habitat Categories**	**Mitigation for Permanent Impacts**	**Mitigation for Temporary Impacts**
4 – Important habitat. Goal of no net loss of habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of in-kind or out-of-kind, in-proximity or off-proximity mitigation.	Low-quality grassland or shrub-steppe	These Guidelines recommend a 1:1 compensatory mitigation ratio for permanent impacts.	If impacts are unavoidable, temporary impacts should be mitigated for by implementing an approved restoration plan that assures no net loss of habitat quantity or quality. For habitat restoration anticipated to be difficult or long-term (greater than 5 years), an additional 0.5 acres of restoration/acre of impact could be negotiated. In all cases, a good faith effort should be made to restore the temporarily impacted area.
5 – Habitat with high potential to become either essential or important. Goal of net benefit in habitat quantity or quality. The standard by which to achieve the mitigation goal is provision of actions that improve the mitigation site's habitat conditions.	Low-quality (weed-infested and/or highly disturbed) habitat	These Guidelines recommend that some net benefit in habitat quantity or quality be attained through action(s) that improve the habitat conditions. For example, weed control.	A good faith effort should be made to restore the impacted area.
6 – Habitat with low potential to	Cropland that is currently being	No mitigation required other	No mitigation required.

become essential or important. Goal is to minimize impacts to surrounding habitat.	cultivated Developed land i.e., areas with pavement, structures or facilities, that eliminates natural habitat values.	than to minimize impacts to surrounding habitat.	

Wildlife Displacement

Indirect impacts to wildlife and habitat may occur because the wind project may cause disturbance to wildlife, causing the habitat to be less appealing and suitable to both resident and/or migratory birds and other wildlife species. The displacement effect to wildlife may be temporary or permanent. If there is a strong likelihood for displacement (e.g. an existing species or habitat assemblage is especially vulnerable to displacement by wind project development), the project developer should consult with the permitting authority and resource agencies. Projects sited in higher quality habitat with sensitive species are more likely to raise displacement concerns than projects sited in lower quality habitat.

The need for site specific assessment of potential wildlife displacement should be negotiated on a project-by-project basis. If, based on existing information, displacement of wildlife from a wind project is anticipated, the project developer, permitting authority and resource agencies should discuss and agree upon suitable mitigation to offset indirect displacement effects. Alternatively, following project start-up, a research project could be implemented by the project developer to determine if wildlife displacement effects are occurring from the wind project. Results of research should be provided to the TAC for review and recommendations, and, if necessary, appropriate measures to mitigate wildlife displacement effects should be taken by the wind project operator.

Wildlife Fatalities

As is the case with most development, some mortality of bats and birds is expected to result from wind power projects. During pre-project assessment, wind project developers should estimate bird and bat mortality to determine expected wildlife impacts and associated risk. These data will be useful for efficacy of pre-project assessment, design of future projects, and assessing cumulative impacts to wildlife species. Impacts to state or federally-listed species require consultation with the ODFW and USFWS if there is potential for take of listed species. Wind power project-related mortality to sensitive, declining and more common species of birds and bats is expected to be minimized at wind projects if proper macrositing, pre-project assessment, and micrositing are implemented and good project management practices are established.

During a wind project's operational monitoring, the project owner should review the results and consult with the permitting authority and resource agencies. If mortalities to bird and bat species populations or other wildlife species populations are at a level of biological concern,[11] consult with the permitting authority, resource agencies and TAC. Discussions may result in the recommendation for additional conservation actions (e.g. habitat conservation, raptor nest platforms, donations to wildlife rehabilitation centers), and other options. Additional monitoring may also be required. Any impacts to state or federally-listed species require immediate consultation with the ODFW and USFWS.

Programmatic Recommendations from the Columbia Plateau Ecoregion Wind and Wildlife Energy Taskforce

During the course of development of these Guidelines, the Taskforce discussed the larger context of wind development and wildlife impacts and came up with the following policy and program recommendations:

Priority Recommendations

1) Regionally-specific guidelines should be created for other areas of Oregon, where wind development will likely occur. It is the Taskforce's view that the Columbia Plateau Ecoregion Guidelines process and approach contained in this document can be applied in a broader regional perspective. However, examples of mitigation ratios, species and habitats of concern, and other tools for different ecoregions in Oregon will need further development. When developed, these additional regional guidelines can be provided as appendices or supplements in this document.
2) The success of these Guidelines depends on providing adequate funding for full ODFW staffing support to wind developers, counties, and EFSC, to effectively participate in implementation of these Guidelines at proposed wind energy facilities. Funding could be via a legislative support package or via a cost-reimbursement agreement with wind developers.
3) Oregon EFSC's model wind energy siting ordinance for county governments should be revised to reflect these Guidelines.

Other Recommendations

- State legislators and agency directors should develop and fund programs designed to educate and work closely with county staff, wind project developers, agency staff and

[11] Events of biological concern could include:
- Mortalities involving endangered, threatened, sensitive and declining species and species of concern identified in the ODFW Conservation Strategy
- Large individual mortality events involving any species
- Long-term high mortality levels for any species

other stakeholders on the Guidelines' application to current and future wind energy project proposals. Educational and training outreach should target all interested and affected stakeholders.

- State legislators should develop legislation/support packages designed to help overcome county technical obstacles that complicate efforts to develop fully transparent procedures and access to relevant documents for wind project siting and permitting, including the creation of internet based document libraries and public notification platforms.
- The Taskforce endorses the creation of statewide digital maps depicting the intersection of wind energy potential and related transmission lines, and Oregon environment and conservation priorities. At the time of this writing, this map does not currently exist, but would be a useful tool that could be periodically updated to assist in the macrositing process. Including wind mapping databases into these Guidelines will be useful. These types of maps are usually the key factor governing where potential future projects will be located. Overlapping wind resource mapping with wildlife habitat information would allow proposed biological surveys to be prioritized in areas with the highest potential for development.
- In addition to developing these Guidelines, the Taskforce reviewed and discussed potential cumulative impacts from future wind energy development in the Columbia Plateau Ecoregion. The Taskforce developed a white paper[12] to review our discussions, research to-date, consensus opinion and recommendations for future research and analysis. The recommendations include:
    - Fund and designate a management entity to design, establish and manage a central data repository for wildlife mortalities and habitat impacts from wind projects.
    - Collaboratively design, fund, and implement cumulative impact analysis(es) for the Columbia Plateau Ecoregion. This analysis should determine the generational population dynamics caused by wildlife mortality from all sources of cumulative effect, create a report of key species status, trends, and "impact thresholds of concern", and develop a comprehensive mitigation plan for impacts to key species above threshold-of-concern levels.
- Studies of potential direct wildlife impacts from temporary met towers should be initiated.
- Studies of potential wildlife displacement impacts from wind project development and operation should be initiated.
- Siting and permitting guidelines for smaller scale, community wind projects (typically 10 MW or less) should be developed.

[12] The cumulative wildlife and habitat impacts review and recommendations is included in the Appendix.

Appendix

Map of the Columbia Plateau Ecoregion

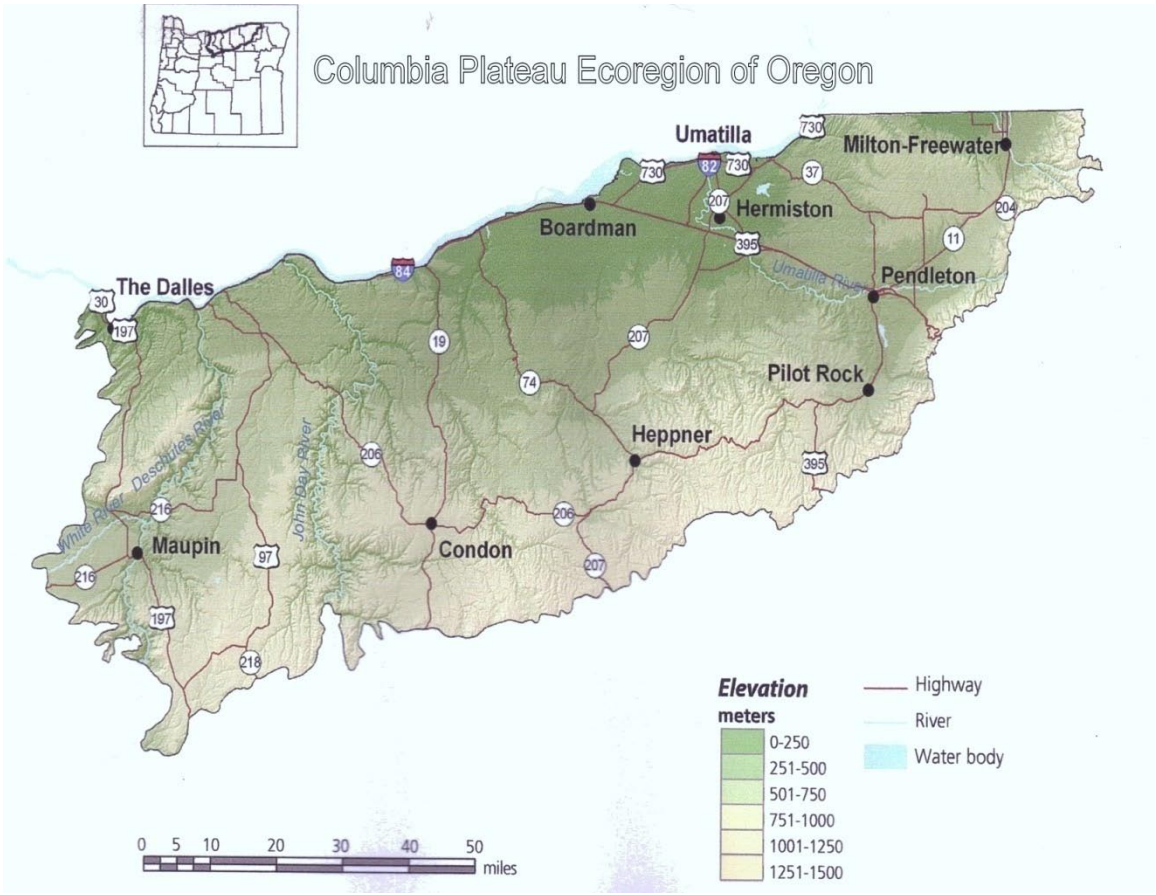
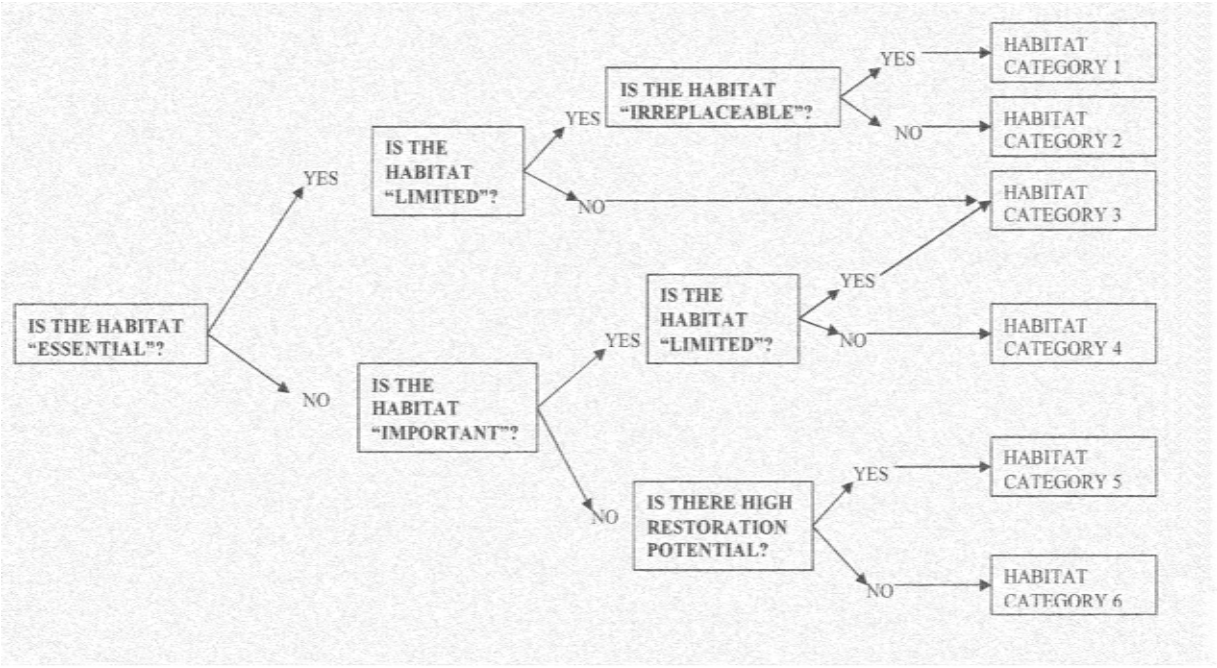


Table 1. ODFW Fish and Wildlife Habitat Categories

Habitat Category	Habitat Included
Category 1	Irreplaceable, essential and limited habitat
Category 2	Essential and limited habitat
Category 3	Essential habitat, or important and limited habitat
Category 4	Important habitat
Category 5	Habitat having high potential to become either essential or important habitat
Category 6	Habitat that has low potential to become essential or important habitat

Table 2. Fish and Wildlife Habitat Mitigation Policy Habitat Categorization



The following definitions describe various terms used to categorize habitats:

Essential Habitat: means any habitat condition or set of habitat conditions which, if diminished in quality or quantity, would result in depletion of a fish or wildlife species. These habitats contain the physical and biological conditions necessary to support the most critical life history function of the fish and wildlife species being considered.

Limited Habitat: means an amount of habitat insufficient or barely sufficient to sustain fish and wildlife populations over time. This concept requires that the relative availability of suitable habitats to support important life history functions be considered at variable scales that may go beyond the project site.

Important Habitat: means any habitat recognized as a contributor to sustaining fish and wildlife populations on an ecoregion basis over time. These habitats may not be necessary to support the most critical life history functions (i.e., spawning, breeding/nesting, juvenile rearing) of the species being considered.

Irreplaceable Habitat: means that successful in-kind habitat mitigation to replace lost habitat quantity and/or quality is not feasible within an acceptable period of time or location, or involves an unacceptable level of risk or uncertainty, depending on the habitat under consideration and the fish and wildlife species or populations that are affected. An acceptable period of time would correlate to benefiting the affected fish and/or wildlife species. Examples provided by ODFW are old-growth forests and bogs.

High Restoration Potential: means habitat that previous land uses or activities have eliminated or severely reduced its value to fish and/or wildlife. The habitat is technically feasible to restore such as a diked or drained coastal marsh.

Table 3. Mitigation Goals and Standards of ODFW's

Fish and Wildlife Habitat Mitigation Policy

Category 1	No loss of habitat quantity or quality	Avoidance
Category 2	No net loss of habitat quantity or quality and to provide a net benefit of habitat quantity or quality	In-kind, in-proximity mitigation
Category 3	No net loss of habitat quantity or quality	In-kind, in-proximity mitigation
Category 4	No net loss of habitat quantity or quality	In-kind or out-of-kind, in-proximity or off-proximity mitigation
Category 5	Net benefit in habitat quantity or quality	Actions that improve habitat conditions
Category 6	Minimize impacts	

Cumulative Wildlife and Habitat Impacts Review and Recommendations

September 29, 2008

In 2007, the Oregon Energy Facility Siting Council (EFSC) requested a cumulative wildlife impacts analysis from existing and proposed wind energy development in the Columbia Plateau Ecoregion (Ecoregion), which in Oregon includes parts of Morrow, Umatilla, and Wasco counties and all of Gilliam and Sherman counties. The Council's recent and future review of a large number of wind energy facility applications proposed to be sited in the Ecoregion, coupled with concerns from the U.S. Fish and Wildlife Service (USFWS), the Oregon Department of Fish and Wildlife (ODFW), and environmental groups regarding wildlife and habitat impacts from wind energy development in the ecoregion, was the primary impetus for the Council's request.

Wind energy development in the Ecoregion continues to expand. Approximately 3,848 MW of wind energy generation facilities are currently operating, being constructed, or have been approved for construction within the Ecoregion (2,107 MW in Oregon, 1,741 in Washington) to date. An additional 1,309 MW of facility applications in the Ecoregion are pending Oregon EFSC siting approval, and at least 520 MW of additional county jurisdictional facilities have been proposed or are in the permitting process in Washington and Oregon.

In the fall of 2007, the ODOE, USFWS and ODFW convened the Columbia Plateau Ecoregion Wind Energy Taskforce (Taskforce). The Taskforce includes multiple state and federal agencies (ODFW, USFWS, ODOE, WDFW), wind energy developers, county representatives, non-profit environmental organizations, and consultants. The Taskforce has developed voluntary wind project siting and permitting guidelines (Guidelines), with hopes that future wind energy development in the Ecoregion is sited in a manner that prioritizes wildlife and habitat protection.

Over the course of several months, the Taskforce reviewed and discussed the most current research and opinion from consulting biologists and statisticians, state and federal agencies and non-profit environmental organizations on wind energy development and wildlife/habitat impacts in the Ecoregion, with a specific interest in defining and understanding the cumulative wildlife and habitat impacts from wind energy development.

This document provides a summary of information regarding the currently known cumulative wildlife and habitat impacts of wind energy development in the Ecoregion. Recommendations included in this document are intended to inform future wind project planning and development within the Ecoregion, as well as direct resources to more fully understand indirect cumulative effects.

Benefits of Wind Power for Conservation of Species

The Taskforce recognizes that responsible wind power development potentially offers significant environmental benefits for species conservation. One of the most significant threats facing wildlife in North America is habitat modification attributed to climate change. Wind power development represents an important strategy for reducing dependence on fossil fuels and combating the effects of climate change. The State of Oregon is a national leader in developing efforts to combat climate change. Oregon law currently requires utilities to provide 25% renewable energy to their customers by 2025. In addition, Oregon law establishes goals to

reduce greenhouse gas emissions by 75% below 1990 levels by 2050. Maximizing the region's wind energy generation potential will be an important factor in achieving renewable energy and climate change targets.

In addition, development of wind power facilities at carefully selected sites offers the potential to reduce incentives to redevelop property for less wildlife friendly practices. For many species, wind power development on disturbed sites may represent a relatively benign land-use conversion.

Finally, by developing and implementing strong guidelines, the Taskforce has created an opportunity to effectively avoid the highest quality habitats, minimize impacts, and mitigate for unavoidable direct and indirect impacts to wildlife from wind power development and to set a standard for responsible energy generation. Strategic investment of mitigation resources can allow for targeted protection of the most critical habitats and most vulnerable species.

All forms of energy generation present both direct and indirect impacts on wildlife and wildlife habitat. By carefully considering the placement of wind power facilities and mitigating for unavoidable consequences, wind power offers opportunities to minimize direct and indirect impacts on wildlife and wildlife habitat while helping to address the global threat presented by climate change.

Cumulative Impacts

The challenge facing wind power in Oregon is to meet aggressive targets to combat climate change while simultaneously avoiding adding significantly to the direct and indirect hazards facing Oregon's wildlife populations, many of which are already in serious decline. Cumulative impacts to wildlife from many sources, including wind energy, represent one of the most challenging and complicated aspects of assessing potential wind power impacts on wildlife and wildlife habitat. By definition, cumulative impacts are the additive or incremental effects of past, present, and foreseeable (future) actions taken as a whole. The impacts associated with an individual action, such as a single wind energy project, may be minor, but the impacts from a number of similar actions or projects taken collectively may be significant. Most activities, including wind energy development, have both direct and indirect impacts. Direct impacts of wind projects on birds and bats are generally associated with mortality from wind turbines. Indirect impacts may occur as a result of habitat loss from the project footprint (e.g., habitat replaced by turbine towers, access roads, substations, and other O&M facilities), lowered habitat value in close proximity to wind turbines (e.g., species displacement), decreased population viability, and habitat fragmentation. Habitat fragmentation is one of the main causes of declines in wildlife populations (Yahner 1988). Direct impacts are often easier to estimate and measure than indirect impacts. As a consequence, cumulative impact analyses have typically focused on direct impacts, such as bird mortality from collisions with turbine blades.

At a broader level, cumulative impacts reach beyond just the consequences from wind power alone. On a regional scale, there is an argument for assessing not only the cumulative impacts of wind power, but also the cumulative impacts of wind power and various other activities taken together as a whole. In other words, in addition to asking whether wind power in and of itself is having population level impacts on birds and other wildlife, consideration should be given to whether wind power is contributing cumulatively along with multiple other causes to population declines. For example, documented population declines in some avian species over the past

few decades are attributed to a number of human-related factors that result in either continued loss of habitat (e.g. urban sprawl, agricultural development), or direct mortality (e.g. collisions with buildings, vehicles, power lines, or, predation from house cats). Therefore, while wind energy developers cannot be held accountable for these other human-related factors, the question is whether the added impacts from wind power could potentially continue or even hasten documented declines in some species populations.

Understanding potential cumulative impacts of wind power development is particularly critical because aggressive state renewable energy targets may lead to large-scale habitat modification across Oregon. Failure to understand the cumulative impacts of this rapid wind project development expansion could contribute to population level impacts to species that could result in future state and federal listings. Additional species listings in turn could have dramatic impacts on the future viability of the wind development industry in Oregon. Comprehensive understanding of the cumulative impacts of wind power development is necessary both to protect our natural heritage and to preserve the viability of wind power development in Oregon. The understanding is also necessary in order to achieve objectives related to combating climate change.

Current Sources and Summaries of Cumulative Impacts Information

To determine the potential impacts of individual and multiple wind projects, the Taskforce focused its attention on several recent mortality assessments conducted by WEST, Inc. These studies found that when averaged across the Ecoregion, the number of bird and bat fatalities per megawatt from existing wind energy facilities is currently relatively low compared to other areas of the country. Each of the assessments concluded that wind power facilities on their own were not having direct population level impacts on birds or bats due to the proportion of birds and bats killed by wind turbines. However, not all cumulative avian mortality impact analyses evaluated whether wind power is contributing cumulatively along with multiple other causes to population declines of birds, bats or other wildlife species. Additionally, existing studies were not all designed to assess the cumulative impacts on species populations resulting from habitat loss or fragmentation, including that unrelated to wind energy facilities[13]. WEST, Inc estimates that 69% of bird fatalities from wind projects in the Ecoregion are passerines (e.g., golden-crowned kinglet), 18% are game birds, and 7% are raptors/vultures. From Ecoregion projects conducting post-construction monitoring, a total of 636 bird fatalities were recorded, which included 73 species, 9% of which were raptors, 40% were horned larks, and 6.5% were golden crowned kinglets. Annually, on average, they estimated 0.07 raptor fatalities/MW, 2.2 general bird fatalities/MW, and 0.68 bat fatalities/MW. The most common bat fatalities observed were the hoary bat and the silver-haired bat. These two bat species comprised more than 90 percent of all bat fatalities.

[13] The Taskforce also reviewed the programmatic Environmental Impact Statement (EIS) for Klickitat County's Energy Overlay Zone, which did evaluate cumulative impacts associated with loss of habitat, including quantity and distribution/concentration of impacted areas across the county.

Upon review and discussion of current avian and bat fatality monitoring studies and expertise, from the Columbia Plateau Ecoregion as well as nationwide, it is the Taskforce's opinion that:

- The cumulative direct mortality from existing wind energy facilities in Oregon where mortality monitoring studies have been undertaken in the Ecoregion has not revealed population level impacts to bird or bat species;
- Past studies are not necessarily a good indicator of future cumulative impact, given the rapid expansion of wind power development in Oregon and increasing pressure to develop wind projects in high quality habitat;
- There are concerns regarding the potential for wind power development impacts on several wildlife species that are already rare or exhibiting widespread species population and distribution declines (e.g., ferruginous hawk, Swainson's hawk, Washington ground squirrel, burrowing owl);
- There are concerns that key habitats that support these sensitive wildlife species are rapidly being converted due to multiple factors, primarily unrelated to wind development;
- In the extreme, siting of even a single wind project may have a significant effect on future cumulative impact analysis[14];

Based on these findings, the Taskforce's Guidelines make several recommendations that will assist with evaluating and reducing the potential for cumulative impacts. These include:

- Presence of existing proximal wind power developments.

- Presence of other proximal causes of wildlife mortality.

- Pre-project assessment surveys and operational monitoring studies that should be implemented;

- Disincentives (including increased mitigation for impacts to wildlife and habitat) to encourage avoidance of key habitats, and incentives to encourage future development on highly disturbed habitats.

However, the Taskforce acknowledges that more information sources on bird, bat and other wildlife species' population status and trends as well as status and impacts on regional habitat

[14] The Altamont Pass Wind Resource Area in Northern California serves as a case in point. The wind projects are connected with the fatality of an approximately 2,000 protected birds of prey annually (Bird Fatality Study at Altamont Pass Wind Resource Area, Table 1: Total Recorded Bird Fatalities, October 2005-September 2007, Altamont Pass Avian Monitoring Team). Costly litigation and redevelopment of these facilities have not yet substantively addressed these mortality concerns. While the Altamont example is frequently cited regarding wind generation facilities, no wind energy project in the Columbia Plateau Ecoregion has demonstrated wildlife mortality problems on the scale associated with the Altamont Pass Wind Resource Area.

resources are needed. The Taskforce believes a broad-scale research project(s) is needed to better inform assessment of the cumulative impacts from wind project development on key species and habitats. Supporting collaborative monitoring and research within the Ecoregion to fully understand wind energy development and project siting impacts to key habitats will be important as wind energy development continues to expand.

Cumulative Population and Habitat Effects Research Needs Recommendations

To address concerns of cumulative impacts to avian and other wildlife populations as well as key habitats from siting of wind energy facilities, the Taskforce is providing the following recommendations to help focus research and conservation efforts.

Data Repository

Useful bird/bat/habitat data has been and is currently being collected from the wind development sites. The challenge is to make fatality, survey and monitoring data, and general site information available and easily accessible to ODFW, USFWS and interested stakeholders for ongoing wildlife fatality and habitat cumulative impact analysis. The Taskforce recommends:

- Funding and designating a central management entity to design, establish, and manage a central data repository for previously-generated and future bird/bat/habitat monitoring data;
- Requiring future developers to submit data to the central data repository;
- Engaging in a national discussion regarding a data repository for wind turbine sites across the country; and
- Requiring county planners to provide ODOE with location data on all county-permitted wind energy facilities.

Population Assessment and Scale

Currently, more research is needed that analyzes species fatality numbers or habitat impacts from all anthropogenic sources across the entire Ecoregion in the context of overall population trends. The Taskforce acknowledges that individual wind projects cannot be held to account for all anthropogenic sources. For some focal species, research of this kind would be very helpful to identify the significance of the individual wind project data that is being collected, to better define key habitat areas of high concern and wind energy-related mortality thresholds of concern, to identify areas where future wind development should be discouraged, and to identify the types of mitigation or conservation actions that would provide the greatest benefits to these species.

- Collaboratively design, fund, and implement cumulative impact analysis(es) for the Columbia Plateau Ecoregion, including investigation of fragmentation of habitat, for species of concern (e.g. ferruginous and Swainson's hawks).
- Design, fund, and implement studies to determine the generational population dynamics caused by avian and other species mortality.
- Using the results from the above Columbia Plateau Ecoregion study(ies) to collaboratively create a report of key species status, trends, and "impact thresholds of concern" for:

        - A limited number of key species that are highly sensitive to additional mortality factors (for example, ferruginous hawk, Swainson's hawk, burrowing owl, hoary bat, and silver-haired bat)
        - A limited number of key species that are highly sensitive to habitat loss or displacement (for example, long-billed curlew, loggerhead shrike, grasshopper sparrow)
- Developing a comprehensive action plan for impacts to key species and associated habitats that are above threshold-of-concern levels
- Publishing wind energy ecoregional studies, analyses, and monitoring in order to raise the standard and credibility of these collaborative efforts.
- Identifying the most up-to-date habitat information and data sources that should be used to evaluate cumulative impacts from wind energy development.
- Extend the study to include anticipated cumulative impacts on wildlife species and their habitat to include other areas in Oregon targeted for clean energy development.

Citations

Johnson, G. D. 2007. Cumulative Impacts Analysis for Birds and Bats from Existing and Permitted Wind Energy Projects in Klickitat County, Washington. Western EcoSystems Technology, Inc. 30 pp.

Yahner, R. H., 1988. Changes in wildlife communities near edges. Conservation Biology 2, 333-339.

From: Jon Germond
Sent: Tuesday, February 26, 2008 4:17 PM
To: STOOPS Tom; WHITE John
Cc: Rose Owens; Patty Snow; Jill Zarnowitz; Steve Cherry; Keith Kohl
Subject: Category 5 Habitat Mitigation

Gentlemen:

ODOE asked ODFW for guidance on how energy project applicants might mitigate for impacts to cultivated lands considered Category 5 habitat under ODFW's Fish and Wildlife Habitat Mitigation Policy (Mitigation Policy).

The Mitigation Policy defines Category 5 habitat as "having high potential to become either essential or important habitat." The mitigation goal for Category 5 habitat is "to provide a net benefit in habitat quantity or quality" by recommending mitigation "actions that contribute to essential or important habitat." The net benefit goal recognizes that Category 5 habitats are generally in a "degraded" state, but have high restoration potential. As such, fish and wildlife species would not benefit much from mitigation taking place on Category 5 habitat designed to achieve a "no net loss" standard (as applied to Category 4 habitats). The intent then is to encourage mitigation that takes advantage of the high restoration potential of Category 5 habitat sites, so that mitigation actions contribute to improving habitat conditions. The Mitigation Policy is silent on the types of mitigation approaches that are acceptable. Mitigation can be in-kind or out-of-kind, in-proximity or out-of-proximity. The Mitigation Policy provides flexibility for Category 5 habitats as long as it achieves a net benefit.

In order to achieve a net benefit from mitigation for Category 5 habitat impacts, ODFW recommends that for every acre of impacted Category 5 habitat, the applicant enhance at least ½ acre of Category 3, 4, or 5 habitat.

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MEMORANDUM

Department of Fish and Wildlife
Wildlife Division
Intra Departmental

Date: June 13, 2008

To: Roy Elicker

From: Ron Anglin

Subject: Categorizing Wheat Fields under the Fish and Wildlife Habitat Mitigation Policy

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Preference by all parties to construct wind projects in cultivated wheat fields rather than native habitats.

Prior to 2000, Mitigation Policy identified four habitat categories. Wind farms in wheat fields fell into Category 4. Mitigation goal – minimize impacts.

OFWC updated Mitigation Policy in 2000 – contains 6 habitat categories. The department classified wheat fields as Category 6. Wheat fields provide little wildlife habitat. Mitigation goal – minimize impacts. Consistent outcome/treatment with previous version of Mitigation Policy.

Department will continue to classify wheat fields as Category 6 habitat. This will provide the wind industry with consistent treatment into the future across Oregon.

If wind energy development were starting today, the department would classify wheat fields as Category 5 habitat due to their potential to develop into productive wildlife habitat.

Conservation Reserve Program (CRP) lands are Category 5 (or 4, or 3) habitat. CRP lands provide beneficial wildlife habitat. Category 5 habitat mitigation goal – provide net benefit.

Category 5 habitat mitigation – Project proponent to utilize the flexibility inherent in the Mitigation Policy to identify/propose a net benefit action (no mitigation ratio standard).

Existing wind projects in wheat or CRP will remain as Category 6 habitat.

New/proposed wind projects in CRP will be Category 5 (or 4, or 3). Category 5 habitat mitigation goal – provide net benefit.

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

LISTED SPECIES

Fish

Inland:

Bull trout	*Salvelinus confluentus*	CH T

PROPOSED SPECIES

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Mammals

Terrestrial:

Washington ground squirrel	*Spermophilus washingtoni*

SPECIES OF CONCERN

Mammals

Pallid bat	*Antrozous pallidus pacificus*
Spotted bat	*Euderma maculatum*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis bat	*Myotis ciliolabrum*
Yuma myotis bat	*Myotis yumanensis*

Birds

Western burrowing owl	*Athene cunicularia hypugaea*
Ferruginous hawk	*Buteo regalis*
Greater sage-grouse	*Centrocercus urophasianus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*

Reptiles and Amphibians

Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Fish

Pacific lamprey	*Lampetra tridentata*

Invertebrates

Insects:

Lynn's clubtail dragonfly	*Gomphus lynnae*

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

Plants

Robinson's onion	*Allium robinsonii*
Laurence's milk-vetch	*Astragalus collinus var. laurentii*
Dwarf evening-primrose	*Camissonia pygmaea*
disappearing monkeyflower	*Mimulus evanescens*
Sessile mousetail	*Myosurus sessilis*

DELISTED SPECIES

Birds

American Peregrine falcon	*Falco peregrinus anatum*
Bald eagle	*Haliaeetus leucocephalus*

Definitions:

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

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

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

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

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

Key:

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

Notes:

Marine & Anadromous Species: Please consult the National Marine Fisheries Service (NMFS) (http://www.nmfs.noaa.gov/pr/species/) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

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

PROPOSED SPECIES

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Mammals

Terrestrial:

Washington ground squirrel	*Spermophilus washingtoni*

SPECIES OF CONCERN

Mammals

Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis bat	*Myotis ciliolabrum*
Long-eared myotis bat	*Myotis evotis*
Yuma myotis bat	*Myotis yumanensis*

Birds

Northern goshawk	*Accipiter gentilis*
Western burrowing owl	*Athene cunicularia hypugaea*
Ferruginous hawk	*Buteo regalis*
Olive-sided flycatcher	*Contopus cooperi*
Willow flycatcher	*Empidonax traillii adastus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*
White-headed woodpecker	*PIcoides albolarvatus*

Reptiles and Amphibians

Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Fish

Margined sculpin	*Cottus marginatus*
Pacific lamprey	*Lampetra tridentata*

Plants

Robinson's onion	*Allium robinsonii*
Laurence's milk-vetch	*Astragalus collinus var. laurentii*

DELISTED SPECIES

Birds

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

American Peregrine falcon	*Falco peregrinus anatum*
Bald eagle	*Haliaeetus leucocephalus*

Definitions:

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

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

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

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KLICKITAT COUNTY
Updated 7/24/2008

LISTED

Endangered

Gray wolf *(Canis lupus)*

Threatened

Bull trout *(Salvelinus confluentus)* – Columbia River distinct population segment
Northern spotted owl *(Strix occidentalis caurina)*
Spiranthes diluvialis (Ute ladies'-tresses), plant

Designated

Critical habitat for the northern spotted owl
Critical habitat for the Columbia River distinct population segment of the bull trout

CANDIDATE

Fisher *(Martes pennanti)* - West Coast distinct population segment
Mardon Skipper (*Polites mardon*), butterfly
Oregon spotted frog *(Rana pretiosa)*
Yellow-billed cuckoo (*Coccyzus americanus*)
Artemisia campestris ssp. *borealis* var. *wormskioldii* (Northern wormwood), plant

SPECIES OF CONCERN

Animals

Bald eagle *(Haliaeetus leucocephalus)* (delisted, monitor status)
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*, mussel
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Larch Mountain salamander *(Plethodon larselli)*
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis (*Myotis evotis*)
Northern goshawk *(Accipiter gentilis)*
Olive-sided flycatcher *(Contopus cooperi)*
Pacific lamprey *(Lampetra tridentata)*
Pacific Townsend's big-eared bat *(Corynorhinus townsendii townsendii)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)
Redband trout (*Onchrhynchus mykiss*)

River lamprey *(Lampetra ayresi)*
Sagebrush lizard *(Sceloporus graciosus)*
Sharptail snake (*Contia tenius*)
Townsend's ground squirrel (*Spermophilis townsendii*)
Western brook lamprey (*Lampetra richardsoni*)
Western gray squirrel *(Sciurus griseus griseus)*
Western pond turtle (*Clemmys marmorata*)
Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*
Wolverine (*Gulo gulo*)

Vascular Plants

Astragalus pulsiferae var. *suksdorfii* (Ames' milk-vetch)
Calochortus longebarbatus var. *longebarbatus* (Long-bearded sego lily)
Cypripedium fasciculatum (Clustered lady's-slipper)
Lomatium suksdorfii (Suksdorf's desert-parsley)
Meconella oregana (White meconella)
Mimulus jungermannioides (Liverwort monkey-flower)
Penstemon barrettiae (Barrett's beardtongue)
Pinus albicaulis (Whitebark pine)
Ranunculus reconditus (Obscure buttercup)
Rorippa columbiae (Persistent sepal yellowcress)
Sisyrinchium sarmentosum (Pale blue-eyed grass)

Lichen

Texosporium sancti-jacobi (Woven spore lichen)

OREGON NATURAL HERITAGE INFORMATION CENTER

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

Wednesday, October 07, 2009

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

Dear Ms. Ruhlen:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Motague Wind Project at portions of Morrow and Gilliam Counties.

Forty (40) records total were noted within a five-mile radius of your project site and are included on the enclosed computer printouts.

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

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

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

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

Sincerely,

Lindsey Koepke

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

encl.: **invoice (H-100709-LAK1)**
computer printouts and data key

Wildlife and Habitat Studies
for
Montague Wind Power Facility

Prepared for:

Iberdrola Renewables, Inc.
1125 NW Couch St., Suite 700
Portland, OR 97209

Prepared by:

Northwest Wildlife Consultants, Inc.
815 NW 4th St.
Pendleton, Oregon 97801



January 7, 2010

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1.0 INTRODUCTION

1.1 Project Description

Iberdrola Renewables, Inc. (the Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). The turbine vendor, size, number, and actual generating capacity have not yet been determined. The minimum turbine layout is 134 3.0-MW turbines. The maximum turbine layout is 269 1.5-MW turbines. The final layout will have 134 to 269 turbines, with any combination of 3.0-MW turbines to 1.5-MW. The total number of turbines will not exceed 269 and the total MW will not exceed 404. The Facility will have up to two operations and maintenance buildings, access roads, up to 8 meteorological towers, and a power collection system. The power collection system will consist of collector cables, two new collector substations, and a new overhead 230-kV transmission line that will connect to the existing 500- kV Bonneville Power Administration (BPA) Slatt-Buckley transmission line at the Slatt Interconnection substation (Slatt substation) approximately 3 miles southeast of Arlington, Oregon. The new overhead 230 kV transmission line will run from the Facility's western collector substation to the central collector substation and from the central collector substation to BPA's Slatt substation.

The Facility components are proposed on private land for which the Applicant has negotiated or is in the final stages of negotiating long-term wind energy leases with the landowners, or on private land for which the Applicant is in the process of obtaining easements from landowners and other wind developers.

The general landscape of Montague Facility is very similar to the well-studied Leaning Juniper II (permitted), Pebble Springs (operating), and Leaning Juniper I (LJI, operating) wind projects (Figure 1).

1.2 Scope of Wildlife and Habitat Investigation

Northwest Wildlife Consultants, Inc. (NWC) was requested by the Applicant to conduct wildlife surveys and habitat mapping within the proposed Montague Wind Power Facility site boundary (Figure 1), and also to review existing information for records of special status species occurrences within various analysis areas.

This report summarizes all site-specific wildlife and habitat data collected within the Montague Wind Power Facility site boundary completed to date (as of this January report). It includes the methods and results of information reviews and database inquiries, documentation on federal and State agency consultation, wildlife habitat mapping, completed avian use surveys, raptor nest surveys, Washington ground squirrel and other special status vertebrate wildlife surveys, and a review of potential and documented bat species occurrence. Because some site-specific surveys are ongoing or planned for 2010, extensive wildlife data collected for adjacent and nearby wind projects located in similar habitats has been reviewed and is included where applicable in the results and impacts sections of this report (3.0 and 4.0).

2.0 METHODS

The following reviews and site-specific studies were conducted for the Montague Wind Power Facility in 2008 and 2009. Some surveys are ongoing or planned for 2010 as indicated below. Detailed methods on each can be found in the following sections (2.1 through 2.7).

- Pre-field literature review, soil maps review, database queries, site reconnaissance, and agency consultation.
- Wildlife habitat mapping and categorization in 2009; field verification and re-assessment of categories, if needed, pending 2010 wildlife survey results.
- Avian use surveys of five plots conducted for a full year: fall season 2008, winter season 2008–2009, spring and summer seasons 2009.
- Avian use surveys of six plots in fall season 2009 in areas not covered by previous avian use surveys. Results of these ongoing surveys for seasons not yet completed will be presented in an addendum to this report.
- Raptor nest surveys in 2009, and planned spring 2010 surveys.
- Washington ground squirrel surveys conducted in spring 2008, and planned 2010 spring season surveys.
- Other special status vertebrate wildlife species surveys conducted in spring 2008, and planned 2010 spring season surveys.
- Bat species literature and other data sources review for species occurrence in the general area.

Methods implemented for this investigation follow the methods used in the biological surveys for the amended site boundary for Leaning Juniper IIB in 2008–2009 (LJWP, 2009; NWC, 2009), and the Leaning Juniper Wildlife Baseline Study and supplemental studies conducted over the period 2004-2006 (LJWP, 2006; Attachment P-2; Kronner et al., 2005); these studied sites are adjacent to the Montague Wind Power Facility. Methods follow standards set forth for pre-project assessment set forth in the Oregon Columbia Plateau Ecoregion wind energy siting and permitting guidelines (USFWS, 2008b).

2.1 Information Review and Agency and Other Briefings and Consultation

2.1.1 Review of Previous Wind Power Related Studies

NWC reviewed results of pre-construction and post-construction wildlife and habitat studies at wind energy facilities in the area surrounding the Montague Wind Power Facility. These studies include extensive biological data collected for Leaning Juniper II including data collected for Leaning Juniper IIA (LJIIA) from 2004-2006 (LJWP, 2006; Kronner et al., 2005; which includes the Leaning Juniper I area) and collected for the amended site boundary for Leaning Juniper IIB (LJIIB) from 2008–2009 (Attachment 7 of the Request for Amendment No. 1 to the Site Certificate for the Leaning Juniper II (LJII) Wind Power Facility; LJWP, 2009; NWC, 2009). Because some of the LJIIA and LJIIB surveys (raptor nest surveys, some avian use plots) overlap with Montague Wind Power Facility survey areas, appropriate data for the LJII areas is also included or referenced within this report. Pre-construction wildlife and habitat data for other wind projects in the area were also reviewed, including Willow Creek Winds, Shepherds Flat Wind Farm, Saddle Butte Wind Park (preliminary permit application documents), Rattlesnake Road Wind Power Facility, Wheat Field Wind Power Facility, Pebble Springs Wind Project, among others (Caithness

Shepherds Flat, 2007; Kronner et al., 2007a and b; Kronner 2008b; PPM, 2006; Saddle Butte Wind, LLC, 2009).

Additionally, results of post-construction avian and bat fatality monitoring, raptor nest monitoring and wildlife monitoring at nearby operating wind projects including Leaning Juniper I, Rattlesnake Road, Pebble Springs Wind Power Project (Gritski et al., 2008a; Gritski, 2009a and b), and other operating wind facilities located in the Columbia Plateau Ecoregion were reviewed and are presented in the impacts section (4.0). For this report, the Columbia Plateau (CPE) is defined as the physiographic area with similar biological features reflecting broad ecological patterns in Oregon and Washington; these watersheds drain into the Columbia River.

2.1.2 Database Searches and Other Information Reviews

A database search was conducted to ascertain the Endangered, Threatened, and special status species of wildlife and plants likely to be present within and near the Montague Wind Power Facility. The U.S. Fish and Wildlife Service (USFWS) maintains lists (by County) of Endangered, Threatened, Proposed, and Candidate species, and species of concern and the electronic file lists were accessed for Gilliam County in early October 2009 (Appendix A; USFWS, 2009). Since all temporary and permanent impacts to wildlife will only occur in Gilliam County Oregon, the Morrow County, Oregon and the Klickitat County, Washington USFWS County-level lists are not included or addressed within this report. That information is presented in Exhibits P and Q in the Facility Application for Site Certificate. In addition to obtaining the USFWS County lists, in early October 2009 a list of documented occurrences of rare, Threatened, and Endangered plant and wildlife species within 5 miles of the site boundary (as of October 7, 2009) was requested by Northwest Wildlife Consultants, Inc. (NWC) from the Oregon Natural Heritage Information Center (ORNHIC, Appendix B). The site boundary was reduced in size after the ORNHIC database inquiry results were received, so some ORNHIC records are no longer located within 5-miles of the site boundary and are, therefore, excluded from this report. Plant results are discussed in other reports.

The USFWS Birds of Conservation Concern list for the Great Basin (applicable to the general area in which the Montague components are proposed) was also reviewed for species with potential occurrence in the area (USFWS, 2008a). Oregon bald eagle and peregrine falcon nesting reports were also reviewed. Special status vertebrate wildlife species documented in the database searches and literature reviews with potential for occurrence within the Montague Wind Power Facility and surrounding area are listed in Appendix C. Scientific names, status, and status definitions for all special status wildlife species discussed in this report are also listed in Appendix C.

Specific historic records for the Washington ground squirrel occurrence in Gilliam County (Betts, 1990) reviewed. This and other source data used by the ORNHIC can sometimes supplement the ORNHIC database printout and provide site-specific details not otherwise available. Many of these records are old (10-plus years) and suitable habitat is no longer present in some areas. Species occurrence data known to NWC for wildlife species on nearby public land (Bureau of Land Management) were reviewed (BLM, 1989; Morgan, 2002; K. Kronner Pers. Field Notes, 2001–2009). Personal records of K. Kronner (NWC) for Washington ground squirrel occurrence and raptor nests in the Facility area were reviewed.

Current agency reports were reviewed for local data on peregrine falcon, bald and golden eagle nesting (Isaacs, 2008; Isaacs and Anthony, 2007).

2.1.3 Agency and Environmental Group Briefings and Consultation

This report includes correspondence conducted with agencies and one environmental group. Details of the discussions are located in related permitting documents (the Montague Application for Site Certificate, Exhibit P).

During a site tour of LJIIB on May 12, 2009 with Oregon Department of Fish and Wildlife (ODFW) and a macrositing conference call on May 26, 2009 with multiple agencies and stakeholders, the Applicant discussed future wind energy project areas under consideration with agencies and environmental stakeholders, including the Montague Wind Power Facility (formerly known as Leaning Juniper III/IV). The attendees of the May 26 conference call included: John White and Sue Oliver (ODOE), Bob Sallinger (Audubon Society of Portland), Chris Carey (Central Oregon Audubon Society), Doug Young and Jerry Cordova (USFWS), Rose Owens, Keith Kohl, Steve Cherry, and Jon Germond (ODFW), Ken Popper (The Nature Conservancy), Karen Kronner (NWC), and Jerry Roppe (IBR).

On October 15, 2009, NWC hosted a phone conversation with ODFW District Biologist Steve Cherry to discuss the general Montague project and standard study protocols being implemented and to discuss in detail the raptor nest surveys. NWC hosted a site tour with Steve Cherry on November 3, 2009. Jerry Cordova from USFWS was invited to the site tour, but declined due to schedule conflicts. The Applicant hosted a project briefing conference call with USFWS Biologist Jerry Cordova on November 23, 2009. Project description, permitting timeline, study protocols were discussed. Both the ODFW and the USFWS biologists were asked for comments about the Facility. A site tour was offered by NWC to Leslie Nelson of The Nature Conservancy (TNC), a non-governmental non-profit organization. The Applicant and NWC hosted a project briefing conference call with Ms. Nelson and Ken Popper of TNC on December 3, 2009.

2.2 Wildlife Habitat Mapping and Categorization

2.2.1 Wildlife Habitat Mapping

Historical land cover maps from the Oregon Gap Analysis Program (OGAP) were reviewed to identify the broad habitat cover types at coarse-scale. While this information is useful for gaining a general overview of vegetation cover, more detailed habitat information, with more specific habitat categories at a finer spatial scale, are needed to be relevant to wildlife use.

Fine-scale habitat mapping, preliminary field reconnaissance and verification was conducted within the Montague site boundary during 2008–2009 (Figure 2a). Experienced wildlife biologists mapped the habitat types and subtypes and rated the habitat quality, using existing knowledge of the extensively-studied habitats in the general area and ground-based surveys conducted in March 2008. Habitat subtypes and their ratings (Category 1 through 6, discussed in detail below in Section 2.2.2) will be field verified and re-assessed, as needed, after the spring 2010 special status wildlife surveys.

This habitat mapping effort characterized vegetation types, based on current vegetation floristics and structure, from the perspective of wildlife use, both general (for species assemblages, i.e. shrub-steppe obligates) and specific (for individual taxa, i.e. special status species). Prior to field surveys, initial habitat boundaries were delineated within the site boundary at a scale of 1:5,000 in a digital GIS environment using 1-meter resolution orthophotographs (image dates July 25-26, 2005; USDA-FSA, 2005). Initial boundaries were delineated based on obvious differences in vegetation, land form, and land-use. Overlay of topography, hydrology, and transportation layers aided with these delineations. Field assessments were conducted by biologists with experience in Columbia Plateau Ecoregion habitats, in order to classify the habitat types present, and to ground-truth habitat type boundary location. Any necessary boundary corrections were hand-drawn on orthophoto topographic maps in the field and later transferred to the digital boundary layer. During field visits, dominant, co-dominant, and other common plant species were noted in order to accurately classify and describe habitat types in the site boundaries. Conservation Priority Habitat statuses for specific habitat types were attained from the ODFW (2006). A separate wetland report addresses methods and results for the wetland investigation (IBR, 2010).

2.2.2 Habitat Categories

To derive the habitat category, the experienced biologists used vegetative structure, habitat functionality, and overall ecological condition for wildlife, in particular for special status species, and the results of special status wildlife surveys (as previously stated). Habitat category ratings were assigned to all lands using 2008 and 2009 wildlife survey results; however, if the 2010 field surveys indicate a need for a category change, this will occur and be documented in future reports. For example, if a new WGS colony is found in 2010, that habitat would be identified as Category 1 habitat and avoided. Outside of the surveyed areas, biologists conservatively assigned ratings to types that were similar to the surveyed types, consistent with the methodology used for the nearby Leaning Juniper IIA and IIB Wind Facility. Narrow linear habitat patches not surveyed yet for wildlife or rare plants were also conservatively assigned a rating consistent with adjacent or nearby habitats. Although small with limited nesting habitat functionality, value to wildlife for fragmented habitat is sometimes challenging to measure. These small areas within an otherwise extensive agricultural (dryland wheat) landscape become important for wildlife escape cover and predator protection cover for species while traveling through the area, but are not necessarily as important for nesting or denning habitat.

Habitat types were classified into six categories as defined in Oregon Administrative Rule (OAR) 635-415-0025 (Figure 2b). This rule defines six habitat categories and establishes mitigation goals and implementation standards for each category. The six habitat categories and corresponding mitigation goals and implementation standards are described below.

(i) ***"Habitat Category 1"*** *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.*

  (a) *The mitigation goal for Category 1 habitat is no loss of either habitat quantity or quality.*

  (b) *The Department (ODFW) shall act to protect Category 1 habitats described in this subsection by recommending or requiring:*

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) No authorization of the proposed development action if impacts cannot be avoided.

*(ii) **"Habitat Category 2"** is essential habitat for a fish or wildlife species, population, or unique assemblage of species and is limited either on a physiographic province or site-specific basis depending on the individual species, population, or unique assemblage.*

(a) The mitigation goal if impacts are unavoidable is no net loss of either habitat quantity or quality and to provide a net benefit of habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 2 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss of either pre-development habitat quantity or quality. In addition, a net benefit of habitat quantity or quality must be provided. Progress towards achieving the mitigation goals and standards shall be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures shall be implemented and completed either prior to or concurrent with the development action.

(c) If neither 635-415-0025(2)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(iii) **"Habitat Category 3"** is essential habitat for fish and wildlife, or important habitat for fish and wildlife that is limited either on a physiographic province or site-specific basis, depending on the individual species or population.*

(a) The mitigation goal is no net loss of either habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 3 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through reliable in-kind, in-proximity habitat mitigation to achieve no net loss in either pre-development habitat quantity or quality. Progress towards achieving the mitigation goals and standards shall be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures shall be implemented and completed either prior to or concurrent with the development action.

(c) If neither 635-415-0025(3)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(iv) **"Habitat Category 4"** is important habitat for fish and wildlife species.*

(a) The mitigation goal is no net loss in either existing habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 4 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through reliable in-kind or out-of-kind, in-proximity or off-proximity habitat mitigation to achieve no net loss in either pre-

development habitat quantity or quality. Progress towards achieving the mitigation goals and standards shall be reported on a schedule agreed to in the mitigation plan performance measures. The fish and wildlife mitigation measures shall be implemented and completed either prior to or concurrent with the development action.

(c) If neither 635-415-0025(4)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(v) **"Habitat Category 5"** is habitat for fish and wildlife having high potential to become either essential or important habitat.*

(a) The mitigation goal, if impacts are unavoidable, is to provide a net benefit in habitat quantity or quality.

(b) The Department shall act to achieve the mitigation goal for Category 5 habitat by recommending or requiring:

(A) Avoidance of impacts through alternatives to the proposed development action; or

(B) Mitigation of impacts, if unavoidable, through actions that contribute to essential or important habitat.

(c) If neither 635-415-0025(5)(b)(A) or (B) can be achieved, the Department shall recommend against or shall not authorize the proposed development action.

*(vi) **"Habitat Category 6"** is habitat that has low potential to become essential or important habitat for fish and wildlife.*

(a) The mitigation goal is to minimize impacts.

(b) The Department shall act to achieve the mitigation goal for Category 6 habitat by recommending or requiring actions that minimize direct habitat loss and avoid impacts to off-site habitat.

2.3 Avian Use Surveys

The protocol used for avian use surveys for Montague Wind Power Facility was consistent with similar baseline studies conducted at other wind power projects in the Columbia Basin, including: Leaning Juniper IIA and IIB (LJWP, 2006; LJWP, 2009), Pebble Springs Wind Project (PPM, 2006); Rattlesnake Road Wind Power Facility (Kronner et al., 2007a); Klondike I Wind Power Project (Johnson et al., 2002), Klondike III Wind Power Project (Mabee et al., 2005), Vansycle and Stateline (URS and WEST, 2001), Big Horn Wind Project (PPM, 2004; Kronner et al., 2006 a and b), Combine Hills (Young et al., 2002) and others. This pre-construction protocol utilizes a large plot point-count method designed to adequately detect birds of various size and habitat use patterns within structurally complex vegetation types, and rugged terrain (Reynolds and Nussbaum, 1980). Each circular study plot was 800-meters (approximately 0.5 mile) in radius and located to provide good coverage of, and viewing conditions within, Facility areas proposed for development. Plots were non-overlapping and were chosen to provide excellent viewing conditions and thorough coverage of the survey corridors and topographical features within the proposed wind project (Figure 3).

Experienced avian observers positioned at the center of the plot recorded all wildlife seen or heard over a 20-minute period, noting species, number of individuals, and distance from plot center, flight height, and habitats utilized for each observation. Flight paths of special

status species and raptors were hand-plotted on topographic maps in the field to later aid in determination of spatial use of these species in relation to proposed turbine sites. Efforts were made to avoid double counting of individuals; however, given the difficulty in tracking multiple individual birds simultaneously, some double counting was likely. Average weather conditions (wind speed/direction, temperature, cloud cover and level of precipitation) were noted for each survey plot visit. Efforts were made to vary the survey times for individual plots throughout each survey season to provide a full spectrum of avian activity during all daylight hours. While all avian detections were recorded, it should be noted that the survey protocol and plot placements used here emphasize the accurate detection of large, uncommon birds over a large area (i.e. raptors) while still providing a useful, though less precise measure of smaller more abundant bird species (Reynolds and Nussbaum, 1980).

Although biologists focused on observing and recording birds during these surveys, other detected wildlife was recorded, whether inside or outside the fixed point plot and all species observed during surveys as well as their scientific names are listed in Appendix D. Special status species or species of interest (such as raptors) were also recorded while in-transit during the avian surveys.

Fall 2008 – Summer 2009 Montague Avian Use Surveys

Methods and results for the four-season study have previously been described. Surveys in fall and winter seasons were previously reported as study plots in the "surrounding area within 5 miles" for the Leaning Juniper IIB amended site boundary wildlife baseline study (LJWP, 2009; NWC, 2009), but are presented again in this report along with spring and summer seasons to show the complete year of avian use data at these five plots.

- Point count surveys of five plots: A, B, C, J, and K (Figure 3)
- One full year of surveys: September 4, 2008–August 7, 2009
- Fall surveys : September 4–October 31, 2008; 9 visits to 5 sites (A, B, C, J, and K) = 45 plot surveys
- Winter surveys: November 3, 2008–March 11, 2009; 16 visits to A & B, C, and 15 to J, K = 78 plot surveys (inclement weather forced survey cancellation at all plots for the weeks of November 23 and December 14, and at plots J and K for the week of December 28)
- Spring surveys: March 17–May 25, 2009; 11 visits to 5 sites (A, B, C, J, and K) = 55 plot surveys
- Summer surveys: May 31–August 7, 2009; 10 visits to 5 sites (A, B, C, J, and K) = 50 plot surveys

2009 Fall Season Montague Avian Use Surveys

Six plots were initiated and studied in fall season 2009 within areas of the Montague Wind Power Facility not previously covered. One plot ("HH") is east of the site boundary. Surveys at these plots are currently planned to continue for a full year through summer season 2010. Results for the first season (fall 2009) are included in this report, and methods are the same as for 2009–2009 surveys.

- Point count surveys of six plots: AA, BB, EE, FF, GG, HH (Figure 3)
- One season of surveys completed and surveys are ongoing for one full year.

- Fall surveys: September 10–October 30, 2009; 8 visits to 4 sites AA, BB, EE, FF; surveys were initiated at plots GG and HH on September 20, 2009 and a total of 6 surveys were conducted for an overall total of 44 plot surveys.

2008–2009 Leaning Juniper IIB Avian Use Surveys

Seven study plots within the amended site boundary for LJIIB were surveyed for a full year, and due to the close proximity of these plots to the Montague Facility, data for the four seasons are presented within this report (fall and winter season data was previously reported in NWC, 2009). Methods are the same as for Montague avian use plots.

- Point count surveys of seven plots D, E, F, G, H, I, and L (Figure 3)
- Several LJIIB plots occur partially within the Montague site boundary (Figure 3).
- One full year of surveys: September 4, 2008–August 7, 2009; season survey dates are the same as for five Montague plots.
- Fall surveys : September 4–October 31, 2008; 9 visits to D–I, 8 visits to L=62 plot surveys
- Winter surveys: November 3, 2008–March 11, 2009; 16 visits to D, E, F, H, I, 15 visits to G, L =110 plot surveys (inclement weather forced survey cancellation at all plots for the weeks of November 23 and December 14, and at plots G and L for the week of December 28)
- Spring surveys: March 17–May 25, 2009; 11 visits to D–I, L = 77 plot surveys
- Summer surveys: May 31–August 7, 2009; 10 visits to D–I, L = 70 plot surveys

Avian Use Data Analysis

Mean use, percent composition, and frequency of occurrence for avian species within the avian study plots were analyzed for the Facility, consistent with other studies in the region (e.g. NWC, 2009; Kronner et al., 2005; Kronner et al., 2007a; Johnson et al., 2002; Mabee et al., 2005). In all data analyses, only observations less than or equal to 800 meters (m) from the center of the 800 m study plots were used.

The following metrics were calculated from avian point-count data collected within the Montague Wind Power Facility:

Mean use for a species equals the total number for each species divided by the number of point counts conducted and provides an index of avian relative abundance per survey point. Mean use serves an as index to compare projects to other projects.

Percent composition equals the mean use for a species/total use for all species, multiplied by 100, and provides an estimate of the relative use of a particular species compared with the use of all other species.

Frequency of occurrence equals the percent of surveys in which a species is observed.

Mean use and frequency of occurrence reflect different aspects of abundance, in that mean use is based on the number of individuals (i.e., large flocks can produce high estimates), whereas frequency of occurrence is based on the number of flocks (i.e., it is not influenced by flock size). Together, these two estimates help one discern the importance of high mean use values (e.g., whether high use was caused by a single large flock of birds) and hence, to determine the likelihood of a particular species' being affected by proposed wind power projects. Avoidance behavior also affects the likelihood of a species being affected.

Species were aggregated into larger taxonomic groups to make them comparable to other studies in the region (e.g. Kronner et al., 2005; Kronner et al., 2007a; Johnson et al., 2002; Mabee et al., 2005). In this report, raptor is defined as any bird of prey; any member of Falconiformes or Strigiformes including vultures, eagles, buteos, falcons, and owls, although sometimes this word is used by others to indicate diurnal (daytime) birds of prey only. Passerines include any member of Passeriformes, but results are further split into two subsets, songbirds and corvids, for comparative purposes.

2.4 Raptor Nest Survey

The objective of the raptor nest survey is to provide information that can be used to predict potential impacts to nesting raptors and to identify options for avoiding or mitigating impacts. Impacts to nesting raptors can potentially occur during the construction or operations phase of the wind project and may include disturbance during nesting, direct loss of the nest structure, or individual locally-nesting/foraging birds colliding with turbines.

The Montague raptor nest survey buffer is 0.50-mile from the preferred transmission line route and alternates and 2-miles from the main proposed site boundary. Approximately 50% of the Montague site boundary has already been surveyed for nesting raptors (Figure 4) during studies conducted for Pebble Springs and Leaning Juniper II (Figure 12 of PPM, 2006; LJWP, 2006; LJWP, 2009; Kronner et al., 2005; NWC, 2009). In addition, a large portion (approximately 35%) of the (192.65 mi^2) 2-mile Montague raptor survey buffer was surveyed in 2009 for nesting raptors for adjacent wind projects. Data was reviewed from several adjacent wind projects surveyed for raptor nests in 2009 by NWC, including Leaning Juniper I, IIA and IIB, and Pebble Springs.

While a large portion (over a third) of the overall Montague raptor nest survey buffer was surveyed in 2009 for various projects, surveys of the remaining area within the Montague 2-mile raptor survey buffer are planned for 2010. Where portions of the Montague 2-mile raptor survey buffer area overlap with the operating wind projects, raptor nest surveys will avoid operating turbines. The Applicant will also coordinate with other developers conducting raptor nest surveys in 2010 to reduce duplication; for example, a large portion of remaining area within the Montague 2-mile raptor survey buffer overlaps with the 2-mile raptor survey buffer for the Shepherds Flat and Saddle Butte wind projects. Also in 2010, Swainson's and ferruginous hawk nests identified in 2009 in areas already surveyed that are within the Montague 2-mile survey area will be checked for status, as requested by ODFW.

Aerial and ground-based raptor nest surveys were conducted in 2009 by NWC for adjacent planned or operating wind projects and their associated 2-mile aerial survey buffer (where applicable). These include Leaning Juniper I, Leaning Juniper IIA and IIB, and Pebble Springs. The areas surveyed and raptor and other large bird (common raven) nests found within the Montague raptor nest survey area are presented within this report (Figure 4). Additionally, a Washington Department of Fish and Wildlife (WDFW) raptor specialist conducted radio telemetry studies of a few nesting ferruginous hawks in and near Eightmile Canyon (J. Watson, Pers. Comm., 2009) to supplement a western United States study on the species. The nests studied by WDFW, as well as NWC internal nest records of raptor nests in Eightmile Canyon (not related to a wind project survey; K. Kronner, Pers. Field Notes, 2009) are also displayed on Figure 4. New records for these two studies from the 2008 nest survey

year were reviewed. The survey areas for these latter two sources of data are not shown on Figure 4 as the survey methods were more linear in extent and generally were not the same as for typical raptor aerial nest surveys conducted for wind project pre- and post-construction studies. Data from the various sources was used in fall 2009 by the Applicant to aid in micrositing Montague turbine placement to minimize potential direct impacts to locally-nesting raptors, in particular the Swainson's and ferruginous hawk and prairie falcon.

Methods implemented are similar for each of the various studies (and will be the same for the planned 2010 aerial survey). Surveys were conducted by an experienced helicopter pilot and wildlife biologist. Known historic nesting locations within each survey area were checked during the 2009 aerial and ground-based wildlife surveys. In addition to checking historical nests, all appropriate nesting areas including trees and rock formations were surveyed to provide the most complete coverage of the aerial survey area possible. The surveys also involved flying along basalt cliffs in canyons and up side drainages and back down to main drainages, as well as scanning hill tops between drainages to detect isolated trees. Hazardous areas (deep canyons, etc.) and residential areas or occupied livestock corrals were not flown. Raptor species not targeted in this type of survey include the ground-nesting owls and northern harrier, and known or suspected American kestrel nests are not included in Figure 4 due to difficulty of confirming nests without extensive on-the-ground surveys. Anywhere there is basalt rimrock escarpment habitat (such along portions of Eightmile Canyon and Rock Creek), American kestrels are likely to nest.

Additionally in 2009, in some areas nests were checked from the ground to supplement the aerial surveys, where needed (Gritski et al., 2009b). During the walking transect surveys conducted for special status wildlife species, isolated trees, basalt cliffs and other suitable raptor nest structures were checked for sign of nesting raptors. Those found are also included in Figure 4. During the 2010 spring season ground-based walking transects for special status species and habitat, suitable trees and other potential raptor nest structures such as basalt cliffs and escarpments will also be examined for use.

During the various surveys, all potential and confirmed raptor nests were recorded, regardless of activity status. Determination of nest status (active, inactive, unknown) was made using a combination of visual clues such as adult behavior, presence of eggs or young, presence or absence of whitewash (excrement), and/or observational data from the ground-based surveys. Inactive nests (without sign of current year's use) were assessed to determine the type of bird that may have used the nest previously. Stick nests in trees that appeared to have been constructed and may have been used by common ravens, were considered "Inactive" because the structures could be attractive to raptors in future years. Nest locations were recorded using a hand-held GPS unit.

2.5 Special Status Vertebrate Wildlife Surveys

Target special status vertebrate wildlife species that may occur within the Facility include State Endangered, Threatened, Candidate, Sensitive status species, and/or Federal "Species of Concern" (Appendix C). Also included in the target list are species that the U.S. Fish and Wildlife Service (USFWS) designate as "Birds of Conservation Concern" (USFWS, 2008a).

Methods to confirm the presence or absence of special status species within the site boundary follow similar agency-accepted protocols used for the Leaning Juniper IIA and IIB surveys, and also implemented at nearby wind projects (e.g. Kronner et al., 2005; Kronner et al., 2007a; NWC, 2009).

Special status vertebrate wildlife surveys were conducted on several dates in late March 2008 (March 3, 5, 6, 12, and 13). The late winter/early spring dates were implemented primarily to target Washington ground squirrels; however, all observations of special status species were recorded. Some species had not yet arrived from wintering areas; local nesting/denning wildlife were not yet at peak activity sufficiently enough for determining use of the habitat for all the target species typically known to occur in the area. Areas surveyed are shown on Figure 5 and all areas of potentially suitable habitat within these areas were carefully examined by experienced field technicians and wildlife biologists. Surveys were conducted during the morning hours when avian species are most active and during weather conditions suitable for detection and accurate identification of wildlife species. Experienced biologists and technicians walked meandering transect surveys approximately 164 feet (50 meters) apart within the survey areas. Surveys were not conducted in disturbed areas lacking suitable habitat, such as plowed wheat fields. All suitable trees and potential nest structures for raptors were examined. Escarpments were scanned from above and below. All wildlife observations were recorded (Appendix E). Special status species locations were either recorded with a handheld GPS unit or plotted on USGS topographical maps. Figures illustrating locations were prepared (Figure 5).

Some areas within the Montague site boundary have previously been surveyed for the Leaning Juniper IIB wind project in spring 2009. Methods for the LJIIB survey were the same as for the Montague surveys and can be found in NWC, 2009. The LJIIB special status wildlife ground transect survey data has been reviewed for species occurrence within the Montague site boundary and surrounding area.

Special status vertebrate wildlife surveys are planned for spring 2010 in all corridors not previously covered thoroughly for all the target species. The 2010 surveys will follow the same methods described above.

2.6 Washington Ground Squirrel Surveys

Washington ground squirrel surveys (WGS) were conducted on several dates in March 2008 (March 3, 5, 6, 12, and 13) concurrently (and in the same corridors) with the special status vertebrate wildlife surveys described above. The late winter/early spring dates were chosen to specifically target WGS. Methods are the same as for special status vertebrate wildlife surveys as detailed above in Section 2.5. NWC personal field notes were also reviewed for WGS locations within the Facility areas (K. Kronner, Pers. Field Notes, 2001–2009). If detections of ground squirrels were found, values were given to different types of detections and level of use was determined. The values given followed a system implemented during studies conducted on the Boardman Bombing Range (Kronner et al., 2007c) and the adjoining Boardman Conservation Area (Marr, 2004) on Washington ground squirrels.

Detections were recorded in field notes as follows:

1 = Holes characteristic of those used by squirrels; droppings, if present are not from current year.
2 = Dropping (scat) of the current year (interior of the dropping is green).
4 = Recognizable calls of Washington ground squirrel.
8 = Visual (actual observation of a Washington ground squirrel)

Field personnel recorded only observations where the cumulative score was at three or greater (i.e. dropping plus hole, call or visual was detected). When a call or visual was obtained, efforts were made to find the nearest hole and look for droppings. If a hole with droppings could not be found, the visual detection of the animal or the approximate location of an auditory only detection was marked. Data was entered in the project GIS files. Locations where confirmed use by WGS had been recorded are shown on Figure 5.

Locations where WGS holes, droppings and vocalizations were recorded in 2008 and 2009 within 2010 survey corridors will be re-visited once in 2010 to confirm activity status. Unsurveyed corridors will also be surveyed; two surveys will be conducted. Results of the 2008, 2009 and planned 2010 wildlife surveys will be reported following the 2010 surveys.

2.7 Bat Literature Review

A review of existing information from areas surrounding the Montague Facility was conducted. Databases were searched and existing literature was reviewed for areas including Gilliam County, Morrow County, Wheeler County, and Sherman County, Oregon, and Klickitat County in Washington (north of the Facility across the Columbia River). The 2005 bat review conducted for the Leaning Juniper II Wind Power Facility (LJWP, 2006; Exhibit P) was reviewed for species occurrence (Kronner et al., 2005, Attachment P-2 to the ASC). Supplemental information (informal acoustical monitoring data on file with NWC staff or habitat investigations), where available, was also reviewed in 2009 and used to update species distribution in the general area. Special status bat species that have potential to occur within the site boundary based on this bat review are listed in Appendix C. Bat fatality monitoring results at regional and nearby projects (indicating species presence in the area), particularly those from Leaning Juniper I, and any other updates were reviewed and are discussed in the impacts discussion (Section 4.5) and shown in Appendix C.

3.0 RESULTS

3.1 Information Review and Agency Other Briefings and Consultation

3.1.1 Oregon Natural Heritage Information Center

A request for special status plant and animal records was submitted to Oregon Natural Heritage Information Center (ORNHIC) by NWC and results were received October 7, 2009. ORNHIC noted that the data is confidential and requested that the data not be distributed. The data can be provided to the Oregon Department of Fish and Wildlife (ODFW) and Oregon Department of Energy (ODOE) upon request, with the permission of ORNHIC. Due to changes in the site boundary after the initial ORNHIC database search request was submitted (Appendix B), some ORNHIC records are no longer located within 5 miles of the site boundary and are excluded from this report. A total of 24 records were found by ORNHIC within 5 miles of the site boundary, including four vascular plant (discussed

further in another report), nine mammal, five bird, four fish, one amphibian, and one invertebrate species records.

Mammal records provided by ORNHIC within the 5-mile buffer of the site boundary include seven State Endangered Washington ground squirrel (*Urocitellus washingtoni* formerly *Spermophilus washingtoni*) locations. One other species of mammal was found (two records) within the search area, State Candidate white-tailed jackrabbit (*Lepus townsendii*).

Bird records include two State Sensitive-Critical species: one record of ferruginous hawk *(Buteo regalis)* and one of western burrowing owl (*Athene cunicularia*). There were three State Sensitive-Vulnerable bird species found including: two records of long-billed curlew *(Numenius americanus),* and one record of Swainson's hawk (*Buteo swainsoni).*

There were two fish species documented including: three records of State Sensitive-Critical Steelhead (*Oncorhynchus mykiss,* population 28), and one record of State Sensitive-Vulnerable Chinook salmon (*Oncorhynchus tshawytscha,* population 19). There was one record of an amphibian, State Sensitive-Vulnerable western toad (*Bufo boreas*). Additionally, there was one record of an invertebrate, shortface lanx (*Fisherola nuttalli*).

3.1.2 United States Fish and Wildlife Service Gilliam County List

The United States Fish and Wildlife Service (USFWS) Gilliam County species list was also reviewed for species with potential for occurrence in the area and to aid in compiling target lists for surveys (Appendix A). For federal status, status definitions and details on potential occurrence see Appendix C. The USFWS Gilliam County species list encompasses a range of habitats within the entire County; species that have no potential for occurrence within and near the Montague Facility area are not included in Appendix C (i.e. mountain quail, greater sage grouse).

Records for the Washington ground squirrel (Betts, 1990) that fell within the Montague site boundary were reviewed. Where suitable habitat is still available, this data will be used to aid in focusing the 2010 surveys.

3.1.3 Agency and Environmental Group Briefings and Consultation

Comments received from ODFW Biologist Steve Cherry on the Montague Facility resulting from the conference call and site tours in fall season 2009 are summarized in Appendix F. During the Nov 23, 2009 project briefing conference call hosted by the Applicant, Biologist Jerry Cordova from USFWS indicated that the USFWS would be sending the Oregon Department of Energy (ODOE) a project-specific comment letter on the Notice of Intent (NOI), and that he may be interested in a site tour sometime in the future.

3.2 Wildlife Habitat Mapping and Categorization

3.2.1 Wildlife Habitat Mapping

The general landscape in the vicinity of the site boundary was formed by the Missoula floods, and consists of moderately-deep to deep soils primarily composed of flood deposited and subsequent wind re-deposited silts and loams. The local vegetation is broadly categorized as Columbia Basin Ecoregion steppe, and Shrub-steppe cover types that have

often been heavily modified by human activities associated with agricultural development, domestic livestock grazing, and human settlement (Kagan *et al.,* 1999).

Historical land cover maps from the Oregon Gap Analysis Program (OGAP) classify vegetation within the Montague area as 'perennial bunchgrass' and 'Basin big sagebrush' cover types (Kagan *et al.,* 1999). However, OGAP's Current Land Cover maps show that much of this area been converted to agricultural use, with native sagebrush-steppe cover type remaining only in portions of the Montague area within deeper-soil lower elevation areas and slopes and canyons unsuitable for farming. However, OGAP's vegetation maps were created through photo interpretation of coarse-resolution satellite imagery and, therefore, only present general classification of broad cover type categories at coarse-scale. While this information is useful for gaining a general overview of vegetation cover, more detailed habitat information, with more specific habitat categories at a finer spatial scale, are needed to be relevant to wildlife use.

Based on 2008 and 2009 wildlife surveys, preliminary site reconnaissance conducted in fall 2009 by NWC on behalf of the Applicant, NWC's prior experience and knowledge in the general area from 2003–2009, and on the 2005 aerial imagery, five primary types and several subtypes of land cover/habitat were mapped within the site boundary (Figure 2a). Wildlife habitat types and subtypes within the site boundary are similar to nearby wind project sites studied by NWC in recent years such as Leaning Juniper I and II (A and B) (LJWP, 2009; LJWP, 2006; NWC, 2009; Kronner et al., 2005), Pebble Springs (PPM Energy, 2006), and Rattlesnake Road (Kronner et al., 2007a). Habitat types and subtypes along with their descriptions, acreages, conservation status, and associated wildlife species are summarized in Table 1. The general land cover types are: Developed, Exposed Rock, Grassland, Shrub-steppe, and Woodland. Detailed descriptions and ecological conditions of these habitat types are listed by habitat category in Section 3.2.2.

No new unique habitat types are present within the anticipated development areas within the site boundary that have not already been studied for adjacent Leaning Juniper II Facility. The Montague site boundary does contain irrigated agricultural lands (alfalfa and other irrigated crops) that are not present in other nearby studied sites (listed above). However, these fields are in the lower elevations along drainage bottoms such as Eightmile Canyon, not on higher elevation sites where turbines are typically placed. Based on NWC's observations at the site, the Juniper Woodland habitat type is more extensive in some portions of the Facility site boundary (found along Eightmile and Fourmile Canyons) than at other nearby studied sites where wildfires and land use have altered vegetation structure and functionality for wildlife. However, like the irrigated agricultural lands, these habitats are generally found at lower elevations and the turbines are typically placed along the ridge tops. In addition, the Applicant has committed to avoiding impacts to trees to the extent practicable. Wildlife habitat mapping and categorization will be field verified and re-assessed, if needed, pending 2010 wildlife survey results.

3.2.2 Habitat Categories

Primary habitat types, subtypes and descriptions of each category assigned to discrete units ("polygons") within the site boundary for the Montague Wind Power Facility are consistent with categorization for the same habitat subtypes found within the amended site boundary

for Leaning Juniper IIB. Habitat types and subtypes found within the Montague site boundary, along with their descriptions and associated wildlife species, are listed below by category. Target wildlife species and their scientific names can be found in Appendix C and scientific name for common wildlife species can be found in Appendices D and E. Habitat category definitions can be found in Section 2.2.2. Wildlife habitat mapping and categorization will be field verified and re-assessed, if needed, pending 2010 wildlife survey results.

Category 1 Habitat

WGS sites are considered Category 1 habitat. In addition, a 785-foot buffer of suitable habitat around WGS burrows is considered Category 1 habitat. Examples of habitat breaks that would cause the 785-foot area to shrink are tilled field edges or unvegetated, continuous vertical drop rim rock which has no burrowing or food value to Washington ground squirrels choosing to explore a given area.

WGS were observed or sign of their use was confirmed in shrub-steppe and grassland habitat during the 2008 or 2009 surveys of the Montague site boundary, as shown on Figure 5 and in Table 15. Shrub-steppe, grassland and CRP or other planted grasslands were also present as suitable habitat within 785 feet of WGS burrows. As a result, three habitat types were identified as Category 1 within the site boundary: Shrub-steppe, Grassland and Developed.

Shrub-steppe

WGS were detected in two subtypes of Shrub-steppe within the site boundary: Sagebrush (Big Sage) Shrub-steppe (subtype SSA) and Rabbitbrush/Snakeweed Shrub-steppe (subtype SSB). Shrub-steppe habitat was also present within 785-ft of WGS burrows, as shown on Figure2b.

Category 1 Sagebrush (Big Sage) Shrub-steppe is similar in vegetative cover and ecological condition to the immediately adjacent, respective Category 2 or Category 3 Sagebrush (Big Sage) Shrub-steppe. Category 1 Sagebrush (Big Sage) Shrub-steppe within the site boundary exists due to its proximity to known WGS occurrences. Category 1 Sagebrush (Big Sage) Shrub-steppe offers high quality breeding habitat for shrub obligate species including loggerhead shrike, and may support Washington ground squirrel and white-tailed jackrabbit. Sage sparrow, Brewer's sparrow and lark sparrow are present in larger blocks of this habitat. Sagebrush lizard and other reptiles are likely to be found in areas where more-sandy soils are present. Commonly occurring species include western meadowlark and mourning dove.

Category 1 Rabbitbrush/Snakeweed Shrub-steppe is similar in vegetative cover and ecological condition to the immediately adjacent, respective Category 2, Category 3, Category 4, or Category 5 Rabbitbrush/Snakeweed Shrub-steppe. Category 1 Rabbitbrush/Snakeweed Shrub-steppe within the site boundary exists due to its proximity to known WGS occurrences. Category 1 Rabbitbrush/Snakeweed Shrub-steppe provides foraging, cover, and/or nesting habitat for grasshopper sparrows, habitat for Washington ground squirrels and white-tailed jackrabbit, as well as for common birds and mammals.

There are approximately 108 acres of Category 1 SSA and 199 acres of Category 1 SSB habitat within the Montague site boundary.

Grassland
WGS were detected in two subtypes of Grassland within the site boundary: Exotic Annual (subtype GA) and Native Perennial (subtype GB). Grassland habitat was also present within 785-ft of WGS burrows, as shown on Figure2b.

Category 1 Exotic Annual Grassland is similar in vegetative cover and ecological condition to the immediately adjacent, respective Category 2, 3 or 4 Exotic Annual Grassland. Category 1 Exotic Annual Grasslands within the site boundary exist due to their proximity to documented WGS occurrences. Some of these sites support nesting long-billed curlew. Horned-larks occur commonly in this habitat.

Category 1 Native Perennial Grassland is similar in vegetative cover and ecological condition to the immediately adjacent, respective Category 2, Category 3, or Category 4 Native Perennial Grassland. Category 1 Native Perennial Grasslands within the site boundary exist due to their proximity to known WGS occurrences. Category 1 Native Perennial Grasslands provide essential foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat. Native grasses and forbs provide forage for mule deer.

There are approximately 59 acres of Category 1 GA and 55 acres of Category 1 GB habitat within the Montague site boundary.

Developed
WGS were not detected in developed habitats. However, one subtype of developed habitat: CRP or Other Planted Grassland (subtype DC) is located within 785-feet of WGS burrows.

Category 1 Developed – CRP or Other Planted Grasslands share the same vegetative cover and ecological condition as neighboring Category 3 Developed – CRP or Other Planted Grasslands; they are Category 1 based on their proximity to known WGS burrows. White-tailed jackrabbits and savannah sparrows may be supported by this Category 1 CRP or Other Planted Grasslands habitat. Grasshopper sparrows and western meadowlarks are commonly found in this habitat subtype.

There are approximately 88 acres of Category 1 DC habitat within the Montague site boundary.

Category 2 Habitat
Four habitat types were identified as Category 2 within the site boundary: Exposed Rock, Grassland, Shrub-steppe, and Woodland.

Exposed Rock

Escarpment (subtype ESC) is the only subtype of Category 2 exposed rock within the site boundary. Category 2 Escarpment provides essential nesting habitat for raptors, roosting habitat for bats and owls and habitat for some passerines.

Category 2 Escarpment are linear Columbia River Basalt outcroppings approximately 3 to 15 meters (10–50 feet) in height, found on steeper slopes which bound canyon edges and shoulders (i.e. Eightmile Canyon). Grazing pressure is light in Escarpment habitat, and when present vegetative cover consists of Sandberg's bluegrass, non-native grasses, and various native and non-native forbs. Soils are absents or very shallow due to rock outcroppings and steep slopes. Pockets of deeper soils are present in swales located in areas with less exposed basalt and fewer cliffs. Category 2 Escarpment habitats provide critical nesting substrate and perching sites for raptors, crevices for bats, and habitat for some passerines. Escarpments provide shade and thermal cover for deer in summer and also serve as good windbreaks. They may also provide home sites for wood-rats and marmots.

Approximately 29 acres of Category 2 ESC exist within the Montague site boundary.

Grassland

Category 2 Grasslands provide essential nesting/denning and foraging habitat for several special status species. These Grasslands also show fewer signs of impacts resulting from wildfires and domestic livestock grazing pressure, and have more native plant diversity and fairly intact soil surface crust than the Category 3 or 4 habitats. There are two subtypes of Category 2 Grassland within the site boundary: Exotic Annual Grassland (subtype GA), and Native Perennial Grassland (subtype GB).

Category 2 Exotic Annual Grasslands in the site boundary are primarily non-native grasslands but extensive in size and support species of interest. The forb component is composed primarily of non-native weeds, such as cheatgrass, tumblemustard, bulbous bluegrass, mustard, and cereal rye with occasional patches of native bunchgrass, primarily Sandberg's bluegrass. The high weed content is primarily due to the recent hot fires, which burned native shrubs and bunchgrasses, and were followed by heavy grazing and/or wind erosion. Lack of native grasses and the dense weed cover limit the ability of most wildlife species to use these areas for forage or cover. Category 2 Exotic Annual Grassland are similar to Category 3 Exotic Annual Grassland in that they occur as a large contiguous area, on a broad open flat and provide important nesting habitat for long-billed curlews. In addition, Category 2 Exotic Annual Grasslands were conservatively designated as such due to their proximately to areas with documented use by Washington ground squirrels, and may provide suitable alternate habitat for cyclic expansion over time. Category 2 Exotic Annual Grassland is found on Shutler Flat in the western portion of the Montague site boundary.

Category 2 Native Perennial Grasslands are composed primarily of perennial bunchgrasses, such as Sandberg's bluegrass (*Poa secunda*). Bluebunch wheatgrass (*Pseudoroegneria spicata*) is also present. Soils appear to be generally medium to deep. Other native species, such as Idaho fescue (*Festuca idahoensis*) and western needle-and-

thread grass (*Hesperostipa comata*), are occasionally present in the appropriate soil types for the species. Various native forbs and low shrubs such as gray rabbitbrush and to a lesser extent, green rabbitbrush are present but are an inconspicuous component. Native vascular plants are diverse and a variety of invertebrates can be found utilizing the plants throughout the growing season. Non-native grasses are present throughout and consist of cheatgrass (*Bromus tectorum*), bulbous bluegrass (*Poa bulbosa*), and annual cereal rye (*Secale cereale*). Snakeweed (*Gutierrezia sarothrae*) is present but not dominant. The non-native grasses and the snakeweed are typical throughout the Columbia Basin, but non-native plants are generally less extensive in Category 2 Grasslands than in Category 3 and 4 Grasslands. Deep soil native bunchgrass sites in good to excellent condition are limited and becoming more limited in the general area. The Category 2 Grassland is found infrequently throughout the site boundary. Native Perennial Grasslands provide essential foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat. Native grasses and forbs provide forage for mule deer.

There are approximately 572 acres of Category 2 GA and 429 acres of Category 2 GB habitat within the Montague site boundary.

Shrub-Steppe

Shrub-steppe is classified as Category 2 where it provides essential habitat to target species such as grasshopper sparrows. There are two subtypes of Category 2 Shrub-steppe: Sagebrush (Big Sage) Shrub-steppe (subtype SSA) and Rabbitbrush/Snakeweed (subtype SSB).

The Category 2 Sagebrush (Big Sage) Shrub-steppe consists of an overstory of mature stage (large structure) patches of basin big sagebrush (*Artemesia tridentata v. tridentata*) and may have occasional western juniper (*Juniperus occedentalis*) acting as a superstory vegetation component. Understory plants consist of a mix of native bunchgrasses and exotic annual grasses depending largely on level of impact from disturbance. Common grasses are Sandberg's bluegrass, bluebunch wheatgrass, cheatgrass, and bulbous bluegrass. Category 2 Sagebrush (Big Sage) has a higher shrub density and greater plant health that similar but lesser quality Category 3 Sagebrush (Big Sage) habitat. This type is found on deep soils throughout the site boundary usually on slopes or in draws that prevent agricultural use. Category 2 Sagebrush (Big Sage) Shrub-steppe offers high quality breeding habitat for shrub obligate species including loggerhead shrike, and may support Washington ground squirrel and white-tailed jackrabbit. Sage sparrow, Brewer's sparrow and lark sparrow are present in larger blocks of this habitat. Sagebrush lizard and other reptiles are likely to be found in areas where more-sandy soils are present. Commonly occurring species include western meadowlark and mourning dove.

The Category 2 Rabbitbrush/Snakeweed Shrub-steppe has an overstory dominated by low-growing gray rabbitbrush (*Ericameria nauseosa)* or, to a lesser extent, green rabbitbrush (*Chrysothamnus viscidiflorus*). Snakeweed (*Gutierrezia sarothrae*) is fairly

extensive throughout and is the dominant mid height structure. Small patches of big sagebrush are intermittent. Understory plants are primarily native and non-native bunchgrass, including Sandberg's bluegrass, western needle-and-thread grass, buckwheat, and annual, non-native grasses such as cheatgrass, and bulbous bluegrass. Annual cereal rye is present in swales and deeper soils where past disturbance has removed most of the native vegetation. Weeds are more common in parts of Rabbitbrush/Snakeweed habitat than Sagebrush (Big Sage) as a result of recent fires or land use practices. These include Russian thistle (*Salsola kali*) and tumblemustard (*Sisymbrium altissimum*). Many sites contain small patches (<1-acre) of sagebrush (big sage). Category 2 Rabbitbrush/Snakeweed Shrub-steppe provides foraging, cover, and/or nesting habitat for grasshopper sparrows, Washington ground squirrels, and white-tailed jackrabbit, as well as common horned lark and western meadowlark.

There are approximately 2,318 acres of Category 2 SSA and 885 acres of Category 2 SSB habitat within the Montague site boundary.

Woodland

Woodland habitat is classified as Category 2 where it provides essential nesting habitat for special status raptors such as ferruginous and Swainson's hawks. There are two Category 2 subtypes of woodland habitat within the site boundary: Juniper Woodland (subtype WJ) and Riparian Woodland (subtype WR).

Category 2 Juniper Woodland habitats are larger, and denser (in canopy cover) than Category 3 Juniper Woodland habitat. Category 2 Juniper Woodland consists of an open canopy of mature and sometimes immature (ingrowth) western juniper. Understory varies widely in this habitat usually owed to land use practices. The most common understory in this habitat subtype is sagebrush or bunchgrass. In heavily impacted areas annual grasses and weeds comprise the understory. Recent wildfires have killed some juniper trees in the Eightmile Canyon area. Category 2 Juniper Woodland habitat provides potential nesting habitat for ferruginous and Swainson's hawks, and potential foraging and nesting habitat for loggerhead shrikes. This habitat also provides potential foraging and breeding habitat for short-horned and sagebrush lizards. American robins, Townsend's solitatire, waxwings, and mountain bluebirds utilize this habitat for wintering and while migrating. Mourning doves commonly nest in Juniper Woodland habitat.

The Category 2 Riparian Woodland habitat within the site boundary is limited to one narrow intermittent linear stream course in Eightmile canyon. Other very small patches are present nearby but were too small to map as separate habitat subtype units. Willows (*Salix spp.)* comprise the primary overstory of this habitat subtype; black cottonwood (*Populus trichocarpa*) present but is less extensive. This woodland habitat provides essential and irreplaceable nesting habitat for the target species ferruginous and Swainson's hawk. Riparian Woodland habitats provide important roosting habitat for bats. Woodland habitats also provide important thermal cover for mule deer and nesting and migration habitat for passerines. Tree owls are occasionally found roosting and nesting in this habitat type.

There are approximately 245 acres of Category 2 WJ and 2 acres of Category 2 WR within the Montague site boundary.

Category 3 Habitat

Four types of habitats were identified as Category 3 within the site boundary: Developed, Grassland, Shrub-steppe, and Woodland.

Developed

Category 3 Developed habitats are areas where former disturbances have ceased and the disturbed areas have attained sufficient ecological condition to become important or essential for wildlife. CRP or Other Planted Grassland (subtype DC) is the only developed Category 3 subtype within the site boundary.

Category 3 CRP or Other Planted Grasslands are planted grassland on previously farmed other disturbed lands that may be enrolled in the Conservation Reserve Program. This habitat subtype is comprised mainly of native or native-like grasses such as: bluebunch wheatgrass, intermediate wheatgrass (*Thinopyrum intermedium)*, crested wheatgrass (*Agropyron cristatum*), big bluegrass (*Poa ampla*), Idaho fescue, and Sandberg's bluegrass. Older planting may contain a sparse (always subordinate) naturally seeded component of rabbitbrush, snakeweed, or sagebrush. White-tailed jackrabbits and savannah sparrows may be supported by this habitat. Grasshopper sparrows and western meadowlarks are commonly found in this habitat subtype.

There are approximately 1,424 acres of Category 3 DC within the Montague site boundary.

Grassland

Category 3 Grasslands provide essential or important foraging and nesting habitat for special status birds and mammals as well as common native and non-native (gamebirds) avian species. There are two Category 3 grassland habitat subtypes: Native Perennial Grassland (subtype GB), and Exotic Annual Grassland (subtype GA).

Category 3 Native Perennial Grasslands are dominated by the same perennial grasses described for Category 2 Native Perennial Grassland. However, these habitats have been altered through land use or wildfires or are more sparsely vegetated. They generally have a higher composition of non-native vegetation (broad-leaf weeds and annual grasses) but are still mostly native vegetation sites. Category 3 Native Perennial Grasslands generally occur on sites with shallower soils and harsher exposures, or in areas that have experienced livestock grazing or frequent fires. Category 3 is the most abundant Category of Native Perennial Grassland. Native Perennial Grasslands provide essential foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat. Native grasses and forbs provide forage for mule deer.

Category 3 Exotic Annual Grassland share the vegetation composition and ecological condition of the Category 4 GA described below except that they occur as a large contiguous area, on a broad open flat and provide important nesting habitat for long-billed curlews. Horned-larks occur commonly in this habitat. While GA habitats occur throughout the site boundary and are generally Category 3, grasslands of this large flat nature are limited in the area.

There are approximately 3,138 acres of Category 3 GB habitat and 1,529 acres of Category 3 GA habitat within the site boundary.

Shrub-Steppe

The primary difference in the Category 2 and Category 3 shrub-steppe habitats is the overall functionality of the habitat and the breeding season value for special status vertebrate wildlife species. In general, Category 3 tends to be more weedy, less biologically diverse, has obvious signs of prior or ongoing impacts and is a habitat type relatively common in the general area.

Category 3 Shrub-steppe habitat was found in abundance throughout the site boundary. When wildlife survey data is available in spring 2010, some of these may be changed to Category 3 or 4, depending on the documented wildlife species values and assemblage of native wildlife utilizing the site. These shrub habitats are similar to their respective Category 2 Shrub-steppe habitats subtypes, but have been affected more by wildfires, domestic livestock grazing or other land use practices resulting in less vascular and nonvascular vegetative diversity. The protective soil surface biotic crust of mosses, lichens, algae and bacteria (cryptogamic layer) has been impacted from land use, resulting in opportunities for non-native weedy plants to become established. The SS habitat is important to wildlife species but is not as limited in the region as the Category 2; many steppe habitats in the local region have experienced wildfires and resulting vegetation is similar in plant species overall vegetative structure. Two habitat subtypes are present in this category: Sagebrush (Big Sage) Shrub-steppe (subtype SSA) and Rabbitbrush/Snakeweed Shrub-steppe (subtype SSB).

The Category 3 Sagebrush (Big Sage) Shrub-steppe (SSA) consists of big sagebrush at a mature stage (large structure). Patches of Category 3 SSA lack the density and plant health of Category 2 SSA or are in patches of very limited size. The overstory sagebrush in this type is often decadent or lacks full foliage. Understory vegetation in Category 3 often tends toward annual grasses and low weeds. These areas were historically higher quality habitats but are experiencing degradation due to land use practices or frequent fires. However, the mature shrub cover provides escape and resting cover for common wildlife and is limited in the immediate area and the region. Sagebrush (Big Sage) Shrub-steppe offers high quality breeding habitat for shrub obligate species including loggerhead shrike, and may support Washington ground squirrel and white-tailed jackrabbit. Sage sparrow, Brewer's sparrow and lark sparrow are present in larger block. Sagebrush lizard and other reptiles are likely to be found in areas where more-sandy soils are present. Commonly occurring species include western meadowlark and mourning dove.

The Category 3 Rabbitbrush/Snakeweed Shrub-steppe (SSB) is by far the most abundant Shrub-steppe subtype within the site boundary. SSB areas have been more affected by recent fires and are in an early seral stage. Native rabbitbrush and other low-stature plants such as snakeweed and buckwheat are common. The understory is native Sandberg's bluegrass and non-native cheatgrass, bulbous bluegrass, and tumblemustard. Patches of native perennial grasses such as bluebunch wheatgrass and western needle-and-thread grass are present but to a lesser extent than found in Category 2. Many of these sites contain small patches of sagebrush that are less than one acre in size. Category 3 Rabbitbrush/Snakeweed Shrub-steppe provides foraging, cover, and/or nesting habitat for grasshopper sparrows, Washington ground squirrels, and white-tailed jackrabbit, as well as common horned lark and western meadowlark.

Approximately 7,317 acres of Category 3 SSB and 344 acres of Category 3 SSA exist within the Montague site boundary.

Woodland

Category 3 Woodland habitats are smaller and less dense than Category 2 Woodland habitats. Trees in some sites appear unhealthy or have been impacted by hot fires. One Category 3 woodland habitat subtypes occurs within the site boundary: Juniper Woodland (subtype WJ).

Category 3 Juniper Woodland habitats are smaller in size, sparser in canopy cover, and have weedier understories than Category 2 Juniper Woodland habitats. Category 3 Juniper Woodland habitat is limited and provides potential nesting habitat for ferruginous and Swainson's hawks, and potential foraging and nesting habitat for loggerhead shrikes. This habitat also provides potential foraging and breeding habitat for short-horned and sagebrush lizards. American robins, Townsend's solitaire, waxwings, and mountain bluebirds utilize this habitat for wintering and while migrating. Mourning dove commonly nest in Juniper Woodland habitat.

There are approximately 41 acres of Category 3 WJ habitat within the site boundary.

Category 4 Habitat

There are three types of Category 4 habitat within the Montague site boundary: Developed, Grassland, Shrub-steppe.

Developed

There is only one subtype of developed Category 4 habitat within the site boundary: Old Field (subtype DB).

Category 4 Old Field (DB) habitat consists of a small area in the northern portion of the site boundary that was previously cultivated and has been left to reseed naturally. The area is currently occupied by a variety of common non-native and native vegetation. Common species are cheatgrass, Russian thistle, tumble mustard, annual cereal rye, and bulbous bluegrass. Native vegetation, when present is a minor component. Category 4 DB provides foraging habitat for horned larks, and western meadowlarks.

There are approximately 8 acres of Category 4 DB habitat within the site boundary.

Grassland
There are two subtypes of Category 4 grassland in the site boundary: Native Perennial Grassland (subtype GB) and Exotic Annual Grassland (subtype GA).

Few small patches of Category 4 Native Perennial Grassland (GB) occur in the site boundary. Category 4 Native Perennial Grassland is ecologically similar to Category 3 GB but is classified as Category 4 because its small size, and isolated nature limit its value to wildlife. Native Perennial Grasslands provide important foraging habitat to a variety of common resident and migratory birds and common mammals. Grasshopper sparrow, savannah sparrow, vesper sparrow, white-tailed jackrabbit and burrowing owl have been shown to use this habitat. Western meadowlark and horned lark occur commonly in this habitat. Native grasses and forbs provide forage for mule deer.

Category 4 Exotic Annual Grasslands found within the site boundary are non-native grasslands with a very high weed component and disturbed or less nutrient-rich soils. The forb component is composed primarily of non-native weeds, such as cheatgrass, tumblemustard, bulbous bluegrass, mustard, and cereal rye with occasional patches of native bunchgrass, primarily Sandberg's bluegrass. The high weed content is primarily due to the recent hot fires, which burned native shrubs and bunchgrasses, and were followed by heavy grazing and/or wind erosion. Some of these sites support long-billed curlew. Horned-larks occur commonly in this habitat. Category 4 GA habitat is found throughout the Montague site boundary. Subtype GA provides important habitat to common species, but the lack of native grasses and the dense weed cover limit the ability of most wildlife species to use these areas for forage or cover. This habitat is commonly found throughout the Columbia Basin. In addition, the weed cover, often dominated by annuals such as cheatgrass, makes the slopes in this area more susceptible to erosion and soil damage from grazing, because of a lack of the robust root structure found in perennial species, such as the native bunchgrasses. With sufficient time and appropriate livestock grazing practices, however, these areas could become essential habitat to both common and special status species.

There are approximately 193 acres of Category 4 GB and 1,046 acres of Category 4 GA within the Montague site boundary.

Shrub-steppe
Category 4 Shrub-steppe habitats are important to wildlife. Rabbitbrush/Snakeweed Shrub-steppe (subtype SSB) is the most abundant subtype in this category.

Category 3 and Category 4 Rabbitbrush/Snakeweed Shrub-steppe (SSB) have the same plant species, but differ in composition. Category 4 SSB has a greater weed and annual grass component than Category 3 SSB. While aspect and soils may contribute somewhat to this, disturbances livestock grazing and fires have a far greater affect. Category 4 Rabbitbrush/Snakeweed Shrub-steppe provide foraging and/or nesting habitat for grasshopper sparrows, Washington ground squirrels, and white-tailed jackrabbit, as well as common horned lark and western meadowlark.

The Category 4 Sagebrush (Big Sage) Shrub-steppe (SSA) consists of big sagebrush at a mature stage (large structure) that has been impacted to varying degrees from recent wildfires. These areas were historically higher quality habitats but are experiencing degradation due to land use practices or frequent fires. However, the residual mature live shrub cover provides escape and resting cover for common wildlife and is limited in the immediate area and the region

There are approximately 175 acres of Category 4 SSB and 22 acres of Category 4 SSA within the Montague site boundary.

Category 5 Habitat

There is no Category 5 habitat area identified within the Montague site boundary: Fire and grazing-impacted native habitats are likely to become more important for wildlife as the vegetation recovers but land use practices are likely to influence that process (could be negatively or positively impacted but it is unknown at this stage). More fire or grazing-impacted habitats were conservatively rated as Category 2, 3 or 4 because of the lack of certainty for "high potential to become essential or important…" as defined for Category 5.

Category 6 Habitat

Category 6 habitat is nonessential wildlife habitat with limited potential to become important or essential in the foreseeable future. There is one type of Category 6 habitat with the site boundary: Developed.

Developed

There are three subtypes of Developed habitat within the site boundary: Irrigated Agriculture (subtype DI), Dryland Wheat (subtype DW), and Other (subtype DX).

Category 6 Irrigated Agriculture (DI) habitat consists of agricultural crop or pasture fields that are irrigated for all or a portion of the growing season. All except for one of these fields occur in the Eightmile canyon portion of the site boundary.

Category 6 Dryland Wheat (DW) habitat is the largest habitat subtype within the site boundary and is extensive throughout the Facility area. It consists of agricultural fields that are currently in small grain production or fallow. Horned larks and mourning doves are common in winter stubble or when fallow.

Category 6 Other (DX) habitat includes farming/ranching home and shop sites, corrals, structures, feedlots, inactive and active gravel quarries, nonirrigated pastures, gravel and paved roads, right-of-ways, and waste areas associated with on-going human activities. These areas are not considered to have significant value to wildlife species.

As a result of the high level of disturbance, no special status/sensitive species are known or expected to occur with regularity in the Category 6 habitats and these areas are unlikely to become important or essential wildlife habitat in the foreseeable future.

Approximately 13,178 acres of Category 6 habitat exist within the Montague site boundary.

3.3 Avian Use Surveys

This section presents results from a full year of avian use surveys conducted over the course of four seasons in 2008–2009 at five Montague study plots, as well as at six additional plots established in fall season 2009 to survey additional lands not previously covered (Figure 3). Although surveys at the six additional plots are ongoing, only fall season 2009 results are complete and presented within this report. Results from avian use surveys at adjacent and nearby sites also presented, with the most emphasis on the seven study plots within the adjacent Leaning Juniper IIB site boundary (Figure 3). Several of the LJIIB study plots actually intersect with the Montague site boundary (Figure 3) and results for the LJIIB avian use survey are assumed to be representative of the Montague Facility due to close proximity and similar habitats. Fall and winter season LJIIB data had been presented previously. Methods for surveys can be found in NWC, 2009 (although they are the same as used for this study). Results of avian use surveys at two other nearby wind projects, Leaning Juniper IIA and Pebble Springs, are compared briefly to Montague Facility results in this section. Further comparisons to avian use at other sites and fatality monitoring results in the region can be found in the impacts discussion (Section 4.0).

A list of special status species observed can be found in Table 3, and details are discussed under the special status species section below. All species observed (including mammals) with their scientific names can be found in the comprehensive species list (Appendix D). Plot locations are plotted on Figure 3.

Avian Use at the Montague Study Plots

A total of 31 species of birds were identified during point count surveys within the five 2008–2009 Montague study plots in four seasons; 11 in fall season, 11 in winter season, 17 in spring season, and 18 in summer season (Tables 4 and 5). A total of 15 avian species were identified during the fall season 2009 Montague point count surveys of six plots (Table 6). No State or Federal listed Threatened or Endangered species were observed during surveys. During the four seasons at the five plots surveyed in 2008–2009, a total of 1,101 groups (flocks) comprising a total of 1,555 individual birds were observed during 228 surveys (some individuals may have been counted more than once; Table 4). At the fall season 2009 plots (six), a total of 120 groups of 560 individuals were observed during 44 surveys Table 6). Overall mean use (# birds per 20 minute survey) by season at the five 2008–2009 plots ranged from 5.769 in winter season to 7.844 in fall season, although overall use was similar between fall, spring at 7.309, and summer season at 7.000; (Table 5). Fall season 2009 mean use was higher overall at 12.727 birds/20 min., primarily due to higher use by passerines (Table 6).

Passerines, including both songbirds and corvids, were the most abundant group during all seasons at the five 2008–2009 plots, and their use did not range dramatically between seasons. The lowest mean use was 5.564 birds/survey in winter season and the highest mean use was of 7.689 birds/survey in fall season (Table 5). Passerine use was higher at the six fall season 2009 plots with a mean use of 12.432; songbirds accounted for most of the detections at 11.614 bird/survey (Table 6). Passerines represented from 82.57% of all detections in summer to 98.02% of all detections in fall season 2008 and 97.68% of all detections in fall 2009. Passerines were observed with great frequency during all seasons (89.74%–100.00% of surveys; Tables 5 and 6). In all seasons, horned lark comprised the

highest use of all identified species during all seasons in 2008–2009, and at fall 2009 plots. Horned lark mean use was similar between all seasons in 2008–2009 ranging from 3.128 in winter season to 3.467 in fall season, and a bit higher, but still somewhat similar in fall season 2009 at 4.341 (Tables 5 and 6). Two other identified passerine species that showed high use were common raven (1.311 birds/20 min. in fall 2008, 0.818 in fall 2009 and 1.551 birds/20 min. in winter) and western meadowlark (2.055 birds/20 min. in spring and 1.600 birds/20 min. in summer). In fall season 2009, unidentified passerine had higher use than horned lark or any other unidentified group or species at 5.795 birds/20 min. survey (due to large flocks of flying small birds). Although some of these birds may have been horned larks, unidentified passerine is a group of unidentified birds and likely doesn't represent any one species.

Shorebirds, including only long-billed curlew, was the second highest group of birds observed during spring and summer seasons at the five 2008–2009 Montague study plots. Mean use for long-billed curlew was 0.709 birds/20 min. survey in spring season and 0.700 birds/20 min survey in summer season (Table 5). Long-billed curlews represented 9.70%–10.00% of all detections in spring and summer seasons and were observed rather frequently (30.00% to 45.45% frequency of occurrence; Table 5). No shorebirds were observed during fall and winter seasons 2008–2009. No shorebirds were observed during fall 2009, however, one wading bird was observed, great blue heron (Table 6).

Raptor use was higher in summer season (0.500 birds/20 min.) than all other seasons (mean use 0.200 in spring, 0.133 in fall 2008, 0.133 in winter, and 0.273 in fall 2009). Raptors overall, had the second highest frequency of occurrence as a group in summer season at 42.00%, but were seen with less frequency in spring (18.18%), fall (13.33%) and winter seasons (5.13%; Table 5). Swainson's hawk was the most abundant species of raptor at the five plots surveyed during the four seasons in 2008-2009 with the highest use in summer season (0.240 birds/20 min. survey), followed by northern harrier and red-tailed hawk (mean use for each was 0.060), ferruginous hawk, American kestrel and prairie falcon (mean use for each was 0.040). Swainson's hawk and northern harrier also had the highest use in spring season (0.091 each; Table 5). Other species of raptor observed in 2008–2009 include rough-legged hawk and turkey vulture. Two additional species observed in-transit to 2008–2009 avian use surveys were golden eagle and great-horned owl (Table 7). Sightings made during 2008-2009 surveys, but outside the 800 meter study plots during surveys, include detections of red-tailed hawk, turkey vulture, and unidentified buteos (Table 8). During fall 2009 surveys of six plots, red-tailed hawk was the most abundant species (mean use 0.091) followed by rough-legged hawk and northern harrier (mean use 0.068), and American kestrel and Swainson's hawk (0.023; Table 6). Golden eagle was observed in-transit and also during one point count survey but outside of the 800m plot radius (Tables 7 and 8) during fall 2009.

All other groups showed relatively low use overall. Waterfowl (Canada goose) was only detected during winter season (0.064 birds/20 min. survey). Game birds (California quail) were only detected during fall season 2008 (0.022 birds/20 min. survey). Doves (mourning dove) were only detected during summer season (0.020 birds/20 min. survey).

Spatial Use at the Montague Study Plots

At the five 2008–2009 Montague study plots, overall avian mean use ranged from 4.200 at plot J in winter season to 9.333 at plot C in fall season; the high was primarily due to large numbers of horned larks (Table 9). The range was not overly broad and no one single plot showed consistently higher use than others in all seasons, although plots B and C (Figure 3) both had relatively high use in several seasons. Overall songbird abundance ranged from 3.067 birds/20 min. at plot J during spring season to 7.667 birds/20 min. at plot J in fall season. Corvid abundance ranged from 0.000 birds/20 min. at plot J in fall season to 3.188 birds/20 min. at plot B in winter season. No plot had consistently higher use by passerines (songbirds or corvids) in all seasons.

All five 2008–2009 study plots had some raptor use in at least two seasons surveyed. There did not seem to be one plot with higher raptor use than others, but overall raptor use was relatively low at each plot. Waterfowl were only detected at plot B. Shorebirds were detected at all plots, with the highest use at plots B, C, and J. Game birds were only detected at plot A. Doves were only detected at plot C.

At the six fall season 2009 Montague study plots, overall avian mean use ranged from 9.500 at plot AA to 23.000 at plot GG; Table 10). The higher use of plot GG was primarily due to higher passerine use, particularly by unidentified passerines and European starlings. All plots except plot EE had some use by raptors, and the highest use for this group was found at plots AA and GG (mean use 0.500).

Special Status Species at the Montague Study Plots

No Federal or State listed Threatened or Endangered species were observed during the avian use surveys at the five study plots in 2008–2009 or at the six fall season 2009 study plots. Summaries of special status species observed during other types of surveys (raptor nest surveys, ground transect surveys) or at nearby sites can be found in Appendix C.

One State Sensitive-Critical species, ferruginous hawk, was observed during winter and summer seasons at plots C, J, and K. Swainson's hawk (State Sensitive-Vulnerable) was the most abundant species of raptor detected during 2008–2009 surveys, with the highest use in summer season. Swainson's hawk was detected at all five 2008–2009 plots. Swainson's hawk was the only special status species observed during fall 2009 surveys and one individual was detected at plot FF. There were 11 additional detections of this species in-transit to study plots during spring and summer seasons (Table 7). Long-billed curlew was the fourth most abundant species observed overall in 2008–2009, with all detections during spring and summer seasons. This species was observed at all five study plots in 2008–2009.

Two special status passerine species were detected in small numbers during 2008–2009 surveys, State Sensitive-Vulnerable loggerhead shrike and grasshopper sparrow. One loggerhead shrike was detected during spring season at plot K. There were three additional detections of loggerhead shrike in-transit to surveys; one during winter and two during spring (Table 7). There were two detections of grasshopper sparrow during summer season at plots B and C.

One species, golden eagle (does not have State status but is protected under the Federal Eagle Protection Act) was observed while in-transit to study plots (between plot J and K) during winter season (Table 7). During fall 2009 surveys a golden eagle was also observed while in-transit to plot BB, and one was detected during a point count survey of plot GG, but outside the plot radius (Tables 7 and 8).

Comparison to Other Adjacent and Nearby Sites

Leaning Juniper IIB

At Leaning Juniper IIB, a total of 34 species were identified during 2008–2009 point count surveys of seven avian plots in four seasons (Table 11). Species composition at LJIIB is relatively similar to the 31 species identified during 2008–2009 surveys of the five Montague plots and the 15 species identified during fall season 2009 Montague surveys. However, no waterfowl were observed during Leaning Juniper IIB surveys whereas waterfowl were observed at Montague, and small numbers of other (non-status) species observed at Montague plots were not observed at LJIIB (i.e. great-blue heron, Townsend's solitaire, yellow-rumped warbler, etc.). At Montague plots, no goatsuckers and woodpeckers were observed during any season; however, these groups all had relatively low use at LJIIB overall.

Between LJIIB and Montague avian use surveys, there was slight variation in species composition and use, but the same overall trends apply to both datasets. *Passerine* use dominated during all seasons, and the passerine species with the highest use overall and in all seasons at both sites was horned lark, followed by common raven and western meadowlark at LJIIB and 2008–2009 Montague plots (Table 5 and 12). The trend was similar during fall season 2009 Montague avian use surveys, although unidentified passerine had the highest mean use followed by horned lark and common raven (Table 6). Seasonal use overall (dominated by passerines) at LJIIB was highest during fall season, similar to Montague avian use surveys. The overall range of mean use for *all species groups* for all four seasons in 2008-2009 was very similar between projects (LJIIB mean use 5.766 in spring to 7.129 in fall, Table 12; compared to a range of 5.769 in winter to 7.844 in fall at Montague in 2008–2009, Table 5). However, all bird use during fall season 2009 Montague surveys was slightly higher (12.727 birds/survey overall; Table 6). Substantial differences in spatial use were not found for any of the LJIIB plots.

Raptor use was similar between LJIIB and Montague surveys. The highest use was in summer (LJIIB 0.500 birds/20 min., Table 12; compared to 0.500 at Montague plots in 2008–2009 and 0.273 in fall 2009 at Montague, Tables 5 and 6). Raptor species observed were almost identical between the two projects, with the exception of turkey vulture which was observed at a Montague plot (Table 4 and 11) but not at LJIIB. Use of Swainson's hawk at LJIIB was also highest in summer season (0.157 birds/20 min.), but lower than at the Montague plots in the summer seasons.

Shorebird use was lower at LJIIB plots than at Montague plots with a high of 0.156 birds/20 min. survey, but species composition (long-billed curlew) and seasonal use (spring and summer detections) was the same between projects. Doves (mourning dove) showed higher use at LJIIB than at Montague with a high of 0.532 birds/20 min. survey in fall season at LJIIB (Table 12).

Leaning Juniper IIA

Overall avian mean use was lower at Montague and LJIIB 2008–2009 plots than was found during 2004–2005 Leaning Juniper IIA (LJIIA) surveys that covered both the Leaning Juniper I project owned by PacifiCorp and LJIIA (avian use plots shown on Figure 3). Overall avian use for fall and winter and spring seasons within the 2004–2005 LJIIA study area was notably higher than at Montague and LJIIB plots (Kronner et al., 2005; Tables 5 and 12). The highest use at LJIIA was found during winter season (47.244) followed by fall season (19.615; Kronner et al., 2005). The main reason for the higher avian use in winter and fall at LJIIA was largely due to the presence of large groups of horned larks, which can vary in number greatly by year, large numbers of unidentified passerines many of which were likely horned larks, greater numbers of common ravens, which occurred in large groups near the landfill adjacent to Leaning Juniper I (LJI), and higher use by Canada geese during winter (Kronner et al., 2005). The slightly higher use in spring at LJIIA was primarily due to higher use by common ravens and ring-billed and unidentified gulls, both which frequent the landfill adjacent to LJI. Fall season 2009 overall avian use at Montague was higher than during 2008-2009 Montague surveys at 12.432 bird/survey (Table 6), primarily due to flocks of unidentified passerines, although use was still lower than use at LJIIA.

The species with the highest use in all seasons is the same for LJIIA, LJIIB, and Montague plots: the horned lark. Other species with high use at LJIIA that are similar to LJIIB and Montague are common raven, western meadowlark, and Swainson's hawk during summer season, and long-billed curlew in spring and summer season. Several species showed higher use at LJIIA including European starling, Canada goose, ring-billed gull, American kestrel, and ferruginous hawk. One special status species observed at LJIIA during summer, but not at other sites during avian use surveys was burrowing owl.

Pebble Springs

At Pebble Springs, waterbirds were the most abundant group in spring season of 2006 (14.85 birds/20 min. survey), the only season that avian use surveys were conducted (PPM, 2006). Species that made up the waterbird group at Pebble Springs were ring-billed gull, unidentified gull, and Canada goose. No gull species were observed during any season at any Montague avian use plots, and similarly, none were observed at LJIIB during any season. A small number (five detections) of Canada goose were observed during winter at Montague and one great-blue heron was observed during fall 2009 (Table 4 and Table 6). The higher use by gull species at Pebble Springs is likely due to closer proximity to the Columbia River, as most of the gulls were observed in the northern portion of the Pebble Springs Project area. As discussed above, ring-billed gulls and unidentified gulls were detected at LJIIA, possibly due to presence at the landfill adjacent to the area. Passerines was the second largest group at Pebble Springs and the overall mean use of passerines in spring (9.60) was slightly higher than at Montague and LJIIB avian use plots in spring season (6.400 and 5.234, respectively); however, the most common species were the same (horned lark, western meadowlark, common raven). Raptor use at Pebble Springs (0.42) was similar and slightly higher than at Montague (0.200) and LJIIB (0.364) plots in spring season, and species composition was also somewhat similar. Long-billed curlew use of Pebble Springs (1.12) was higher than at Montague (0.709) and LJIIB (0.156) in spring season.

3.4 Raptor Nest Survey

During 2009, a large portion (approximately 35%) of the (192.65 mi^2) Montague raptor survey buffer was surveyed for nesting raptors for adjacent wind projects, and additional portions of the raptor survey area were examined during other studies. The Montague raptor survey buffer is 0.5-mile from the preferred transmission line route and alternates and 2-miles from the Montague site boundary.

Data was reviewed from several adjacent wind projects surveyed for raptor nests in 2009 by NWC, including Leaning Juniper I, IIA and IIB, and Pebble Springs. Results of raptor nest surveys that cover portions of the Montague 2-mile survey area are shown on Figure 4. WDFW ferruginous hawk telemetry study nests and 2009 raptor nest records from NWC field notes not associated with wind project surveys are also included on Figure 4.

In 2009, a total of 42 active raptor nests, 9 active common raven nests, and 86 inactive stick nests were located within the portion of the Montague 2-mile raptor survey buffer surveyed previously as follows:

- 18 Swainson's hawk nests
- 11 red-tailed hawk nests
- 10 ferruginous hawk nests
- 2 prairie falcon nests
- 1 long-eared owl nest
- 9 common raven nests
- 86 inactive stick nests (includes 4 large-sized nest)

Some of the inactive nests were likely originally constructed by raptors or corvids such as the common raven; however, the structure could be attractive to raptors in future years. Five of the inactive nests were relatively large and may have been used by ferruginous hawks in the past or will be used in the future.

While a large portion (over a third) of the overall Montague raptor nest survey buffer was surveyed in 2009 for various projects, surveys of the remaining area within the Montague 2-mile raptor survey buffer are planned for 2010. Where portions of the Montague 2-mile raptor survey buffer area overlap with the operating wind projects, raptor nest surveys will avoid operating turbines. The Applicant will also coordinate with other developers conducting raptor nest surveys in 2010 to reduce duplication; for example, a large portion of remaining area within the Montague 2-mile raptor survey buffer overlaps with the 2-mile raptor survey buffer for the Shepherd's Flat and Saddle Butte wind projects.

Results of both the 2009 and 2010 raptor nest surveys will be reported following the 2010 surveys. Raptor nest density was not calculated for the partially surveyed Montague raptor nest survey buffer, but nest density rates for adjacent and nearby wind projects are shown in Table 14.

3.5 Special Status Vertebrate Wildlife Surveys

3.5.1 Special Status Vertebrate Wildlife Surveys for Montague

The following summarizes the results of special status vertebrate wildlife species surveys conducted in March 2008 at Montague Wind Power Facility. A comprehensive species list from the special status vertebrate wildlife surveys, including scientifc names of species, is provided in Appendix E. Special status species observed during these ground-based surveys are mapped on Figure 5. Raptor species observed flying over during the ground based surveys were assumed to be associated with known nests and were not mapped; active nest locations for raptors can be found on Figure 4.

Some areas within the Montague site boundary have been previously surveyed for the LJIIB Facility in the spring of 2009; those results are provided in Section 3.5.2, and also shown on Figure 4. Results of both the 2008, 2009 and planned 2010 wildlife surveys will be reported following the 2010 surveys.

Sightings listed below only include those observed during the ground-based surveys. For information on sightings of these species during other field investigations such as the avian use surveys or raptor nest surveys, refer to those sections (3.3 and 3.4) or refer to Appendix C. Washington ground squirrel (State Endangered) sightings are detailed in Section 3.6.

Sage sparrow (State Sensitive-Critical)
One sage sparrow was observed during surveys near proposed turbine string V in Sagebrush Shrub-steppe habitat in the north eastern portion of the Facility site boundary.

Loggerhead shrike (State Sensitive-Vulnerable)
One loggerhead shrike was observed during surveys in Rabbitbrush/Snakeweed Shrub-steppe habitat in the north eastern portion of the site boundary near proposed turbine string V, and another was observed in the northern portion of the site boundary in Juniper Woodland habitat near proposed turbine string L.

White-tailed jackrabbit (State Sensitive-Vulnerable)
White-tailed jackrabbits were observed in three locations in the north eastern portion of the site boundary near proposed turbine strings U and V in Rabbitbrush/Snakeweed Shrub-steppe and Sagebrush Shrub-steppe habitat.

Other special status vertebrate wildlife species that occur within the Leaning Juniper IIB site boundary where it overlaps with the Montague site boundary include: grasshopper sparrow (State Sensitive-Vulnerable), long-billed curlew (State Sensitive-Vulnerable), Sagebrush lizard (State Sensitive-Vulnerable), as further described in Section 3.5.2. Based on suitable habitat within the Montague site boundary and results from surveys conducted at nearby projects include: ferruginous hawk (State Sensitive-Critical) and Swainson's hawk (State Sensitive-Vulnerable) may also be found during the planned 2010 Montague wildlife surveys.

3.5.2 Special Status Vertebrate Wildlife Surveys Within Montague Site Boundary – Prior Studies

Data from special status vertebrate wildlife surveys conducted in April and May 2009 for the adjacent Leaning Juniper IIB wind project (NWC, 2009) were reviewed for species occurrence within and near the Montague Facility. Results are summarized in Appendix C for all areas of LJIIB. Special status wildlife observed within the Montague Facility site boundary during LJIIB ground transect surveys are summarized below and displayed on Figure 5.

Grasshopper sparrow (State Sensitive-Vulnerable)
One detection of grasshopper sparrow was found during LJIIB ground transect surveys within the Montague site boundary near proposed turbine string H (Figure 5) in Exotic Annual Grassland. Additional detections were found during LJIIB surveys near, but not within the Montague site boundary (NWC, 2009). They were observed singing and calling during LJIIB surveys, and are assumed to be breeding within the LJIIB site.

Loggerhead shrike (State Sensitive-Vulnerable)
There were 3 detections of loggerhead shrike found during LJIIB ground transect surveys within the Montague site boundary at the southern end of proposed turbine string L (Figure 5). Two locations were in Juniper Woodland habitat and one was in Sagebrush Shrub-steppe. Additional detections of this species and a nest were documented within other portions of the LJIIB survey corridors near, but not within the Montague site boundary (NWC, 2009).

Long-billed curlew (State Sensitive-Vulnerable)
There were 2 detections of long-billed curlew within the Montague site boundary found during LJIIB ground transect surveys in Rabbitbrush/Snakeweed Shrub-steppe habitat to the west of proposed turbine string X (Figure 5). This species was found in other locations within LJIIB survey corridors and were assumed to be nesting although not nests were found (NWC, 2009).

Sagebrush lizard (State Sensitive-Vulnerable)
Sagebrush lizards were recorded in four locations within the Montague site boundary at the southern end of proposed turbine string L during surveys for LJIIB in Juniper Woodland habitat.

3.6 Washington Ground Squirrel Surveys

3.6.1 Washington Ground Squirrel Surveys of Montague

Signs of WGS (holes, pellets, vocalizations) were discovered within the Montague site boundary in 12 locations in March 2008 and in one location in 2006/2007 (Figure 5). Table 15 describes each location's characteristics and other pertinent information. In three locations WGS were seen, in one vocalizations confirming presence were heard, and fresh pellets were found in several locations. Most locations were very small in size ranging from one to three holes, but at four sites, there were small colonies (multiple individuals, number undetermined) as confirmed by numerous (7–10+) WGS holes. Most active sites were noted in Rabbitbrush/Snakeweed Shrub-steppe habitat, but three were in Sagebrush Shrub-steppe

habitat. The 2006/2007 WGS site (K. Kronner, Pers. Field Notes) was in Sagebrush Shrub-steppe and Native Perennial Grassland habitats (Table 15).

Some areas within the Montague site boundary have been previously surveyed for the LJIIB Facility in the spring of 2009; those results are provided in Section 3.6.2, and also shown on Figure 5.

Locations where WGS holes, droppings and/or vocalizations were recorded in 2008 and 2009 within 2010 survey corridors will be re-visited once in 2010 to confirm activity status. Unsurveyed corridors will also be surveyed; two surveys will be conducted. Results of the 2008, 2009 and planned 2010 wildlife surveys will be reported following the 2010 surveys.

3.6.2 Washington Ground Squirrel Sightings Within the Montague Site Boundary – Prior Studies

Two additional WGS locations were found within the Montague site boundary during surveys conducted for other wind projects (Figure 5). One location with approximately 10 holes and pellets in Rabbitbrush/Snakeweed Shrub-steppe habitat was found during surveys for LJIIB (LJIIB colony #25 in Table 12 of NWC, 2009). This colony is located within the Montague site boundary to the east of the proposed G turbine string.

At Pebble Springs in 2006, there was a confirmed WGS hole found in perennial grassland habitat (PPM, 2006) located within what is now the northern part of the Montague site boundary near the proposed transmission line, but this location was checked in 2009 and was not found to be active in 2009 (Gritski et al., 2009b). Surveys are planned for the area in 2010.

3.7 General Wildlife Observations

Other mammals observed during the course of avian use and special status species surveys include black-tailed jackrabbit, coyote, pronghorn antelope, and mule deer. A full list (with scientific names) of species including both special status and common species observed during surveys can be found in Appendices D and E.

4.0 IMPACTS DISCUSSION

4.1 Impacts to Wildlife Habitat Types and Categories

Potential impacts on wildlife habitat from construction of the Facility include temporary and permanent habitat loss, and alteration and disturbance during construction and operation. Because the Applicant seeks micrositing flexibility for the Facility as described in Exhibit C, temporary and permanent impacts were calculated based on both the "current" proposed Facility and the "worst case" Facility layout. Impacts for the "current" scenario were calculated to demonstrate that potential impacts to wildlife habitat are expected to be significantly lower than those calculated for the "worst-case" scenario. When calculating the impacts from the "current" layout, the maximum turbine layout (269 turbines) was used based on the current Facility layout, with a smaller disturbance area per turbine. Table 2 displays the habitat types by Category that may be impacted.

4.2 Impacts to Threatened and Endangered Plant and Wildlife Species

Mammals

For listed mammals, only the State Endangered and Federal Candidate WGS was documented. WGS, holes, and pellets were observed within the site boundary during March 2008 in eleven locations, and in one location in 2006/2007 (Table 15; Figure 5). Further study of WGS presence and use is planned for early spring 2010. WGS were also observed during surveys of LJIIB and LJIIA (Kronner et al., 2005; NWC, 2009) and the surrounding area (PPM, 2006; Caithness Shepherds Flat, 2007; ORNHIC, 2009). Two WGS observations found during surveys for other wind projects (in 2009, LJIIB and in 2006, Pebble Springs) are located within the Montague site boundary (discussed in detail in Section 3.6.1).

While WGS may be expected within these known locations or colony areas during the breeding cycle, not all squirrels remain within the colony throughout the season. For example, adult males may travel more than 150 meters (m) (492 feet) in less than an hour and adult females about 100 m (328 feet). One adult male was documented to have moved more than 600 m (1,968 feet), returned after a few days, then traversed the distance again to immerge for estivation/hibernation (Delavan, 2005). Juvenile males are known to have dispersed up to 2.25 miles, though the average is about 0.6 mile (0.9 km) (Klein, 2005). Ground squirrels, therefore, may use any parcel within these movement parameters while traveling, conducting daily activities, settling after dispersal, or estivating/hibernating. Some impacts might occur to WGS as a result of accidental injuries or kills caused by construction and operation traffic, but significant impacts that would jeopardize the survival of the recovery of the species are not anticipated from this effect of the Facility.

The Facility components have been designed and will be microsited to avoid all known, occupied WGS areas (taking into account 2010 survey information when available), thus keeping direct loss of individual squirrels to a minimum based on current knowledge. Two Facility-related factors could influence WGS persistence of the currently occupied areas and future use of suitable, unoccupied habitat: disturbance through construction/operation activities and loss or degradation of habitat. Disturbance during construction/operations and permanent or temporary loss or degradation of suitable habitat could temporarily or permanently influence the species' persistence near turbines and new roads. Facility construction activities could disturb estivating squirrels or interrupt the WGS daily habits during their above-ground activity period (late January through early June) resulting in increased energy consumption and underweight immergence, respectively, followed by greater over-winter mortality. Loss and degradation of occupied habitat would likely result in loss of animals, whereas loss or degradation of suitable, unoccupied areas may reduce the ability of subpopulations to communicate and for the population as a whole to expand as conditions allow.

Little is known about how WGS respond to human activity and no long-term monitoring data are available to aid in understanding how WGS might respond to new gravel roads and presence of wind turbines. Short-term monitoring data recorded for Leaning Juniper I in 2007, during the first year of post-construction monitoring, showed that most of the areas of WGS use found during 2005 pre-construction surveys continued to be used following construction (Gritski et al., 2008a). Only one small area showed discontinued use, but

ground squirrel species can vary their temporal use over time based on changes in vegetation and other environmental factors and there was no evidence to show that the WGS area had received more intense pressure from construction activities; rather due to its location it was more likely less disturbed by construction than other sites where WGS use remained. Studies from the Stateline Wind Project in Washington also show anecdotal evidence of persistence of WGS in the presence of wind project facilities and human activities related to facility operations (NWC field notes, 2002, 2003, 2004; Erickson et al., 2004). Ground squirrels are known to display population ebbs and flows due to environmental conditions and epizootics (epidemic disease), and interpreting changes in WGS use should take into consideration all known influencing factors. Survey efforts conducted in March through May 2009 in some locations in the Columbia Plateau have indicated that, compared to 2008 and earlier years, spring 2009 was generally a low activity year for the WGS in some areas (Kronner and Marr, field notes 2009), whereas others in parts of Washington within the Columbia Plateau are showing typical activity patterns. Though some are anecdotal, these observations suggest some level of tolerance by WGS to construction and operation activities at wind projects. Construction and operations activities planned at the Montague Facility are similar to those that occurred near WGS active sites at Stateline and Leaning Juniper I where the WGS persisted in the area during construction and has persisted through the operations phase.

It is not known how the WGS near the Montague Facility will respond to construction and operation. However, based on a visual assessment of vegetation and a review of soil types, suitable habitat is quite extensive both within and outside the site boundary. Temporary impacts during construction and permanent impacts of the facilities will alter 5.35% of the non-agricultural habitats within the site boundary. Not all is equally suitable for all the needs of WGS; spring 2010 surveys will confirm the extent of valuable habitat, presence of WGS and suitability for burrowing. Near their burrows WGS may use nearby suitable habitat for temporary/intermittent travel to and from "more-suitable" habitat, depending on the soil types, vegetative cover/structure habitat characteristics and tolerable predator activity level.

During micrositing all turbines, roads, and collector lines will be eliminated or relocated outside the occupied ground squirrel areas to prevent placement of permanent facilities within these areas. There is the potential for animals to be struck by vehicles if they should travel outside of identified colonies and into the Facility construction zones during the activities. While some incidental injuries or kills might occur as a result of construction and operation traffic, no impacts will occur that would reduce the likelihood of the survival or recovery of the species.

WGSs were primarily observed within the site boundary in Rabbitbrush/Snakeweed Shrub-steppe and Sagebrush Shrub-steppe habitats. A few individual WGS may be living or traveling through areas outside of known colonies. It can reasonably be expected that individuals may move throughout the landscape. There are approximately 11,367.12 acres of these habitat types present within the site boundary (Figure 2b and Table 1). Not all areas have suitable soils for this burrowing mammal. A lesser number of WGS were observed in native perennial grassland habitat; 3,814.88 acres of this habitat type (GB) occur within the site boundary. Based on a maximum possible Facility layout, up to 396.59 acres of

Rabbitbrush/Snakeweed Shrub-steppe (SSB) of variable quality and suitability for the WGS could be impacted temporarily during construction and approximately 50.40 acres permanently impacted (facility footprint). Revegetation of the temporary construction zones with native vegetation species, along with weed and fire management and appropriate grazing practices during the vegetation recovery period all have the potential to improve the habitat to some degree. Post-construction monitoring of the WGS use near the Montague turbines could aid in understanding WGS persistence onsite in the presence of wind projects over a longer period than what has been documented at other projects. The habitat mitigation plan (to be finalized in 2010) would also offset WGS habitat impacts by conserving suitable habitat and implementing enhancements.

Birds

No birds classified as Threatened or Endangered by the U.S. Fish and Wildlife Service or Oregon Department of Fish and Wildlife were observed within site boundary. Bald eagles (State Threatened) were not observed during surveys of the Montague Facility, or during surveys of Leaning Juniper IIB or IIA, but could occasionally occur during winter months as this species winters along the Columbia River. They could also potentially pass through the site very infrequently during spring or fall migration, but are not expected to nest on or near the site. The nearest nest is approximately 22 miles away from the Facility (C. Flick, Pers. Comm. 2009). One bald eagle was recorded during the winter avian use study at the Rattlesnake Road Wind Power Project to the north of the Facility, one was recorded in winter to the east at the Willow Creek Winds Project (Kronner et al., 2007a and b), and another individual was documented in winter in the northern portion of the Shepherds Flat Wind Farm (Caithness Shepherds Flat, 2007). Bald eagles do not appear susceptible to colliding with wind turbines (unlike golden eagles), likely because of their differences in foraging habits. Golden eagles are predators and move through the landscape in search of upland prey whereas bald eagles tend to feed on fish or scavenge. There have been no reported instances of a bald eagle fatality at any U.S. wind farm (Erickson et al., 2001; Table 18). It is unlikely that the Montague Facility will have any negative effect on bald eagles.

4.3 Impacts to Avian Species

This section focuses primarily on impacts to birds from the operating turbines. The most probable impact to birds resulting from the Montague Wind Power Facility is direct mortality or injury due to collisions with the turbines. Collisions may occur with resident birds foraging and flying within the area, or with birds migrating through the area. Impacts to birds from disturbance or displacement are discussed in Section 4.3.7. Other potential but infrequent direct impacts could occur such as bird strikes with facility operations vehicles traveling roads away from turbine area but these are not discussed here.

The Montague Wind Power Facility is located within the Columbia Plateau Ecoregion (CPE) of the Pacific Northwest, a region where many wind projects have been developed and studied. Pre-construction studies and fatality monitoring have been conducted at twelve wind projects of 25 MW or greater in the CPE including: LJI, Vansycle, Klondike I, II, and III, Biglow Canyon, and Combine Hills in Oregon, and Big Horn, Nine Canyon, Hopkins Ridge and Wild Horse in Washington, and Stateline in both Oregon and Washington (Table 16). Extensive pre-construction studies have been also been conducted at other nearby sites in Oregon including the Wheat Field, Shepherds Flat, Willow Creek Winds, and Saddle Butte

Wind Projects, and preliminary fatality monitoring studies have also been conducted at other nearby sites including Rattlesnake Road, Pebble Springs Wind Power Projects, (Kronner et al., 2007a and b; Kronner et al., 2008b; PPM, 2006; Caithness Shepherds Flat, Saddle Butte Wind, LLC, 2009) and reports from these and other nearby wind projects have been reviewed for pertinent information.

Results from fatality monitoring data from Leaning Juniper I in particular were reviewed and compared to the Montague Wind Power Facility in the most detail in this report, as it is the closest wind project with completed fatality monitoring. Due to its proximity to the site boundary, and similar topography, fatality estimates at Leaning Juniper I could provide a fair basis for predicting fatality impacts at the Montague Facility. Avian use metrics collected and analyzed for the 2004-2005 LJIIA study that covered both LJI and LJIIA were combined with flight-altitude characteristics (percent of time birds fly, percent of time birds fly within the rotor swept area of a turbine) to produce an exposure index for LJI—a relative measure of the risk of each species' exposure to wind turbine collision risk (Kronner et al, 2005). This combination of metrics is a logical and appropriate component in determining whether certain species are at high risk of collision. However, other facets of a species' natural history and behavior may also influence its susceptibility to collision (e.g., its ability to see and avoid wind turbine blades, whether it is a diurnal or nocturnal migrant) and should also be taken into consideration. For example, horned larks conduct aerial displays during the breeding season (often within the rotor-swept area of the turbine) and hence may be more at risk during this season because of this behavior. However, they spend considerable time on the ground and have very low flight patterns during most of the year because they are ground nesters. In addition, certain species such as ravens, turkey vultures and bald eagles seem to be able to avoid turbines, and as a result their fatality rates have generally been low relative to their exposure (Thelander and Rugge, 2000). Therefore, all behavioral facets of a species and its general biology should be considered before determining its propensity to collide with wind turbines. One way to address this variability is to consider each species' history of collisions in relation to their abundance at other projects in the CPE where they have been documented to occur.

Project and turbine characteristics of twelve CPE wind projects where standardized fatality monitoring has been conducted are described in Table 16. All bird average fatality estimates from these have ranged from 0.6 to 10.0 fatalities/turbine/year or 0.9 to 6.7 fatalities/MW/year (Table 17). The only species represented by more than 10% of the documented fatalities was horned lark, the most commonly observed species at CPE projects during daytime use surveys (Table 18), and also the most common species observed at the Montague survey plots (Table 3). Overall bird use within the Montague site boundary were not high relative to other open habitat project sites in the CPE, and was lower than overall bird use observed in the 2004-2005 surveys that covered LJI. This suggests that fatality estimates observed at these twelve CPE projects provide a fair basis for predicting fatality impacts from the Montague Facility, particularly for raptors. Because overall mean use of birds at the Montague survey plots was lower than at LJI for all four seasons, a conservative prediction of the annual fatality estimate for all birds (inclusive of non-native species) at the Montague Facility could be lower than LJI, and could be 1 to 5 bird fatalities/MW/year, likely consisting of a high percentage of passerines. Fall season 2009 avian use surveys at Montague showed higher use than at 2008 survey plots, but overall use was still lower in fall

2009 than at LJI and LJIIA. Data from winter 2009–2010, and spring and summer seasons 2010 avian use surveys at Montague will be reviewed when results are available to determine whether use patterns are similar to the 2008-2009 plot data. Avian use data is available for a full year (2008–2009) from Leaning Juniper IIB which is not only adjacent to the Montague Facility, but several of the LJIIB avian use plots intersect with the Montague site boundary and so is a sufficient sample of the Montague Facility for this review. Avian use data at LJIIB shows the same overall trends as the 2008–2009 four season dataset from the Montague study, with just slight variation in species composition and use (as discussed in detail in Section 3.3). Other fatality monitoring data from operating wind projects (fatality monitoring not completed) have been reviewed for species composition and presented below where applicable, and final results will be reviewed as they become available (including Pebble Springs, PPM, 2006: Rattlesnake Road, Kronner et al., 2007a).

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

4.3.1 Raptors

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

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

A full survey of the entire raptor nest survey area has not yet been completed and, therefore, raptor nest density for the Montague Facility has not yet been calculated. However, nest densities for adjacent LJIIA, LJIIB, and Pebble Springs raptor nest surveys which occur in all

or part of the Montague raptor nest survey area, as well as nest densities of other regional wind projects are shown in Table 14. Raptor nest densities at adjacent Leaning Juniper IIA and IIB (overall 0.41 and 0.40/mi^2, respectively) are slightly above the regional average of 0.30/mi^2; however, the nest density for the 2009 Pebble Springs raptor survey was just below average at 0.26/mi^2 Table 14. Raptor nest densities at Pebble Springs, Leaning Juniper IIA and IIB for Swainson's hawk were higher than at most other regional projects (discussed in more detail in Section 4.4), and it could be expected that Swainson's hawk nest density at the Montague Facility may also be near the high end of the range for the region. Although raptor nest surveys of the southeastern portion of the Montague raptor nest buffer have not yet been completed, nest data from 2009 indicates core ferruginous hawk nesting in the Eightmile Canyon vicinity (Figure 4) and it could be expected that nest density for this species for the Montague Facility nest study (the site plus a 2-mile buffer) may be near the higher end of the range for the region.

Raptor species most at risk of turbine collision at the Montague Facility include locally nesting species such as Swainson's hawk, ferruginous hawk, red-tailed hawk, and American kestrel, as these species have been observed within the 2009 survey area for and found as fatalities at other wind projects in the CPE (Table 18), and found as fatalities at LJI (Gritski et al., 2008a). Within the Montague site boundary during spring season 2009 there were six active Swainson's hawk nests (plus one just on the boundary), two active ferruginous hawk nests (plus two just on the boundary), and three active red-tailed hawk nest (plus two just on the boundary). Other nests were also found outside the boundary, but within the 2-mile survey area (see Figure 4). Swainson's hawk was the raptor with the highest mean use of the Montague Facility in spring and summer seasons 2009, and several red-tailed hawks, ferruginous hawks, and American kestrels were observed during the avian use surveys of the Facility. These four species are the four raptor species with the highest exposure indices during pre-construction avian use analyses conducted for Leaning Juniper IIA (Kronner et al., 2005).

Other raptor species with exposure indices greater than "0" for Leaning Juniper IIA were rough-legged hawk, golden eagle, northern harrier, sharp-shinned hawk, and turkey vulture. Small numbers of fatalities of these species or owls may also occur. Rough-legged hawk, golden eagle, northern harrier, and turkey vulture were observed during avian use surveys for the Montague Facility. Prairie falcons and burrowing owls were also found at LJIIA, but determined to have low exposure (Kronner et al., 2005). No prairie falcons or burrowing owls were found as fatalities during the two year fatality monitoring study at LJI (Gritski et al., 2008a). Prairie falcons have been observed at the Montague Facility, but burrowing owls have not been detected at the Facility to date, although they have been observed nesting at LJIIB and Pebble Springs (NWC, 2009; PPM, 2006). A sharp-shinned hawk was identified as a fatality recently at Pebble Springs (Gritski et al., 2007b).

Short-eared owls, which were observed during the 2004-2005 surveys of Leaning Juniper IIA, may be found as casualties at the Montague Facility based on avian fatality monitoring results at LJI where one was found as a fatality despite low exposure risk estimates for this species during pre-construction surveys (Gritski et al., 2008a; Kronner et al., 2005). Short-eared owls have also been found as fatalities at other regional wind projects (Erickson, et al., 2004; NWC and WEST, 2007; Table 18). Influencing factors that could affect potential

mortality of short-eared owls include the species' year-to-year wintering population fluctuation that may be influenced by prey abundance and/or winter weather patterns (snow depth and length of time of snow cover).

Other species of owl that have been found as fatalities at regional wind projects include barn owl, great-horned owl, and long-eared owl (Table 18). All aforementioned species of owl could be expected to occur at various times of the year in suitable habitats within the amended site boundary (not throughout). One long-eared owl was found nesting within the Montague Facility site boundary in 2009. Great-horned owl was observed in-transit to avian use surveys in summer 2009. No owls were observed during fall and winter season avian use surveys.

Average annual fatality estimates for raptors (including owls) at the twelve CPE wind projects mentioned above range from 0 to 0.21 per MW/year (Table 17). This estimated range from completed avian fatality monitoring studies in the CPE provides a fair basis for predicting fatality impacts at the Montague Facility. However, LJI was on the high end of the regional range both in terms of raptor use and raptor fatalities. Winter raptor mean use at LJIIA and LJI was higher for all seasons studied at the Montague Facility. At LJI, seven raptor fatalities (including three incidentals) were observed during the two-year fatality monitoring study (the estimated annual fatality rate after data analysis was 21.47 raptor fatalities per year) (Gritski et al. 2008a), which is the high end of the range listed for the CPE. Despite proximity and similar habitat features at the operating LJI and the Montague Facility, fatality rates for the Montague turbines would be expected to be lower than recorded at LJI based on lower raptor use in all seasons studied in 2008–2009 at the Montague Facility. Fall season 2009 avian use surveys at the six 2009–2010 Montague plots showed higher raptor use than fall 2008 at the five 2008–2009 Montague plots, but still lower than fall season at Leaning Juniper IIA. When the remaining three seasons of avian use studies are completed at the 2009–2010 Montague study plots, results will be compared to 2008–2009 data from the Facility and from LJIIA to determine whether the pattern of use holds for plots in all areas of the Montague Facility. Raptor use was similar between LJIIB and Montague for the full year of avian use surveys from 2008–2009 with almost identical species composition between the two projects (NWC, 2009).

Winter would be the season of lowest risk for raptors, as no raptors were found as fatalities at LJI during the winter season (Gritski et al., 2008a) and it was the season with lowest mean use to date at the Montague Facility. Other factors such as final turbine location distance to nearest active raptor nest site could influence raptor risk. Actual fatality numbers may be higher or lower than predicted for each year for the life of the Montague Facility.

4.3.2 Passerines

Passerines, often referred to as songbirds, have been the most abundant avian fatality at wind projects in the CPE, comprising >65% of the fatalities overall (Table 18). Passerines include many dozens of species, which generally outnumber other groups (such as raptors), thus their collision rate may not be out of proportion to their overall relative abundance in the landscape. A review of avian fatalities at eight new generation projects in the West and Midwest (Stateline, OR/WA; Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Ponnequin, CO; Buffalo Ridge, MN; Wisconsin) showed that most fatalities are of

horned lark (29.6%), followed by sparrows (13.8%), warblers (9.2%), upland game birds (8.8%), and approximately <5% for other groups of birds (Erickson et al., 2001). Overall fatality rates for birds (most presumably passerines) was approximately three fatalities/MW/yr in the US (Vansycle, OR; Klondike, OR; Nine Canyon, WA; Foote Creek, WY; Buffalo Ridge, MN; Wisconsin; Buffalo Mountain, TN; Mountaineer, WV; excluding older generation sites in CA; Erickson et al., 2001). One eastern US site (Buffalo Mountain, TN) had unusually high overall avian fatality rates (approximately 11 fatalities/MW/yr).

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

Passerines were the most abundant avian group observed during the Montague avian use surveys in 2008 and 2009 in all seasons and similar trends and apply for neighboring Leaning Juniper IIB avian use surveys for passerines (NWC, 2009). Passerine use at the Montague Facility was notably lower than at Leaning Juniper IIA (Kronner et al. 2005), largely due to the presence of large groups of horned larks at LJIIA, which can vary in number by year, and common ravens, which occurred in large groups near the active landfill adjacent to LJI. Passerines comprised the largest percentage of observed casualties at LJI (78%) as well as estimated casualties (91%; Gritski et al., 2008a). The annual fatality estimate for passerines at LJI (range 3.61–9.67 per MW per year) is higher than the range of estimates at other regional projects (NWC and WEST, 2007; Erickson et al., 2004; Erickson et al., 2003a; Johnson et al., 2003). Because overall mean use of birds at the Montague Facility was lower than at LJI, a conservative prediction of the annual fatality estimate for passerines (inclusive of non-native species) at the Montague Facility could be 1 to 4.6 passerine fatalities/MW/year. Due to close proximity and similar habitat features (excluding the large operating landfill), fatality estimates and species composition of the fatalities for the Montague Facility may be expected to be similar or less than LJI. Of the passerine fatalities, it is expected that approximately 5% of these fatalities will be non-native species (European starlings, etc.) based on the fatality results at LJI. Winter, spring, and summer season avian use data from ongoing surveys at the 2009-2010 avian use plots will be reviewed to

determine whether it follows the same patterns as 2008-2009 data for passerine use. Fall season 2009 mean use for passerines (12.423) was higher than in fall season 2008 (7.689), but still significantly lower fall season than at LJIIA which includes LJI (19.062; Kronner et al., 2005).

Passerine exposure indices at Leaning Juniper IIA were highest for common raven, unidentified passerine, horned lark, and European starling. Exposure indices have not been calculated for the Montague Facility, but based on results from this analysis at LJIIA and the fact that horned lark was the most abundant species at the Montague Facility, it could be expected that horned lark would be the primary passerine species most at risk at the Montague Facility. Horned lark was also the most common fatality observed at LJI. Common ravens, although they were calculated to have a high exposure indices at LJIIA and were one of the three most abundant species at the Montague Facility, may have lower levels of fatalities because their use was lower at the Montague Facility than at LJIIA, and they appear far less susceptible to collision than would be expected based on their level of use. While ravens are usually within the top five most abundant birds observed at projects and are known to have flight heights in the turbine rotor swept area, only two common ravens have been found as fatalities at CPE wind projects (Gritski et al., 2008a; Gritski 2009b; Table 18). Ravens are known for their relatively high intelligence levels and likely learn very fast to avoid the new structures. European starling (non-native) and dark-eyed junco were two passerine species found as fatalities at LJI. Smaller numbers of migrant species (i.e. golden-crowned kinglet) and species nesting elsewhere in the region will likely also be found as fatalities at the Montague Facility based on trends from regional wind projects such as the recently studied Klondike II, Stateline and Big Horn wind projects. Two golden-crowned kinglet fatalities were observed as fatalities at LJI (Gritski et al., 2008a), one was identified as a fatality at Rattlesnake Road (Gritski et al., 2009a), and two were observed at Pebble Springs (Gritski 2009b).

Actual numbers of passerine fatalities may be higher or lower for each year during the life of the Montague Facility due to fluctuation in weather patterns and other environmental events influencing avian activity levels and distribution patterns within the wind project site. In summary, based on the information known to date and taking a conservative approach, passerine fatalities at the Montague Facility could be expected to be similar to LJI but not likely to exceed the estimated range recorded in the two-year LJI fatality monitoring study. No impacts to Threatened or Endangered passerine species are anticipated.

4.3.3 Waterfowl and other Waterbirds

Wind projects with year-round waterfowl use have shown the highest waterfowl fatalities, although levels of waterfowl/waterbird fatalities appear insignificant compared to use of the sites by these groups. Two Canada goose fatalities were documented at the Klondike I (OR) wind project (Johnson et al., 2003), although several Canada goose flocks were observed during pre-construction surveys (Johnson et al., 2002). They are known to forage sprouting wheat in the extensive dryland wheat fields of the Columbia River area. Few Canada goose or other waterbird fatalities have been observed as fatalities at Stateline Wind Project (Erickson et al., 2004) or at other regional wind projects (Table 15). One bufflehead was found at the Klondike II Wind Project (NWC and WEST, 2007). Two great-blue herons have been found as fatalities at regional wind projects (Stateline and Nine Canyon; Erickson

et al., 2003a; Erickson et al., 2004). Other waterbird species that have been found at regional wind projects include American coot, mallard, horned grebe, ruddy duck, western grebe, bufflehead, and Virginia rail (Table 18).

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

One waterfowl/waterbird species was found as a fatality at LJI during the two year monitoring study: an unidentified duck (feather spot) was found in March (Gritski et al., 2008a). In general, low numbers of fatalities of this group have been found regionally, and since waterfowl use at the Montague Facility was relatively low during the season when their presence would be most likely (five Canada geese observed in winter), and the estimated fatalities for this group was low at LJI (0.04 mean fatalities per MW per year), waterfowl/waterbirds in general are expected to have low risk of collision at the Montague Facility turbines and turbine strike casualties may only occur infrequently. The waterbird species with the highest exposure index at the LJIIA project was Canada goose (Kronner et al., 2005). Since this was the waterbird species observed at the Montague Facility, this species would likely be most at risk. One other species of waterbird was observed at the Montague Facility during fall season 2009, one great blue heron. Results of winter–summer 2009–2010 avian use surveys will be evaluated when completed to determine whether waterfowl/waterbird use follows similar patterns to 2008–2008 avian use data.

4.3.4 Shorebirds

The only shorebird observed during the 2008 and 2009 avian use surveys of the Montague Facility was the long-billed curlew, a State Sensitive-Vulnerable species. The current distribution of this species in North America has changed dramatically from the historical distribution. Within the CPE, this species showed a positive population trend, based on analysis of Breeding Bird Survey (BBS) data collected from 1968 through 2001 (Dobkin and Sauder, 2004). However, suitable resting, staging and nesting habitats are becoming less abundant in the CPE. Population trend data are mixed or unclear, and not necessarily promising for the species (Dobkin and Sauder, 2004).

Shorebirds as a group are rarely killed at wind projects; of 1036 avian fatalities collected at U.S. wind projects, only one was a shorebird (a killdeer found at Buffalo Ridge, Minnesota) (Erickson et al., 2001), even though shorebirds have been recorded at virtually every wind project evaluated. One long-billed curlew was recently found at Pebble Springs Wind

Project, the first known fatality of this species in the CPE (Gritski 2009b; Table 18). Because long-billed curlew was the one species of shorebird that has been observed at the Facility to date, it is the most likely species of shorebird that could be found as a fatality at the Montague Facility. See Section 4.4 (special status species) for risk assessment of the long-billed curlew. Small numbers of other shorebirds may be found as fatalities. One killdeer was found as a fatality at LJI (Gritski et al., 2008a).

4.3.5 Upland Gamebirds

Some upland game bird mortality has been documented at wind projects (Erickson et al., 2001; Erickson et al., 2004). It is not clear if these mortalities were caused by striking turbine towers or blades, but there are also likely some strikes with vehicles traveling through the wind projects. Based on habitat present, results from other regional wind projects, and the presence of a few gamebirds (California quail) within the Montague Facility, there is potential for mortality of some upland gamebirds to occur; however, it is expected to be infrequent. During the two years of fatality monitoring at LJI, one chukar and one ring-necked pheasant were found as fatalities and the estimated mean number of fatalities of this group was 0.07 per MW per year (Gritski et al., 2008a).

4.3.6 Other Avian Groups

Small numbers of other avian groups, including doves and woodpeckers, could be expected to be found as fatalities at the Montague Facility. At LJI three doves were found (estimated mean 0.09 per MW per year) and one woodpecker was found as a fatality (estimated mean 0.03 per MW per year; Gritski et al., 2008a). The primary species at risk in these groups would be mourning dove, as this species were found as a fatality at LJI and observed during the 2009 surveys at the Montague Facility. Small numbers of other species in these groups such as rock pigeon (found as a fatality at LJI) or small numbers of birds of other species groups may also be found as fatalities.

4.3.7 Displacement Effects

Development of wind turbines near raptor nests may result in indirect impacts to the nesting birds such as resulting in the nest site being less attractive for nesting, or displacement of birds during nesting; however, few studies have shown avoidance of wind turbine areas by nesting raptors. One report of avoidance of wind turbines by nesting raptors in the U.S. occurred at Buffalo Ridge (MN). During this study raptor nest density on 101 mi^2 (261 km^2) of land surrounding a wind project was 5.94/39 mi^2 (5.94/100 km^2). No nests were present in the 12 mi^2 (32 km^2) wind project facility itself, even though habitat was similar (Usgaard et al., 1997). A pair of golden eagles successfully nested 0.8 km from the Foote Creek Rim, Wyoming wind plant for three different years after it became operational (Johnson et al., 2000), and a Swainson's hawk nested within 0.8 km of Klondike Wind Project (Johnson et al., 2003). Studies at the Stateline Wind Project in Oregon and Washington have not shown any short-term effects on nesting raptors (Erickson et al., 2004). In 2006 at Stateline II Wind Project (supplemental surveys of a subset of the full Stateline Project), there were fewer active target raptor species (ferruginous hawk and Swainson's hawk) nests within two miles of the project than during the previous years, although some changes may be attributed to various factors such as nest structure degradation and competition with other species (great horned owl) for the limited nest sites (Erickson et al., 2007). Ferruginous hawks appear to continue to nest in the Stateline Oregon/Washington area, given some intermittent

competition with great horned owl over the monitored years (2001-2006). One nest within 1,122 feet and approximately 42 feet lower in elevation of the nearest turbine persisted as an active and successful nest site from 2001 (pre-construction) through 2006, the year last studied.

Recent grassland bird study results (Erickson et al., 2007) show a relatively small-scale impact of the Stateline wind facility on grassland nesting passerines. A gradient analysis (Morrison et al., 2001) was used to determine the relationship between density of grassland/steppe avian species and distance from the Vestas 0.660 MW turbines. A "gradient analysis" assesses whether a significant or a biologically substantial relationship exists between distance from project structures and abundance or use of the area. The initial impacts observed during the early years of the study were mostly due to direct loss of habitat due to placement of turbine pads, construction of roads, and some temporary habitat disturbance (Erickson et al., 2004). During the 2006 post-construction study, grasshopper sparrows showed a significant decrease in use when compared to pre-construction use within the first 50 meter (horizontal) sub-segment of the turbines, although sample sizes were very low for grasshopper sparrows. Horned lark, savannah sparrow, and western meadowlark displacement was not apparent. In summary, the data suggests there was a relatively small-scale impact of the wind facility on the grassland passerine species of that project site for the period studied. Grassland species as a whole appear not to have been impacted. Grassland bird displacement studies at the Combine Hills Wind Project also suggest a relatively small-scale impact from the operating wind facility on grassland nesting passerines (Young et al., 2006). Passerine use at survey points offset from the turbines showed a significant increase from pre-construction to post-construction surveys, but there was no change at the turbine points suggesting other factors that could also be involved (Young et al., 2006).

A grassland bird study initiated in 2003 at the South Dakota Wind Energy Center was also conducted to determine if wind turbines constructed in grazed, mixed grass prairie affect the density or species composition of breeding grassland birds. Preliminary results did not detect avoidance patterns for the western meadowlark, thus finding no evidence so far that this species was avoiding wind turbines. However, for grasshopper sparrow, the mean difference between the observed and expected numbers tended to be negative out to about 200m, indicating that this species avoided wind turbines to some degree. Studies at this and other nearby sites are continuing to determine if this pattern persists throughout the study (Johnson and Shaffer, 2008).

Nesting burrowing owls were monitored during construction at Stateline (FPLE, 2002) and although most active nests were not within turbine construction zones, one nest site located 367 feet from a turbine was active through the construction period and successfully produced young (although the nest was not in a direct line of sight to the construction zone). In addition to persistence during construction, burrowing owl nest site monitoring conducted post-construction for two to three years indicated persistence in the presence of an operating wind turbine facility (Erickson et al., 2004; Kronner, 2004, 2005). This species had not been confirmed within the Montague site boundary to date, but nesting has been confirmed at LJIIA, LJIIB, and at Pebble Springs and the surrounding area (NWC, 2009; PPM, 2006; Kronner et al., 2005; Kronner et al., 2007a; ORNHIC, 2009). If construction occurs

during the nesting season, it is not known how construction activity will affect the burrowing owls or other nesting grassland birds. However, no adverse impacts to the regional populations are expected.

Curlews are also known to be susceptible to human disturbance during the breeding season which can result in nest abandonment or disruption of important parental behaviors (such as brooding chicks; Dugger and Dugger, 2002). Loss of suitable habitat may also reduce social behaviors or reduce nesting opportunities. However, no displacement data are available from other wind projects for these species. During operations, grassland birds may avoid areas of human activity and a perimeter around new roads and turbines. Long-billed curlews were documented at the Montague Facility during their breeding season; however, due to lack of studies on displacement for this species, the indirect impacts are unknown.

Loggerhead shrike is a shrub-steppe bird species documented at the Montague Facility during its breeding season. This species was not documented as nesting within the site boundary, but has been documented as nesting in nearby areas (NWC, 2009). Due to lack of displacement for this species at other wind projects, indirect impacts are unknown. Response to vehicular traffic will likely depend on the level of use and size of equipment (noise, width, etc.). Intermittent travel through the nesting habitat during Facility operations is not likely to alter this species ability to nest and fledge young within the Facility area however, some avoidance of concentrated human activity areas may result. After a final facility layout and construction schedule is known, a more in-depth review of potential impacts for special status species can be conducted.

4.4 Impacts to Special Status Vertebrate Wildlife Species

This section discusses potential risk of turbine collision for special status avian species and potential impacts of the Facility to other species of vertebrate wildlife, with the exception of bats and listed species. For information on potential impacts to bats see Section 4.5. For discussion on potential impacts to Threatened or Endangered wildlife species see Section 4.2. For full Federal and State status, scientific names, and status definitions, see Appendix C. Risk assessment for special status species may be re-evaluated after raptor nest surveys, avian use surveys, and special status wildlife surveys are completed in 2010 if results differ from 2008–2009 data, particularly for nesting species.

Special Status Raptors

The *golden eagle* (Eagle Protection Act) is considered at *low risk* of collision. One was observed in-transit during winter season (plot J and K), and another in fall season (plot BB). A third detection of golden eagle was recorded during fall 2009 surveys at plot GG, but outside of the plot radius. This species was observed infrequently during the avian use study of Leaning Juniper, Pebble Springs, Willow Creek Winds, and elsewhere in the general vicinity (Kronner et al., 2005; Kronner et al., 2007a; PPM, 2006). Two historic nests are present within 1.88 and 5 miles of the planned Facility and one is located approximately within 10 miles (undisclosed location); the nest closest to the Facility was not active in 2009, but the area will be aerially-surveyed and checked in 2010 for raptor activity.

Golden eagles are known to collide with turbines at other wind projects (Erickson et al., 2001) and one was recently found as a fatality near Goodnoe Hills in Washington (Kidder

and Every, 2009). However, at the Foote Creek Rim Phase II Wind Project in Wyoming, where there is year-round golden eagle use and nesting, only one fatality was documented during a study conducted from July 1999 to December 2000 (Young et al., 2003a). In addition, no golden eagle fatalities were found during a one-year carcass survey at the Condon Wind Project in Oregon (Fishman, 2003) or incidentally after the formal survey, even though 25 detections were recorded during the one-year formal pre-construction surveys and nesting occurred in the John Day River Basin within 10 to 12 miles of that project (URS and WEST, 2001). Based on relatively low use of the Montague Facility by golden eagles to date, and low eagle mortality at CPE operating wind projects (only one known), it is unlikely that the Facility will have any significant impact on golden eagle populations in the area. After a final Facility layout and construction schedule are known, and all avian use, special status wildlife surveys, and raptor nest surveys are complete, data and construction plans will be reviewed to attempt to minimize any potential impacts.

The *burrowing owl* (State Sensitive-Critical) is considered at *low risk* of collision. This species has not been confirmed within the Montague site boundary to date, but nesting has been documented at Leaning Juniper IIB, Pebble Springs, Leaning Juniper I, Rattlesnake Road, and the surrounding area (NWC, 2009; PPM, 2006; Kronner et al., 2005; Kronner et al., 2007a; ORNHIC, 2009; G. Wing Pers. Comm., 2009). Although there was one confirmed burrowing owl nest observed at LJI (Kronner et al., 2005), no burrowing owls were observed as fatalities at LJI (Gritski et al., 2008a). Burrowing owl fatalities have been found during fatality monitoring studies at Altamont Pass Wind Resource Area in California (Orloff and Flannery, 1992; Smallwood and Thelander, 2004). One dead burrowing owl was found at the Stateline Wind Project, not near turbines; it collided with an operations maintenance truck (Dominick, C. 2009). Due to the low-flying habits of this species, impacts at wind projects could be turbine strikes or vehicle strikes. The authors of this report are not aware of any other burrowing owl fatalities found at projects in the CPE. Information about nest persistence amidst construction and operation of turbines can be found in Section 4.3.7 (displacement effects).

Ferruginous hawk (State Sensitive-Critical) would be considered at *moderate to high risk* of collision, depending on the final turbine placements and nest distribution on the landscape. One individual was documented during winter season point count surveys, and two were documented during summer season point counts. Individuals were also detected flying in multiple locations during March 2008 special status wildlife surveys. This species nests in the general area (NWC, 2009; Gritski et al., 2008a; Kronner et al., 2007a; Caithness Shepherds Flat, 2007; G. Wing Pers. Comm., 2009) as well as within the Montague site boundary. Two active nests were located within the Montague site boundary (one of the two inside the boundary by just a few feet), and two were located just on the boundary. An additional six ferruginous hawk nests were found within surveyed portions of the Montague raptor nest survey area (Figure 4). There are also three inactive large-sized stick nests within the site boundary that could have been made or used by ferruginous hawks in the past, or the sites could be attractive to this species in the future. Although raptor nest surveys of the southeastern portion of the Montague raptor nest buffer have not yet been completed, nest data from 2009 in the Eightmile Canyon vicinity (Figure 4) indicates core ferruginous hawk nesting along Eightmile (in canyon cliffs, juniper trees) and it could be expected that nest

density for this species for the Montague Facility nest study area may be near the higher end of the range for the region.

One ferruginous hawk was recently found as a fatality at Willow Creek Winds Project during July 2009 (Invenergy, Pers. Comm., 2009). It had the third highest turbine exposure index at the Willow Creek Wind Project according to avian use study analysis, and nest density for this species was higher than other CPE projects (0.25/mi^2; Table 14; Kronner et al., 2007b). Several ferruginous hawk nests are present in the LJI project area and one individual was observed colliding with an operating turbine by a maintenance worker at LJI in April 2008 (Gritski et al., 2008a). The 2004-2005 pre-construction avian use study analysis showed this species to have relatively high exposure for the site (Kronner et al., 2005). At the Big Horn Wind Project in WA, one ferruginous hawk fatality was found in early July 2007 and this species is not known to nest within the lease boundary for that wind project (Kronner et al., 2008a). At the Stateline Wind Project, one ferruginous hawk fatality was detected during the fatality monitoring period from July 2001 through December 2003. The nearest nest was 0.5 miles (0.8 km from the turbine), but it was not known whether the fatality was an adult from that nest. A one-year fatality monitoring study was conducted for part of the full Stateline project in 2006; one ferruginous hawk fatality was found in that year as well. In summary, from 2001 through 2009, there are five known ferruginous hawk fatalities at wind projects in the CPE.

After the raptor nest surveys, avian use, and special status wildlife surveys are complete and a final facility layout is known, turbine placement and construction plans for areas near known nests or suspected nests will be reviewed to accommodate the sensitive nesting period, March 15 through August 15 (ODFW, 1994, LJF Site Certificate) and to attempt to minimize potential impacts.

Swainson's hawk (State Sensitive-Vulnerable) is considered at *moderate to high risk* of collision depending on the final turbine placements and nest distribution on the landscape. A total of six nests were found in 2009 within the Montague site boundary, and an additional nest just on the boundary, and eleven within the surveyed portion of the raptor nest survey area. This species was detected during avian use surveys for the Facility at all plots and seasons with the greatest use in summer season (12 detections). This species has been documented nesting at LJIIB, LJI, Pebble Springs, Rattlesnake Road, and elsewhere in the general vicinity (Gritski et al., 2008a; NWC, 2009; Kronner et al., 2005; PPM, 2006; Caithness Shepherds Flat, 2007; Saddle Butte Wind, 2009; ORNHIC, 2009; G. Wing Pers. Comm., 2009). Swainson's hawk nest density was high at wind projects with nest survey buffers that intersect with the Montague raptor nest survey area: Pebble Springs (0.18 nests/mi^2), Leaning Juniper IIA (0.18/mi^2), and IIB (0.19/mi^2). Nest density for this species was also high at two other wind projects in the area surrounding the Montague Facility, Rattlesnake Road (0.19 nests/mi^2) and Willow Creek Winds (0.44/ mi^2 however, Swainson's hawk nest density was lower in other areas within the CPE ranging from 0.00 to 0.07 nests/mi^2 (Table 14). Based on higher nest densities for this species in the immediate area, and the number of nests of this species (18) found in surveyed areas of the Montague raptor nest survey buffer, it could be expected that Swainson's hawk nest density at the Montague Facility may be near the high end of the range for the region.

Two Swainson's hawks were found as fatalities at LJI in August 2007 (Gritski et al., 2008a). Swainson's hawks nest within the LJI area, had been observed hunting near turbines, and were also observed attempting to nest very near one turbine, where nesting had not been observed in the two years prior to construction of LJI. The pre-construction avian use study analysis conducted at that site for this species showed that it had relatively high risk exposure (Kronner et al., 2005). At Stateline, one Swainson's hawk fatality was detected; the nearest nest to the fatality was over two miles. It is not known whether it was a local nesting bird or a migrant from further away. Also at Stateline, an injured Swainson's hawk was found at the base of a turbine. It was captured, treated and successfully released (Erickson et al., 2004). At Klondike I, a Swainson's hawk was found as a fatality after the formal monitoring study was complete. Recently, one was found as a fatality at the Klondike III wind project (Gritski et al., 2009c), at Pebble Springs Wind Project (Gritski et al, 2009b), and at Hopkins Ridge (Young et al., 2009), making the regional total seven fatalities and one injured Swainson's hawk (includes incidental findings). After the raptor nest surveys, avian use, and special status wildlife surveys are complete and a final facility layout is known, turbine placement and construction plans for areas near known nests or suspected nests will be reviewed to accommodate the sensitive nesting period, April 1 through August 15 (ODFW, 1994 and LJF Site Certificate) and to attempt to minimize potential impacts.

Peregrine falcon (State Sensitive-Vulnerable) is considered at *very low risk* of collision. This species was not observed during surveys of the Montague Facility or within the immediate area, but this species has been seen in Arlington area (Morgan, pers. comm., 2004). Basalt cliffs along the Columbia River are potentially suitable for nesting but are less suitable than habitat along the Columbia River further to the west, which is the traditional nesting area for peregrine falcons. Historic nest sites are located approximately 8 to 50 miles from the Facility (S. Cherry Pers. Comm., 2007). No peregrine falcons have been found as fatalities at any of the operational CPE wind projects.

The Habitat Mitigation Plan will include conservation of suitable habitat and habitat enhancement projects that will increase habitat quality for foraging raptors as well as providing habitat with low or no human activity during sensitive periods.

Special Status Passerines

Sage sparrow (State Sensitive-Critical) is considered to be at *very low risk* of collision with turbines due to limited observations of this species in the immediate area. There was one detection of this species in March 2008 on site during special status vertebrate wildlife surveys. They are known to nest in the general area in larger patches of sagebrush and are seen occasionally in smaller patches during migration (Kronner 2001 and 2009). This species needs extensive sagebrush shrub habitat to support breeding populations. This species breeds at Boardman Conservation Area to the east of the Facility. One sage sparrow was observed in the northern portion of Shepherds Flat Project in Eightmile Canyon in June (Caithness Shepherds Flat, 2007). If this species is detected in greater numbers or found to nest within the site boundary during 2010 special status wildlife surveys, once the final layout and construction schedule is know, risk assessment for this species may be re-evaluated. This species needs extensive sagebrush shrub habitat to support breeding populations and while this habitat is present, suitable nesting areas within the site boundary are limited.

Grasshopper sparrow (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines due to low level flight characteristics of this species. This species was detected during summer avian use surveys at the Montague Facility (two detections). There was one detection of this species within the Montague site boundary found during 2009 special status wildlife surveys for LJIIB (NWC, 2009; Figure 5). It has also been observed at LJIIA (Kronner et al., 2005). This species occurs throughout much of the CPE on and near wind project sites, but only one has been documented as a fatality at a wind project in the CPE (Table 18). The main concern to grasshopper sparrows is the impact of habitat loss and potential displacement during the nesting season. As previously discussed, Stateline Wind Project (Oregon and Washington) and South Dakota Wind Energy Center displacement study data suggests grasshopper sparrows are displaced during their season of use (nesting season) near turbines, though it may be a temporary affect due to construction disturbance (NWC and WEST, 2007; Johnson and Shaffer, 2008; discussed in detail in Section 4.3.7 on indirect impacts).

Loggerhead shrike (State Sensitive-Vulnerable) is considered to be at *low risk* of collision with turbines due to seeming low susceptibility to turbine collision. This species occurs throughout the U.S. where wind projects have been built, yet only two loggerhead shrikes (both in California) have been reported as fatalities at wind power facilities (Erickson et al., 2001). This species was documented within the Montague site boundary in suitable habitat (mature sagebrush, isolated junipers, and juniper woodlands) during March 2008 special status wildlife surveys (two locations), and during spring avian use surveys (two detections in spring, one in winter) as well as during ground transect surveys for LJJIB (4 detections within Montague site boundary). Nesting was confirmed in one location at Leaning Juniper IIB and nesting was also confirmed at LJIIA (Kronner et al., 2005; NWC, 2009). This species may be more affected by habitat loss and displacement than by turbine collision; however, the affects of indirect impacts such as these are largely unknown as studies of displacement have not been conducted for this species. A more in-depth analysis of risk to this species may be identified after 2010 surveys are complete and a final turbine layout and construction schedule is known, and opportunities will be explored to avoid construction during the sensitive nesting and brood-rearing period. The Habitat Mitigation Plan will include conservation of suitable loggerhead shrike habitat and habitat enhancement projects.

Special Status Shorebirds

Long-billed curlew (State Sensitive-Vulnerable) appears to be at *low to moderate risk* of collision with turbines. Only one long-billed curlew fatality (at Pebble Springs on April 9, 2009; Gritski et al, 2009b) has been reported at regional wind projects (although the only operational wind project with *completed* fatality monitoring study in the CPE with high densities of this species is LJI) The estimated exposure risk conducted for LJI and LJIIA for this species of shorebird was relatively high; however, to date none have been reported as fatalities at LJI (Kronner et al., 2005; Gritski et al., 2008a). This species has been observed at all avian use study plots surveyed at the Montague Facility to date. Mean use during spring season at Montague was slightly lower (0.709 birds/20 min. survey) than at LJI and Pebble Springs during spring season avian use surveys (0.864 and 1.12 birds/20 min. survey, respectively); however, frequency of occurrence was higher at Montague plots in spring (45.45%) than at the other two projects (33–36%; Kronner et al., 2005; PPM, 2006). Spring season and summer 2010 data will be compared to spring and summer 2009 data for a better

understanding of long-billed curlew use of the Facility. Data from neighboring LJIIB shows slightly lower use than at the Montague Facility (0.156 birds/survey at LJIIB; NWC, 2009). The northeastern portion of the Montague Facility is adjacent to part of BLM's Horn Butte Area of Critical Environmental Concern (ACEC) established for nesting long-billed curlew. The Horn Butte Curlew ACEC is approx. 6,000 acres, contains curlew nesting habitat (some of it is being restored or enhanced), and is located 5 miles east of Arlington (BLM, 2008; BLM, 1989).

Curlews defend a nesting territory (6–14 hectares or 15–35 acres) and typically forage outside the nesting territory (Dugger and Dugger, 2002). Unpaired males establish territories and begin aerial displays (often 30–50 meters above ground level) to attract females. Curlews are most visible during this arrival and pre-incubation period (mid-March to mid-April; (Kronner, pers. field notes). While long-billed curlews may be at risk for collision with turbines whenever they occur, they may be at increased risk during pair formation, when they are performing their aerial displays. There were numerous detections of this species during spring and summer season point count surveys at the Montague Facility at all five plots surveyed during those seasons. No nests have been confirmed, however, ground transect surveys have not yet been completed during the species breeding season and due to the timing of observations, it is expected that this species nests on or near the Montague Facility. If long-billed curlews nest in the Facility area, construction of the Facility could results in some temporary and permanent habitat loss and the presence of turbines and human activity during and after construction may displace curlews from some areas. However, other portions of the wind-leased area are suitable for curlew nesting and staging and curlew use is expected to occur there. Localized impacts to nesting and staging curlews would not likely impact breeding populations in the general area. This species has been recorded as occurring and some nests have been documented in the general vicinity (NWC, 2009; Kronner et al., 2005; Kronner et al., 2007a and b; PPM, 2006; ORNHIC, 2009; Caithness Shepherds Flat, 2007; Saddle Butte Wind, 2009; G. Wing Pers. Comm., 2009). After special status wildlife ground transect surveys have been completed in 2010 and the final layout and construction schedule has been determined, further analysis of impacts for this species could be conducted and opportunities will be explored to avoid construction during the sensitive nesting and brood-rearing period.

Special Status Mammals

White-tailed jackrabbit (State Sensitive-Vulnerable). This species was recorded within the site boundary in three locations during special status wildlife surveys in 2008. It is also known to occur at adjacent projects and within the general area (NWC, 2009; Kronner et al., 2005; ORNHIC, 2009; G. Wing Pers. Comm., 2009). A small percentage of the suitable habitat within the site boundary will be impacted. Temporary and permanent loss of open shrub cover and grassland will not adversely impact this species because this habitat type is extensive where additional jackrabbits may be present. The Habitat Mitigation Plan will include conservation of suitable white-tailed jackrabbit habitat and habitat enhancement projects.

Other Special Status Wildlife

Sagebrush lizard (State Sensitive-Vulnerable). This species was detected within the Montague site boundary in Juniper Woodland habitat (4 detections) during ground transect surveys conducted for LJIIB in spring 2009 (Figure 4). It may also occur in other portions of the

Facility in suitable habitat where surveys are planned for 2010. This species has also been observed in the general vicinity (Kronner et al., 2005; PPM, 2006). No adverse impacts are expected to the regional population.

Western toad (State Sensitive-Vulnerable). There was one ORNHIC record of this species within 5 miles of the site boundary. However, this species was not observed within the Montague Facility, and there is no aquatic habitat and very limited potential for upland movements during wet periods. If present, they are likely restricted to more mesic habitats around ranch yards. Impacts are not expected for this species.

Other Wildlife

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

4.5 Impacts to Bats

The primary impact to bats will be turbine collision mortality. Available local and regional evidence indicates that this will be confined primarily to the migratory species. Throughout the CPE, fatalities have been comprised primarily of silver-haired and hoary bats with fall being the main season of fatalities and spring and summer seasons contributing only small numbers of fatalities (Table 19; Appendix G). Data from twelve CPE wind projects (Appendix G) shows that > 88% of over 464 total bat fatalities found at these CPE projects to date have been found during the period of August-October (the peak in September) and >96% of all of these bat fatalities were hoary and silver-haired bats.

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

Because the Townsend's big-eared bat is a State Sensitive-Critical species, other literature was reviewed to more thoroughly understand the biology of this bat species and potential use of habitat near wind turbines. A Biological Assessment recently was prepared to address the potential for a wind project in West Virginia to impact the federally endangered Virginia big-eared bat, a subspecies of Townsend's big-eared bat (Johnson and Strickland, 2003). The Biological Assessment concluded that the collision risk to the Virginia big-eared bat is very low because the species is nonmigratory and forages well below the space occupied by turbine blades. Not much is known about the species daily and seasonal activity patterns in

Gilliam County. A roost of 102 Townsend's big-eared bats were found in Rock Creek drainage in Klickitat County, Washington (across the Columbia River from the Facility), and a maternity site and foraging by this species has also been documented in Klickitat County (Kronner et al., 2005a; Kronner and Gritski, 2007; Appendix C). The Townsend's big-eared bat was detected, among other species, on August 24, 2007 by NWC at the Miller Ranch Wind Facility in Washington (Northwest Wind Partners, 2007). To date greater than 464 bat fatalities have been recorded and identified at CPE Wind Projects and Townsend's big-eared bat has not been found as a fatality at any CPE project.

Bat species composition of fatalities at the Montague Facility will likely be similar to fatalities found at LJI. At LJI, silver-haired and hoary bats (both State Sensitive-Vulnerable) comprised most of the fatalities; seven hoary bats and 13 silver-haired bats were found during standard searches at LJI over a two-year study period (Gritski et al., 2008a). These two species are the most common fatalities at other wind projects in the CPE (Appendix G). Small numbers of other bat species, such as big brown bat (Kronner et al., 2008a), little brown bat (Erickson, et al., 2004), and other *Myotis* species have been found at wind projects in the CPE and may also be found as fatalities at the Montague Facility.

As with other CPE projects, most bat mortality would be expected to occur from July through early fall, coinciding with the fall migration period for hoary and silver-haired bats, with the exception of a few fatalities found during May and June (Appendix G). At LJI, 4 silver-haired bats were found as fatalities during May that could represent local breeding individuals or individuals temporarily residing in lower warmer elevation zones before going to mountainous areas for the summer. In December, one hoary bat was found as a fatality at LJI as an incidental (Gritski et al., 2008a). At Pebble Springs, one silver-haired bat was found as a fatality (incidental) in late April, one in late May, and two bats were found in mid-June at Pebble Springs, a hoary bat and an unidentified bat (Gritski et al., 2009b). During the 2009 wildlife monitoring study, through August 12 there were no bat fatalities found at the nearby Rattlesnake Road Wind Farm (Gritski et al. 2009a).

Bat mortality patterns at wind projects in Washington and Oregon have followed patterns similar to the rest of the country, but the average is slightly lower (NWCC, 2004; Arnett et al., 2008). Bat mortality at the Montague Facility could be expected to be similar to fatalities at LJI where the estimated range of bat fatalities was 1.2 to 3.19/MW/year and a mean of 1.98 bats/MW/year or 2.97 bats/turbine/year (Gritski et al., 2008a). The fatality rates at LJI were slightly higher than the average for the CPE projects, which ranged from 0.39 to 2.47/MW/year with a mean of 1.38 (Table 19), but since confidence intervals overlap, there is no significant difference. Actual fatality numbers may be higher or lower for each year for the life of the Montague Facility. Bat fatality rates for the Montague Facility are expected to be lower than fatalities at many other wind projects in the United States, particularly lower than projects in the eastern U.S. where bat mortality at some projects has ranged from 28 to over 40 per turbine per year (Kerns and Kerlinger, 2004; Nicholson, 2003; Arnett et al., 2008).

Unlike many species of birds, bats typically have low reproductive rates, are not long-lived, and appear to be especially vulnerable to wind turbines (BCI, 2009). Additionally, although most wind projects in the Northwest, Rocky Mountains, and upper Midwest where the habitat is open prairie and farmland have 1–3 bat fatalities/turbine/year (NWCC, 2004;

Arnett, 2005; Johnson, 2005), the number of bat kills becomes more significant as the number of operating turbines increases nationwide into the thousands (Arnett, 2005). Bat Conservation International (BCI), the American Wind Energy Association (AWEA), the USFWS, and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) have initiated a research effort (the Bat Wind Energy Cooperative) to understand bat and wind turbine interactions and how bat fatalities can be prevented or minimized. Research efforts include improving pre-construction impact predictions for bat fatalities, studying the effectiveness of bat deterrent devices, and studying the effectiveness of changing turbine cut-in speed on reducing bat fatalities (Arnett et al., 2009), as well as other studies that may help to more fully understand impacts to bats from wind projects in the future.

5.0 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

Similar avoidance, minimization and mitigation measures described in the Application for Site Certificate and Final Order for the Leaning Juniper II Facility will be implemented. A short summary of the avoidance, minimization and mitigation measures implemented and planned is provided below.

Prior to construction, the Montague components will be designed to avoid impacts to sensitive species, riparian areas and native habitat.

- Pre-project assessment surveys have been conducted and are planned for 2010 as described in detail in the methods section (2.0) of this report.
- Turbine locations, laydown areas, and roads located near WGS locations will be microsited to avoid these areas. No components will be located in Category 1 habitat.
- Montague components will be microsited to avoid and minimize both temporary and permanent impacts to high quality native habitat such as Shrub-steppe and Juniper Woodlands where practicable to retain habitat cover/structure in the general landscape.
- The current maximum and minimum turbine layouts include components microsited away from known Washington ground squirrel colonies with a 785 foot buffer.
- Collector lines will be installed underground where feasible, and overhead lines will be constructed according to the Avian Power Line Interaction Committee (APLIC) recommendations.

During construction, the following measures will be implemented to minimize impacts.

- Construction monitoring
- Exclusion Flagging around wetlands and sensitive species locations
- During construction, a 1,300 foot buffer around sensitive active raptor nests will protect the area during the nesting period.
- Environmental Training
- Speed Limits
- Fire Control
- Erosion Control

After construction, the temporary construction zones will be revegetated with native vegetation species as described in the Montague Revegetation Plan. Weed and fire management measures will also be implemented to improve habitat within the site boundary. For the impacts that cannot be avoided or minimized, the Wildlife Mitigation and Monitoring Plan and the Habitat Mitigation Plan will be implemented. Additional details on post-construction monitoring can be found in the respective mitigation and monitoring plans and in the Iberdrola Renewables avian and bat protection plan as described below.

Avian and Bat Protection Plan

Iberdrola Renewables (IBR) recently adopted its Avian and Bat Protection Plan, the first in the wind industry. The plan is modeled in part after the 2005 Avian Protection Plan template developed by some 30 electric utility companies, electric cooperatives and rural utilities in partnership with the U.S. Fish and Wildlife Service to address impacts of transmission and distribution lines on birds. IBR's plan will be implemented across its entire wind fleet, and contains a corporate policy about wildlife protection to evaluate and mitigate any potential avian or bat issues early on in the development process. It also establishes internal policies for pre- and post-construction monitoring and proper site design, impact assessment, permit compliance, nest management, and employee training. In addition, the plan supports IBR's ongoing efforts in wildlife research, quality control, and public awareness. A copy of the plan can be found on IBR's web site: http://www.iberdrolarenewables.us/rel_08.10.29.html

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Alan Tomaszewki - Wildlife Biologist
Miko Ruhlen - Report Preparer
Barbara Wells - Report Editor
Several Field Biologists and Technicians

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8.0 TABLES

Table 1. General land cover and wildlife habitat types within the Montague site boundary.

General Land Cover Type and Codes	Specific Habitat Type ("subtype") and Mapping Codes	Specific Habitat Type Description*	Acres in Site Boundary
Developed (D)	**Old Field (DB)**	Previously cultivated but likely not DC (see below), currently occupied by a variety of common non-native and native vegetation plants (rabbitbrush shrubs/annual grasses and weeds). Native vegetation is minor component. Common species: horned lark (HOLA), western meadowlark (WEME) foraging, may occasionally include savannah sparrow (SVSP).	7.54
	CRP or Other Planted Grassland (DC)	Planted grassland on previously farmed or other disturbed lands that may be enrolled in the Conservation Reserve Program. Residual (not previously plowed) native vegetation patches in a few locations. Old grass stands contain rabbitbrush or other shrubs but are not dominant (see SSB below). May support white-tailed jackrabbits (WTJ). Common species include WEME and grasshopper sparrow (GRSP) where grassland is mature.	1,512.19
	Irrigated Agriculture (DI)	Agricultural crop or livestock pasture fields that are irrigated for all or a portion of the growing season. The use was determined by presence of farm crop and onsite irrigation implements such as pipes, sprinklers, pumps, and motors.	270.76
	Dryland Wheat or Other Small Grain (DW)	Agricultural fields currently in small grain production or fallow. Common species include HOLA and mourning dove in winter stubble or when fallow.	12,660.54
	Other (DX)	Developed/disturbed areas including farming/ranching home and shop sites, corrals, structures, feedlots, inactive and active gravel quarries, pastures, roads, right-of-ways and waste areas associated with on-going human activities. Not considered of significant value to native wildlife species.	246.57
Exposed Rock (ER)	**Escarpment (ESC)**	Linear Columbia River Basalt outcroppings approximately 3 to 15 meters (10–50 feet) in height, found on steeper slopes which bound canyon edges and shoulders. Plant diversity and cover is very low on escarpments. Provides critical nesting substrate and perching sites for raptors and crevices for bats. Provides shade and thermal cover for deer in summer and also serve as good windbreaks. May also provide home sites for wood-rats and marmots.	28.67
Grassland (G) Steppe dominated by native and/or non-native grasses (<20% shrub cover)	**Exotic Annual Grassland (GA)**	Dominated by exotic annual grass and/or weeds. Open, low shrubs such as snakeweed are present in larger blocks. Some GA sites supports long-billed curlew (LBCU), Washington ground squirrel (WGS). Common bird species include HOLA.	3,205.90
	Native Perennial Grassland (GB)	Dominated by native perennial bunchgrass. Shrubs, if present, are an inconspicuous component. May support WGS, WTJ, burrowing owl, depending on soil type and depth. Important nesting habitat for ground-nesting birds such as GRSP, SVSP and vesper sparrow. Common bird species include WEME and HOLA. This is an *Oregon Conservation Strategy Habitat*.	3,814.88

General Land Cover Type and Codes	Specific Habitat Type ("subtype") and Mapping Codes	Specific Habitat Type Description*	Acres in Site Boundary
Shrub-steppe (SS) Steppe dominated by shrubs (>20% shrub cover)	**Sagebrush Shrub-steppe (SSA)**	Big sage sagebrush/bunchgrass-annual grass. Offers high quality breeding habitat for shrub obligate species including loggerhead shrike (LOSH). May also support WGS and WTJ. Common species include WEME and mourning dove. Sage sparrow, Brewer's sparrow and lark sparrow are present in larger blocks. In the more-sandy soils, sagebrush lizard and other reptiles are likely to be found. Juniper trees present in some SSA as individuals or small groups, not as woodland cover. A few sites have been impacted in varying degrees by recent fires. Sagebrush steppe is an *Oregon Conservation Strategy Habitat*.	2,791.78
	Rabbitbrush-Snakeweed Shrub-steppe (SSB)	Rabbitbrush-snakeweed-buckwheat/bunchgrass-annual grass. Most of these areas are formerly SSA (sagebrush-rabbitbrush-snakeweed/bunchgrass - annual grass) attempting to recover from recent fire or are older DC/CRP and have significant shrub component. Many sites contain mature big sagebrush cover in patches approx. 2-ac. and less in size. Can support LBCU, WTJ, and WGS. Common species include HOLA and WEME. Lark sparrow occasional found nesting. Juniper trees present in some SSB as individuals or small groups, not as woodland cover.	8,575.34
Woodland (W) With >10% tree cover	**Juniper Woodland (WJ)**	Open canopy woodland consisting of western juniper trees in more concentrated distribution (vs. scattered individual trees in other habitat types). Often with significant big sage and grass understory component. Potential habitat for nesting ferruginous hawk and Swainson's hawk; foraging and nesting loggerhead shrike; foraging and breeding short-horned and sagebrush lizards. Migrating and wintering habitat for American robins, Townsend's solitaire, waxwings, and mountain bluebirds. Mourning dove nesting habitat. Recent wildfires have killed some juniper trees in the Eightmile Canyon area.	285.64
	Riparian Woodland (WR)	Riparian woodland is limited to one narrow intermittent linear stream course in Eightmile canyon. Willow is the dominant deciduous tree of the overstory. Provides important roosting habitat for bats; important thermal cover for mule deer; important nesting and migration habitat for passerines.	2.49
		Total Acres	**33,402.32**

* refer to Section 3.3.2 of this report for more detailed descriptions and wildlife use

Table 2. Habitat types and categories within the Montague site boundary with maximum possible area of impact—worst-case layout.

Category and Habitat Description	Habitat Subtype Code	Impacts (Worst Case)		
		Total Acres Within Montague Site Boundary	**Temporary Montague* Components** (acres disturbed)	**Permanent Montague* Components** (acres disturbed)
Category 1				
Developed – CRP or Other Planted Grassland	DC	88.27	0.00	0.00
Grassland – Exotic Annual	GA	59.29	0.00	0.00
Grassland – Native Perennial	GB	54.93	0.00	0.00
Shrub-steppe – Sagebrush (Big Sage)	SSA	107.51	0.00	0.00
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	199.09	0.00	0.00
Total		**509.09**	**0.00**	**0.00**
Category 2				
Exposed Rock on Slopes – Escarpment	ESC	28.67	0.34	0.09
Grassland – Exotic Annual	GA	571.56	81.26	13.36
Grassland – Native Perennial	GB	429.10	21.66	2.25
Shrub-steppe – Sagebrush (Big Sage)	SSA	2,318.22	96.30	14.90
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	884.69	70.80	10.93
Woodland – Juniper	WJ	244.53	16.33	1.99
Woodland–Riparian	WR	2.49	0.00	0.00
Total		**4,479.26**	**286.69**	**43.53**
Category 3				
Developed – CRP or Other Planted Grassland	DC	1,423.92	76.85	7.45
Grassland – Exotic Annual	GA	1,528.83	132.82	14.75
Grassland – Native Perennial	GB	3,137.61	91.10	12.35
Shrub-steppe – Sagebrush (Big Sage)	SSA	344.16	3.32	3.65
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	7,316.80	312.83	37.83
Woodland – Juniper	WJ	41.11	0.30	0.00
Total		**13,792.43**	**617.22**	**76.03**
Category 4				
Developed – Old Field	DB	7.54	0.00	0.00
Grassland – Exotic Annual	GA	1,046.22	34.83	5.21
Grassland – Native Perennial	GB	193.24	2.28	0.59
Shrub-steppe – Sagebrush (Big Sage)	SSA	21.90	0.04	<0.01
Shrub-steppe – Rabbitbrush/Snakeweed	SSB	174.77	12.96	1.64
Total		**1,443.66**	**50.12**	**7.44**
Category 5				
none				
Subtotal for Cat. 2, 3, 4		**20,224.44**	**954.03**	**127.00**
Category 6				
Developed – Irrigated Agriculture	DI	270.76	6.32	2.77
Developed – Dryland Wheat	DW	12,660.54	742.82	80.79
Developed – Other	DX	246.57	13.35	9.48
Total		**13,177.88**	**762.49**	**93.04**
Total for all Categories		**33,402.32**	**1,716.51**	**220.04**

[1] Temporary facilities include access roads, construction areas, access for overhead line construction, installation sites for underground collector cables, and equipment laydown areas for individual turbines, entire strings of turbines, and laydown areas for in-transit towers, cranes, and miscellaneous construction equipment.

[2] Permanent facilities include turbine pads and towers, substation, meteorological towers, Operations and Maintenance facility or facilities, and permanent access roads.

Table 3. Special status avian species observed during avian use surveys (including incidental observations and in-transit) at: Montague Wind Power Facility (5 plots in 2008–2009 and 6 plots in fall season 2009), the amended site boundary for Leaning Juniper IIB (7 plots); at Leaning Juniper IIA (6 plots) in all four seasons in 2004–2005; and at Pebble Springs in spring season 2006 (5 plots).

Species	Status	Montague	LJIIB	LJIIA	Pebble
burrowing owl	SC, BoCC			X	
ferruginous hawk	SC, BoCC	X	X	X	
golden eagle	EPA, BoCC	X		X	X
grasshopper sparrow	SV	X	X	X	X
loggerhead shrike	SV, BoCC	X	X	X	
long-billed curlew	SV, BoCC	X	X	X	X
Swainson's hawk	SV, BoCC	X	X	X	X

* This table does not include sightings of special status wildlife observed during ground transect surveys. For more details on all sightings of special status wildlife see Appendix C.

Status Key:

Oregon (ORNHIC, 2008):

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

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

Federal:

EPA Eagle Protection Act (Bald and Golden Eagle) 16 U.S.C. §§ 668-668d, June 8, 1940, as amended 1959, 1962, 1972, 1978.

BoCC USFWS Birds of Conservation Concern (USFWS, 2008a; Table BCR 9, Great Basin Region).

Note: blank cell = species not observed.

Table 4. Species observed within 800m at five 2008–2009 Montague Wind Power Facility avian use study plots in four seasons, September 4, 2008–August 7, 2009.

Species/Groups	Fall		Winter		Spring		Summer	
	# Grps	# Ind	# Grps	# Ind	# Grps	# Ind	# Grps	# Ind
Waterfowl		**0**		**5**		**0**		**0**
Canada goose	0	0	1	5	0	0	0	0
Raptors		**6**		**4**		**11**		**25**
Harriers		*2*		*0*		*5*		*3*
northern harrier	2	2	0	0	5	5	3	3
Buteos		*2*		*3*		*6*		*18*
red-tailed hawk	1	1	0	0	1	1	3	3
rough-legged hawk	0	0	1	1	0	0	0	0
ferruginous hawk	0	0	1	1	0	0	2	2
Swainson's hawk	0	0	1	1	5	5	12	12
unidentified buteo	1	1	0	0	0	0	1	1
Falcons		*1*		*1*		*0*		*4*
American kestrel	0	0	0	0	0	0	2	2
prairie falcon	0	0	1	1	0	0	2	2
unidentified falcon	1	1	0	0	0	0	0	0
Vultures		*1*		*0*		*0*		*0*
turkey vulture	1	1	0	0	0	0	0	0
Shorebirds		**0**		**0**		**39**		**35**
long-billed curlew	0	0	0	0	33	39	21	35
Game birds		**1**		**0**		**0**		**0**
California quail	1	1	0	0	0	0	0	0
Doves		**0**		**0**		**0**		**1**
mourning dove	0	0	0	0	0	0	1	1
Passerines		**346**		**441**		**352**		**289**
Songbirds		*286*		*315*		*313*		*267*
American robin	0	0	2	6	0	0	0	0
barn swallow	0	0	0	0	1	2	0	0
Brewer's blackbird	0	0	0	0	0	0	1	1
dark-eyed junco	1	6	0	0	0	0	0	0
European starling	1	15	0	0	0	0	0	0
grasshopper sparrow	0	0	0	0	0	0	2	2
house finch	2	2	3	3	1	1	1	2
horned lark	110	156	207	244	147	178	120	168
lark sparrow	0	0	0	0	1	1	2	3
loggerhead shrike	0	0	0	0	1	1	0	0
mountain bluebird	1	3	0	0	0	0	0	0
red-winged blackbird	0	0	0	0	1	2	0	0
savannah sparrow	0	0	0	0	2	2	2	2
unidentified blackbird	2	26	0	0	0	0	0	0
unidentified finch	0	0	1	4	0	0	0	0
unidentified passerine	10	39	9	30	5	6	0	0
unidentified sparrow	5	17	0	0	0	0	3	4
vesper sparrow	0	0	0	0	4	4	4	4
western kingbird	0	0	0	0	1	3	1	1
western meadowlark	22	22	28	28	98	113	73	80
Corvids		*60*		*126*		*39*		*22*
American crow	0	0	0	0	1	1	0	0
black-billed magpie	1	1	4	5	2	2	1	1
common raven	29	59	48	121	22	36	15	21
Totals	**191**	**353**	**307**	**450**	**331**	**402**	**272**	**350**

Table 5. Mean use, percent composition, and percent frequency of occurrence for avian groups observed at five 2008–2009 Montague Wind Power Facility avian use study plots in four seasons.

Species	Seasons*			
	Fall	Winter	Spring	Summer
	Mean Use[1]			
Waterfowl	**0.000**	**0.064**	**0.000**	**0.000**
Canada goose	0.000	0.064	0.000	0.000
Raptors	**0.133**	**0.051**	**0.200**	**0.500**
Harriers	*0.044*	*0.000*	*0.091*	*0.060*
northern harrier	0.044	0.000	0.091	0.060
Buteos	*0.044*	*0.038*	*0.109*	*0.360*
red-tailed hawk	0.022	0.000	0.018	0.060
rough-legged hawk	0.000	0.013	0.000	0.000
ferruginous hawk	0.000	0.013	0.000	0.040
Swainson's hawk	0.000	0.013	0.091	0.240
unidentified buteo	0.022	0.000	0.000	0.020
Falcons	*0.022*	*0.013*	*0.000*	*0.080*
American kestrel	0.000	0.000	0.000	0.040
prairie falcon	0.000	0.013	0.000	0.040
unidentified falcon	0.022	0.000	0.000	0.000
Vultures	*0.022*	*0.000*	*0.000*	*0.000*
turkey vulture	0.022	0.000	0.000	0.000
Shorebirds	**0.000**	**0.000**	**0.709**	**0.700**
long-billed curlew	0.000	0.000	0.709	0.700
Game birds	**0.022**	**0.000**	**0.000**	**0.000**
California quail	0.022	0.000	0.000	0.000
Doves	**0.000**	**0.000**	**0.000**	**0.020**
mourning dove	0.000	0.000	0.000	0.020
Passerines	**7.689**	**5.654**	**6.400**	**5.780**
Songbirds	*6.356*	*4.038*	*5.691*	*5.340*
American robin	0.000	0.077	0.000	0.000
barn swallow	0.000	0.000	0.036	0.000
Brewer's blackbird	0.000	0.000	0.000	0.020
dark-eyed junco	0.133	0.000	0.000	0.000
European starling	0.333	0.000	0.000	0.000
grasshopper sparrow	0.000	0.000	0.000	0.040
house finch	0.044	0.038	0.018	0.040
horned lark	3.467	3.128	3.236	3.360
lark sparrow	0.000	0.000	0.018	0.060
loggerhead shrike	0.000	0.000	0.018	0.000
mountain bluebird	0.067	0.000	0.000	0.000
red-winged blackbird	0.000	0.000	0.036	0.000
savannah sparrow	0.000	0.000	0.036	0.040
unidentified blackbird	0.578	0.000	0.000	0.000
unidentified finch	0.000	0.051	0.000	0.000
unidentified passerine	0.867	0.385	0.109	0.000
unidentified sparrow	0.378	0.000	0.000	0.080
vesper sparrow	0.000	0.000	0.073	0.080
western kingbird	0.000	0.000	0.055	0.020
western meadowlark	0.489	0.359	2.055	1.600
Corvids	*1.333*	*1.615*	*0.709*	*0.440*
American crow	0.000	0.000	0.018	0.000
black-billed magpie	0.022	0.064	0.036	0.020
common raven	1.311	1.551	0.655	0.420
Totals	**7.844**	**5.769**	**7.309**	**7.000**

Species	Seasons*			
	Fall	Winter	Spring	Summer
	% Composition[2]			
Waterfowl	**0.00**	**1.11**	**0.00**	**0.00**
Canada goose	0.00	1.11	0.00	0.00
Raptors	**0.17**	**0.89**	**2.74**	**7.14**
Harriers	*0.57*	*0.00*	*1.24*	*0.86*
northern harrier	0.57	0.00	1.24	0.86
Buteos	*0.57*	*0.67*	*1.49*	*5.14*
red-tailed hawk	0.28	0.00	0.25	0.86
rough-legged hawk	0.00	0.22	0.00	0.00
ferruginous hawk	0.00	0.22	0.00	0.57
Swainson's hawk	0.00	0.22	1.24	3.43
unidentified buteo	0.28	0.00	0.00	0.29
Falcons	*0.28*	*0.22*	*0.00*	*1.14*
American kestrel	0.00	0.00	0.00	0.57
prairie falcon	0.00	0.22	0.00	0.57
unidentified falcon	0.28	0.00	0.00	0.00
Vultures	*0.28*	*0.00*	*0.00*	*0.00*
turkey vulture	0.28	0.00	0.00	0.00
Shorebirds	**0.00**	**0.00**	**9.70**	**10.00**
long-billed curlew	0.00	0.00	9.70	10.00
Game birds	**0.28**	**0.00**	**0.00**	**0.00**
California quail	0.28	0.00	0.00	0.00
Doves	**0.00**	**0.00**	**0.00**	**0.29**
mourning dove	0.00	0.00	0.00	0.29
Passerines	**98.02**	**98.00**	**87.56**	**82.57**
Songbirds	*81.02*	*70.00*	*77.86*	*76.29*
American robin	0.00	1.33	0.00	0.00
barn swallow	0.00	0.00	0.50	0.00
Brewer's blackbird	0.00	0.00	0.00	0.29
dark-eyed junco	1.70	0.00	0.00	0.00
European starling	4.25	0.00	0.00	0.00
grasshopper sparrow	0.00	0.00	0.00	0.57
house finch	0.57	0.67	0.25	0.57
horned lark	44.19	54.22	44.28	48.00
lark sparrow	0.00	0.00	0.25	0.86
loggerhead shrike	0.00	0.00	0.25	0.00
mountain bluebird	0.85	0.00	0.00	0.00
red-winged blackbird	0.00	0.00	0.50	0.00
savannah sparrow	0.00	0.00	0.50	0.57
unidentified blackbird	7.37	0.00	0.00	0.00
unidentified finch	0.00	0.89	0.00	0.00
unidentified passerine	11.05	6.67	1.49	0.00
unidentified sparrow	4.82	0.00	0.00	1.14
vesper sparrow	0.00	0.00	1.00	1.14
western kingbird	0.00	0.00	0.75	0.29
western meadowlark	6.23	6.22	28.11	22.86
Corvids	*17.00*	*28.00*	*9.70*	*6.29*
American crow	0.00	0.00	0.25	0.00
black-billed magpie	0.28	1.11	0.50	0.29
common raven	16.71	26.89	8.96	6.00
	% Frequency of Occurrence[3]			
Waterfowl	**0.00**	**1.28**	**0.00**	**0.00**
Canada goose	0.00	1.28	0.00	0.00
Raptors	**13.33**	**5.13**	**18.18**	**42.00**
Harriers	*4.44*	*0.00*	*9.09*	*6.00*
northern harrier	4.44	0.00	9.09	6.00

Species	Seasons*			
	Fall	Winter	Spring	Summer
Buteos	*4.44*	*3.85*	*10.91*	*28.00*
red-tailed hawk	2.22	0.00	1.82	6.00
rough-legged hawk	0.00	1.28	0.00	0.00
ferruginous hawk	0.00	1.28	0.00	4.00
Swainson's hawk	0.00	1.28	9.09	20.00
unidentified buteo	2.22	0.00	0.00	2.00
Falcons	*2.22*	*1.28*	*0.00*	*8.00*
American kestrel	0.00	0.00	0.00	4.00
prairie falcon	0.00	1.28	0.00	4.00
unidentified falcon	2.22	0.00	0.00	0.00
Vultures	*2.22*	*0.00*	*0.00*	*0.00*
turkey vulture	2.22	0.00	0.00	0.00
Shorebirds	**0.00**	**0.00**	**45.45**	**30.00**
long-billed curlew	0.00	0.00	45.45	30.00
Game birds	**2.22**	**0.00**	**0.00**	**0.00**
California quail	2.22	0.00	0.00	0.00
Doves	**0.00**	**0.00**	**0.00**	**2.00**
mourning dove	0.00	0.00	0.00	2.00
Passerines	**97.78**	**89.74**	**92.73**	**100.00**
Songbirds	*95.56*	*87.18*	*92.73*	*100.00*
American robin	0.00	2.56	0.00	0.00
barn swallow	0.00	0.00	1.82	0.00
Brewer's blackbird	0.00	0.00	0.00	2.00
dark-eyed junco	2.22	0.00	0.00	0.00
European starling	2.22	0.00	0.00	0.00
grasshopper sparrow	0.00	0.00	0.00	4.00
house finch	4.44	3.85	1.82	2.00
horned lark	95.56	83.33	87.27	92.00
lark sparrow	0.00	0.00	1.82	2.00
loggerhead shrike	0.00	0.00	1.82	0.00
mountain bluebird	2.22	0.00	0.00	0.00
red-winged blackbird	0.00	0.00	1.82	0.00
savannah sparrow	0.00	0.00	3.64	4.00
unidentified blackbird	4.44	0.00	0.00	0.00
unidentified finch	0.00	1.28	0.00	0.00
unidentified passerine	20.00	11.54	9.09	0.00
unidentified sparrow	11.11	0.00	0.00	6.00
vesper sparrow	0.00	0.00	5.45	6.00
western kingbird	0.00	0.00	1.82	2.00
western meadowlark	26.67	17.95	72.73	70.00
Corvids	*37.78*	*42.31*	*38.18*	*32.00*
American crow	0.00	0.00	1.82	0.00
black-billed magpie	2.22	5.13	3.64	2.00
common raven	35.56	39.74	34.55	30.00
Totals	**97.78**	**92.31**	**94.55**	**100.00**

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

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

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

* Seasons and number of surveys:
Fall: September 4–October 31, 2008; 9 visits to 5 sites (A, B, C, J, and K) = 45 surveys
Winter: November 3, 2008–March 11, 2009; 16 visits to A & B, C, and 15 to J, K = 78 surveys
Spring: March 17–May 25, 2009; 11 visits to 5 sites (A, B, C, J, and K) = 55 surveys
Summer: May 31–August 7, 2009; 10 visits to 5 sites (A, B, C, J, and K) = 50 surveys

Table 6. Species observed, mean bird use, percent composition, and percent frequency of occurrence for avian species and groups observed within 800m during fall season 2009 Montague (6 plots) avian use surveys.

Species/Group	Montague				
	# Grps	# Ind	Mean Use[1]	% Comp.[2]	% Freq.[3]
Raptors		**12**	**0.273**	**2.14**	**25.00**
Harriers		*3*	*0.068*	*0.54*	*6.82*
northern harrier	3	3	0.068	0.54	6.82
Buteos		*8*	*0.182*	*1.43*	*15.91*
red-tailed hawk	4	4	0.091	0.71	6.82
rough-legged hawk	3	3	0.068	0.54	6.82
Swainson's hawk	1	1	0.023	0.18	2.27
Falcons		*1*	*0.023*	*0.18*	*2.27*
American kestrel	1	1	0.023	0.18	2.27
Wading birds		**1**	**0.023**	**0.18**	**2.27**
great blue heron	1	1	0.023	0.18	2.27
Passerines		**547**	**12.432**	**97.68**	**95.45**
Songbirds		*511*	*11.614*	*91.25*	*90.91*
American pipit	4	23	0.523	4.11	9.09
European starling	3	24	0.545	4.29	6.82
horned lark	49	191	4.341	34.11	79.55
mountain bluebird	1	3	0.068	0.54	2.27
Townsend's solitaire	1	1	0.023	0.18	2.27
unidentified passerine	18	255	5.795	45.54	36.36
western meadowlark	4	10	0.227	1.79	9.09
white-crowned sparrow	1	3	0.068	0.54	2.27
yellow-rumped warbler	1	1	0.023	0.18	2.27
Corvids		*36*	*0.818*	*6.43*	*52.27*
common raven	25	36	0.818	6.43	52.27
Totals	**120**	**560**	**12.727**	**-**	**95.45**

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

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

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

Fall Season: September 10, 2009–October 30, 2009; 8 visits to AA, BB, EE, FF; 6 visits to GG, HH = 44 surveys

Table 7. Avian species and number of observations recorded while in-transit to avian use surveys at Montague Wind Power Project, fall 2008, winter 2008–2009, spring and summer 2009, and fall 2009.

Common Name*	Observed Only In-Transit	Fall 2008	Winter 2008-2009	Spring 2009	Summer 2009	Fall 2009	Total
American kestrel		6	5	1	6	0	18
Cooper's hawk	X	0	0	0	0	1	1
golden eagle	X	0	1	0	0	1	2
great-horned owl	X	0	0	0	3	0	3
loggerhead shrike		0	1	2	1	0	4
long-billed curlew		0	0	12	6	0	18
northern harrier		1	0	1	3	1	6
prairie falcon		0	1	0	0	0	1
red-tailed hawk		2	5	3	5	0	15
rough-legged hawk		0	1	1	0	1	3
Swainson's hawk		0	0	4	7	0	11
Total		**9**	**14**	**24**	**31**	**4**	**82**

*Table includes species of interest (such as raptors and special status species) that were observed incidentally while traveling in-transit near survey plots. As with the plot observations, for species with more than one recorded, individuals may have been counted more than once.

Table 8. Species observed at distances greater than 800 meters in the Montague Wind Power study during fall 2008, winter 2008–2009, spring 2009, summer 2009, and fall 2009.

Species	Fall 2008	Winter 2008-09	Spring 2009	Summer 2009	Fall 2009	Total
golden eagle	0	0	0	0	1	1
red-tailed hawk	0	3	0	2	0	5
rough-legged hawk	0	0	0	0	3	3
turkey vulture	0	0	1	0	0	1
unidentified buteo	0	1	2	2	0	5
unidentified hawk	0	0	0	0	1	1
Total	**0**	**4**	**3**	**4**	**5**	**16**

Table 9. Species observed and mean use within 800 meters by plot at five 2008–2009 Montague Wind Power Facility avian use study plots in four seasons.

Species	Study Plots									
	A		B		C		J		K	
	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Waterfowl	**0**	**0.000**	**5**	**0.109**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	5	0.313	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Raptors	**7**	**0.152**	**9**	**0.196**	**12**	**0.261**	**7**	**0.156**	**11**	**0.244**
Fall	1	0.111	2	0.222	1	0.111	0	0.000	2	0.222
Winter	1	0.063	0	0.000	1	0.063	1	0.067	1	0.067
Spring	3	0.273	2	0.182	2	0.182	2	0.182	2	0.182
Summer	2	0.200	5	0.500	8	0.800	4	0.400	6	0.600
Shorebirds	**9**	**0.196**	**23**	**0.500**	**22**	**0.478**	**16**	**0.356**	**4**	**0.089**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	7	0.636	11	1.000	14	1.273	4	0.364	3	0.273
Summer	2	0.200	12	1.200	8	0.800	12	1.200	1	0.100
Gamebirds	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**
Fall	1	0.111	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Passerines	**271**	**5.891**	**318**	**6.913**	**302**	**6.565**	**264**	**5.867**	**273**	**6.067**
Songbirds	*233*	*5.065*	*230*	*5.000*	*242*	*5.261*	*239*	*5.311*	*237*	*5.267*
Fall	48	5.333	50	5.556	67	7.444	69	7.667	52	5.778
Winter	62	3.875	73	4.563	70	4.375	46	3.067	64	4.267
Spring	73	6.636	64	5.818	43	3.909	70	6.364	63	5.727
Summer	50	5.000	43	4.300	62	6.200	54	5.400	58	5.800
Corvids	*38*	*0.826*	*88*	*1.913*	*60*	*1.304*	*25*	*0.556*	*36*	*0.800*
Fall	19	2.111	23	2.556	16	1.778	0	0.000	2	0.222
Winter	14	0.857	51	3.188	33	2.063	16	1.067	12	0.800
Spring	2	0.182	8	0.727	9	0.818	3	0.273	17	1.545
Summer	3	0.300	6	0.600	2	0.200	6	0.600	5	0.500
Doves/Pigeons	**0**	**0.000**	**0**	**0.000**	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	1	0.100	0	0.000	0	0.000
Total Fall All Groups	69	7.667	75	8.333	84	9.333	69	7.667	54	6.000
Total Winter All Groups	77	4.813	129	8.063	104	6.500	63	4.200	77	5.133
Total Spring All Groups	85	7.727	85	7.727	68	6.182	79	7.182	85	7.727
Total Summer All Groups	57	5.700	66	6.600	81	8.100	76	7.600	70	7.000
Overall All Groups (All Seasons)	**288**	**6.261**	**355**	**7.717**	**337**	**7.326**	**287**	**6.378**	**288**	**6.400**

Seasons

Fall: September 4, 2008 through October 31, 2008; 9 visits to 5 sites = 45 surveys
Winter: November. 3, 2008 through March 11, 2009; 16 visits to A, B, C, 15 visits to J, K = 78 surveys
Spring: March 17, 2009 through May 25, 2009; 11 visits to 5 sites = 55 surveys
Summer: May 31, 2009 through August 7, 2009; 10 visits to 5 sites = 50 surveys

Overall (all seasons) visits to Plots: A – 46 surveys; B – 46 surveys; C – 46 surveys; J – 45 surveys; K – 45 surveys

Table 10. Species observed and mean use within 800 meters by plot during fall season 2009 Montague avian use surveys (6 plots).

Species	Study Plots											
	AA		BB		EE		FF		GG		HH	
	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Raptors	**4**	**0.500**	**1**	**0.125**	**0**	**0.000**	**2**	**0.250**	**3**	**0.500**	**2**	**0.333**
Wading birds	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**1**	**0.167**	**0**	**0.000**
Passerines	**72**	**9.000**	**86**	**10.750**	**112**	**14.000**	**75**	**9.375**	**134**	**22.333**	**68**	**11.333**
Songbirds	*62*	*7.750*	*84*	*10.500*	*108*	*13.500*	*68*	*8.500*	*127*	*21.167*	*62*	*10.333*
Corvids	*10*	*1.250*	*2*	*0.250*	*4*	*0.500*	*7*	*0.875*	*7*	*1.167*	*6*	*1.000*
Totals	**76**	**9.500**	**87**	**10.875**	**112**	**14.000**	**77**	**9.625**	**138**	**23.000**	**70**	**11.667**

Fall Season: September 10, 2009–October 30, 2009

8 visits to AA, BB, EE, FF; 6 visits to GG, HH

Table 11. Species observed within 800m at seven avian use study plots within the amended site boundary for Leaning Juniper IIB Wind Project in four seasons, 2008–2009.

Species/Groups	Fall[1]		Winter[2]		Spring[3]		Summer[4]	
	# Grps	# Ind	# Grps	# Ind	# Grps	# Ind	# Grps	# Ind
Raptors		**5**		**17**		**28**		**35**
Harriers		*0*		*2*		*7*		*4*
northern harrier	0	0	2	2	7	7	4	4
Buteos		*1*		*10*		*15*		*24*
red-tailed hawk	0	0	5	5	6	6	11	12
rough-legged hawk	1	1	4	4	0	0	0	0
ferruginous hawk	0	0	0	0	1	1	1	1
Swainson's hawk	0	0	0	0	6	7	11	11
unidentified buteo	0	0	1	1	1	1	0	0
Falcons		*4*		*5*		*6*		*7*
American kestrel	2	2	4	4	6	6	6	6
prairie falcon	1	1	1	1	0	0	0	0
unidentified falcon	1	1	0	0	0	0	1	1
Shorebirds		**0**		**0**		**12**		**10**
long-billed curlew	0	0	0	0	11	12	9	10
Game birds		**1**		**0**		**0**		**0**
California quail	1	1	0	0	0	0	0	0
Doves		**33**		**9**		**1**		**15**
mourning dove	8	33	3	9	1	1	6	15
Goatsucker		**0**		**0**		**0**		**2**
common nighthawk	0	0	0	0	0	0	2	2
Passerines		**400**		**666**		**403**		**338**
Songbirds		*347*		*562*		*369*		*328*
American pipit	0	0	0	0	1	5	0	0
American robin	0	0	3	23	2	2	2	2
barn swallow	1	1	0	0	2	3	0	0
Brewer's blackbird	0	0	0	0	2	10	1	6
Brewer's sparrow	0	0	0	0	0	0	1	4
dark-eyed junco	0	0	2	8	0	0	1	2
European starling	0	0	0	0	1	2	0	0
grasshopper sparrow	0	0	0	0	6	6	3	4
house finch	1	1	0	0	0	0	0	0
horned lark	141	271	221	457	181	224	152	232
lark sparrow	0	0	0	0	2	2	0	0
loggerhead shrike	0	0	0	0	1	1	1	1
mountain bluebird	1	2	1	5	0	0	0	0
northern shrike	0	0	2	2	0	0	0	0
rock wren	0	0	0	0	0	0	2	2
savannah sparrow	0	0	0	0	1	1	1	1
spotted towhee	0	0	0	0	1	1	0	0
unidentified passerine	13	44	14	38	1	1	5	6
unidentified sparrow	1	1	1	1	2	2	2	2
vesper sparrow	4	6	0	0	2	2	8	8
violet-green swallow	0	0	0	0	3	5	0	0
western kingbird	0	0	0	0	1	2	0	0

Species/Groups	Fall[1]		Winter[2]		Spring[3]		Summer[4]	
	# Grps	# Ind	# Grps	# Ind	# Grps	# Ind	# Grps	# Ind
western meadowlark	21	21	28	28	98	100	56	58
Corvids		*53*		*104*		*34*		*10*
black-billed magpie	4	4	0	0	0	0	1	1
common raven	33	49	48	104	20	34	7	9
Woodpeckers		**3**		**0**		**0**		**2**
northern flicker	3	3	0	0	0	0	2	2
Totals	**237**	**442**	**340**	**692**	**366**	**444**	**296**	**402**

[1] Fall: September 4, 2008 through October 31, 2008; 9 visits to D-I, 8 visits to L = 62 surveys

[2] Winter: November. 3, 2008 through March 11, 2009; 16 visits to D, E, F, H, I, 15 visits to G, L = 110 surveys

[3] Spring: March 17, 2009 through May 25, 2009; 11 visits to D-I, L = 77 surveys

[4] Summer: May 31, 2009 through August 7, 2009; 10 visits to D-I, L = 70 surveys

Note: Fall and winter season data previously presented in NWC, 2009.

Table 12. Mean use, percent composition, and percent frequency of occurrence for avian groups observed at seven avian use study plots within the amended site boundary for the Leaning Juniper IIB Wind Project in four seasons, 2008–2009.

Species/Groups	Fall* (62 surveys)	Winter (110 surveys)	Spring (77 surveys)	Summer (70 surveys)
	Mean Use[1]			
Raptors	**0.081**	**0.155**	**0.364**	**0.500**
Harriers	*0.000*	*0.018*	*0.091*	*0.057*
northern harrier	0.000	0.018	0.091	0.057
Buteos	*0.016*	*0.091*	*0.195*	*0.343*
red-tailed hawk	0.000	0.045	0.078	0.171
rough-legged hawk	0.016	0.036	0.000	0.000
ferruginous hawk	0.000	0.000	0.013	0.014
Swainson's hawk	0.000	0.000	0.091	0.157
unidentified buteo	0.000	0.009	0.013	0.000
Falcons	*0.065*	*0.045*	*0.078*	*0.100*
American kestrel	0.032	0.036	0.078	0.086
prairie falcon	0.016	0.009	0.000	0.000
unidentified falcon	0.016	0.000	0.000	0.014
Shorebirds	**0.000**	**0.000**	**0.156**	**0.143**
long-billed curlew	0.000	0.000	0.156	0.143
Game birds	**0.016**	**0.000**	**0.000**	**0.000**
California quail	0.016	0.000	0.000	0.000
Doves	**0.532**	**0.082**	**0.013**	**0.214**
mourning dove	0.532	0.082	0.013	0.214
Goatsucker	**0.000**	**0.000**	**0.000**	**0.029**
common nighthawk	0.000	0.000	0.000	0.029
Passerines	**6.452**	**6.055**	**5.234**	**4.829**
Songbirds	*5.597*	*5.109*	*4.792*	*4.686*
American pipit	0.000	0.000	0.065	0.000
American robin	0.000	0.209	0.026	0.029
barn swallow	0.016	0.000	0.039	0.000
Brewer's blackbird	0.000	0.000	0.130	0.086
Brewer's sparrow	0.000	0.000	0.000	0.057
dark-eyed junco	0.000	0.073	0.000	0.029
European starling	0.000	0.000	0.026	0.000
grasshopper sparrow	0.000	0.000	0.078	0.057
house finch	0.016	0.000	0.000	0.000
horned lark	4.371	4.155	2.909	3.314
lark sparrow	0.000	0.000	0.026	0.000
loggerhead shrike	0.000	0.000	0.013	0.014
mountain bluebird	0.032	0.045	0.000	0.000
northern shrike	0.000	0.018	0.000	0.000
rock wren	0.000	0.000	0.000	0.029
savannah sparrow	0.000	0.000	0.013	0.014
spotted towhee	0.000	0.000	0.013	0.000
unidentified passerine	0.710	0.345	0.013	0.086
unidentified sparrow	0.016	0.009	0.026	0.029
vesper sparrow	0.097	0.000	0.026	0.114
violet-green swallow	0.000	0.000	0.065	0.000
western kingbird	0.000	0.000	0.026	0.000
western meadowlark	0.339	0.255	1.299	0.829
Corvids	*0.855*	*0.945*	*0.442*	*0.143*
black-billed magpie	0.065	0.000	0.000	0.014
common raven	0.790	0.945	0.442	0.129
Woodpeckers	**0.048**	**0.000**	**0.000**	**0.029**
northern flicker	0.048	0.000	0.000	0.029
Totals	**7.129**	**6.291**	**5.766**	**5.743**

Species/Groups	Fall* (62 surveys)	Winter (110 surveys)	Spring (77 surveys)	Summer (70 surveys)
	% Composition[2]			
Raptors	**1.13**	**2.46**	**6.31**	**8.71**
Harriers	*0.00*	*0.29*	*1.58*	*1.00*
northern harrier	0.00	0.29	1.58	1.00
Buteos	*0.23*	*1.45*	*3.38*	*5.97*
red-tailed hawk	0.00	0.72	1.35	2.99
rough-legged hawk	0.23	0.58	0.00	0.00
ferruginous hawk	0.00	0.00	0.23	0.25
Swainson's hawk	0.00	0.00	1.58	2.74
unidentified buteo	0.00	0.14	0.23	0.00
Falcons	*0.90*	*0.72*	*1.35*	*1.74*
American kestrel	0.45	0.58	1.35	1.49
prairie falcon	0.23	0.14	0.00	0.00
unidentified falcon	0.23	0.00	0.00	0.25
Shorebirds	**0.00**	**0.00**	**2.70**	**2.49**
long-billed curlew	0.00	0.00	2.70	2.49
Game birds	**0.23**	**0.00**	**0.00**	**0.00**
California quail	0.23	0.00	0.00	0.00
Doves	**7.47**	**1.30**	**0.23**	**3.73**
mourning dove	7.47	1.30	0.23	3.73
Goatsucker	**0.00**	**0.00**	**0.00**	**0.50**
common nighthawk	0.00	0.00	0.00	0.50
Passerines	**90.50**	**96.24**	**90.77**	**84.08**
Songbirds	*78.51*	*81.21*	*83.11*	*81.59*
American pipit	0.00	0.00	1.13	0.00
American robin	0.00	3.32	0.45	0.50
barn swallow	0.23	0.00	0.68	0.00
Brewer's blackbird	0.00	0.00	2.25	1.49
Brewer's sparrow	0.00	0.00	0.00	1.00
dark-eyed junco	0.00	1.16	0.00	0.50
European starling	0.00	0.00	0.45	0.00
grasshopper sparrow	0.00	0.00	1.35	1.00
house finch	0.23	0.00	0.00	0.00
horned lark	61.31	66.04	50.45	57.71
lark sparrow	0.00	0.00	0.45	0.00
loggerhead shrike	0.00	0.00	0.23	0.25
mountain bluebird	0.45	0.72	0.00	0.00
northern shrike	0.00	0.29	0.00	0.00
rock wren	0.00	0.00	0.00	0.50
savannah sparrow	0.00	0.00	0.23	0.25
spotted towhee	0.00	0.00	0.23	0.00
unidentified passerine	9.95	5.49	0.23	1.49
unidentified sparrow	0.23	0.14	0.45	0.50
vesper sparrow	1.36	0.00	0.45	1.99
violet-green swallow	0.00	0.00	1.13	0.00
western kingbird	0.00	0.00	0.45	0.00
western meadowlark	4.75	4.05	22.52	14.43
Corvids	*11.99*	*15.03*	*7.66*	*2.49*
black-billed magpie	0.90	0.00	0.00	0.25
common raven	11.09	15.03	7.66	2.24
Woodpeckers	**0.68**	**0.00**	**0.00**	**0.50**
northern flicker	0.68	0.00	0.00	0.50
	% Frequency of Occurrence[3]			
Raptors	**8.06**	**13.64**	**33.77**	**42.86**
Harriers	*0.00*	*1.82*	*9.09*	*5.71*
northern harrier	0.00	1.82	9.09	5.71
Buteos	*1.61*	*9.09*	*18.18*	*30.00*

Species/Groups	Fall* (62 surveys)	Winter (110 surveys)	Spring (77 surveys)	Summer (70 surveys)
red-tailed hawk	0.00	4.55	7.79	15.71
rough-legged hawk	1.61	3.64	0.00	0.00
ferruginous hawk	0.00	0.00	1.30	1.43
Swainson's hawk	0.00	0.00	7.79	15.71
unidentified buteo	0.00	0.91	1.30	0.00
Falcons	*6.45*	*4.55*	*7.79*	*10.00*
American kestrel	3.23	3.64	7.79	8.57
prairie falcon	1.61	0.91	0.00	0.00
unidentified falcon	1.61	0.00	0.00	1.43
Shorebirds	**0.00**	**0.00**	**12.99**	**12.86**
long-billed curlew	0.00	0.00	12.99	12.86
Game birds	**1.61**	**0.00**	**0.00**	**0.00**
California quail	1.61	0.00	0.00	0.00
Doves	**11.29**	**2.73**	**1.30**	**8.57**
mourning dove	11.29	2.73	1.30	8.57
Goatsucker	**0.00**	**0.00**	**0.00**	**2.86**
common nighthawk	0.00	0.00	0.00	2.86
Passerines	**98.39**	**89.09**	**96.10**	**92.86**
Songbirds	*93.55*	*86.36*	*96.10*	*92.86*
American pipit	0.00	0.00	1.30	0.00
American robin	0.00	2.73	2.60	2.86
barn swallow	1.61	0.00	2.60	0.00
Brewer's blackbird	0.00	0.00	2.60	1.43
Brewer's sparrow	0.00	0.00	0.00	1.43
dark-eyed junco	0.00	1.82	0.00	1.43
European starling	0.00	0.00	1.30	0.00
grasshopper sparrow	0.00	0.00	3.90	4.29
house finch	1.61	0.00	0.00	0.00
horned lark	90.32	65.45	92.21	90.00
lark sparrow	0.00	0.00	2.60	0.00
loggerhead shrike	0.00	0.00	1.30	1.43
mountain bluebird	1.61	0.91	0.00	0.00
northern shrike	0.00	1.82	0.00	0.00
rock wren	0.00	0.00	0.00	2.86
savannah sparrow	0.00	0.00	1.30	1.43
spotted towhee	0.00	0.00	1.30	0.00
unidentified passerine	17.74	12.73	1.30	7.14
unidentified sparrow	1.61	0.91	2.60	2.86
vesper sparrow	4.84	0.00	2.60	8.57
violet-green swallow	0.00	0.00	3.90	0.00
western kingbird	0.00	0.00	1.30	0.00
western meadowlark	20.97	18.18	61.04	48.57
Corvids	*41.94*	*29.09*	*22.08*	*11.43*
black-billed magpie	6.45	0.00	0.00	1.43
common raven	41.94	29.09	22.08	10.00
Woodpeckers	**4.84**	**0.00**	**0.00**	**2.86**
northern flicker	4.84	0.00	0.00	2.86
Totals	**98.39**	**90.91**	**98.70**	**95.71**

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

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

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

* Seasons (start and end dates of surveys)

Fall: September 4, 2008 through October 31, 2008 Winter: November 3, 2008 through March 11, 2009

Spring: March 17, 2009 through May 25, 2009 Summer: May 31, 2009 through August 7, 2009

Table 13. Species observed and mean use within 800 meters by plot at seven avian use plots within the amended site boundary for the Leaning Juniper IIB Wind Project in four seasons, 2008–2009.

Species	Study Plots													
	D		E		F		G		H		I		L	
	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Raptors	**11**	**0.239**	**15**	**0.326**	**6**	**0.130**	**9**	**0.200**	**15**	**0.326**	**22**	**0.478**	**7**	**0.159**
Fall	0	0.000	1	0.111	0	0.000	0	0.000	2	0.222	1	0.111	1	0.125
Winter	0	0.000	4	0.250	0	0.000	3	0.200	0	0.000	7	0.438	3	0.200
Spring	4	0.364	5	0.455	3	0.273	4	0.364	5	0.455	6	0.545	1	0.091
Summer	7	0.700	5	0.500	3	0.300	2	0.200	8	0.800	8	0.800	2	0.200
Shorebirds	**2**	**0.043**	**4**	**0.087**	**0**	**0.000**	**2**	**0.044**	**10**	**0.217**	**3**	**0.065**	**1**	**0.023**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	2	0.182	4	0.364	0	0.000	1	0.091	4	0.364	1	0.091	0	0.000
Summer	0	0.000	0	0.000	0	0.000	1	0.100	6	0.600	2	0.200	1	0.100
Gamebirds	**0**	**0.000**	**0**	**0.000**	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**
Fall	0	0.000	0	0.000	1	0.111	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Passerines	**353**	**7.674**	**165**	**3.587**	**249**	**5.413**	**240**	**5.333**	**312**	**6.783**	**198**	**4.304**	**290**	**6.591**
Songbirds	*314*	*6.826*	*157*	*3.413*	*214*	*4.652*	*215*	*4.778*	*282*	*6.130*	*178*	*3.870*	*246*	*5.591*
Fall	57	6.333	33	3.667	31	3.444	46	5.111	91	10.111	41	4.556	48	6.000
Winter	148	9.250	47	2.938	87	5.438	69	4.600	83	5.188	58	3.625	70	4.667
Spring	71	6.455	39	3.545	43	3.909	73	6.636	36	3.273	39	3.545	68	6.182
Summer	38	3.800	38	3.800	53	5.300	27	2.700	72	7.200	40	4.000	60	6.000
Corvids	*39*	*0.848*	*8*	*0.174*	*35*	*0.761*	*25*	*0.556*	*30*	*0.652*	*20*	*0.435*	*44*	*1.000*
Fall	15	1.667	1	0.111	6	0.667	7	0.778	14	1.556	8	0.889	2	0.250
Winter	15	0.938	2	0.125	22	1.375	11	0.733	8	0.500	6	0.375	40	2.667
Spring	8	0.727	5	0.455	7	0.636	3	0.273	5	0.455	5	0.455	1	0.091
Summer	1	0.100	0	0.000	0	0.000	4	0.400	3	0.300	1	0.100	1	0.100
Goatsuckers	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**0**	**0.000**	**1**	**0.022**	**0**	**0.000**
Fall	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	1	0.100	0	0.000	0	0.000	0	0.000	0	0.000	1	0.100	0	0.000
Doves/Pigeons	**0**	**0.000**	**2**	**0.043**	**9**	**0.196**	**39**	**0.867**	**0**	**0.000**	**5**	**0.109**	**3**	**0.068**
Fall	0	0.000	0	0.000	0	0.000	28	3.111	0	0.000	2	0.222	3	0.375
Winter	0	0.000	0	0.000	0	0.000	9	0.600	0	0.000	0	0.000	0	0.000

Species	Study Plots													
	D		E		F		G		H		I		L	
	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use	# Ind	Mean Use
Spring	0	0.000	0	0.000	1	0.091	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	2	0.200	8	0.800	2	0.200	0	0.000	3	0.300	0	0.000
Woodpeckers	**0**	**0.000**	**0**	**0.000**	**4**	**0.087**	**0**	**0.000**	**1**	**0.022**	**0**	**0.000**	**0**	**0.000**
Fall	0	0.000	0	0.000	3	0.333	0	0.000	0	0.000	0	0.000	0	0.000
Winter	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Spring	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
Summer	0	0.000	0	0.000	1	0.100	0	0.000	1	0.100	0	0.000	0	0.000
Overall All Groups (All Seasons)	**367**	**7.978**	**186**	**4.043**	**269**	**5.848**	**290**	**6.444**	**338**	**7.348**	**229**	**4.978**	**301**	**6.841**

Seasons

Fall: September 4, 2008 through October 31, 2008; 9 visits to D-I, 8 visits to L = 62 surveys

Winter: November. 3, 2008 through March 11, 2009; 16 visits to D, E, F, H, I, 15 visits to G, L = 110 surveys

Spring: March 17, 2009 through May 25, 2009; 11 visits to D-I, L = 77 surveys

Summer: May 31, 2009 through August 7, 2009; 10 visits to D-I, L = 70 surveys

Overall (all seasons) visits to Plots

D – 46 surveys E – 46 surveys F – 46 surveys G – 45 surveys H – 46 surveys I – 46 surveys L – 44 surveys

Table 14. Estimated raptor nest densities from regional proposed and operating wind projects located primarily in comparable Columbia Basin environments*.

Project Site**	Raptor Nest Density (#/mi^2), rounded							
	All Raptor Species Combined	Buteos				Eagle	Falcon	Owl
		SWHA	RTHA	FEHA	UNBU	GOEA	PRFA	GHOW
Willow Creek Winds, OR	0.80	0.44	0.07	0.25	0.00	0.00	0.00	0.04
Rattlesnake Road, OR	0.45	0.19	0.13	0.05	0.00	0.00	0.08	0.00
Hopkins Ridge, WA	0.42	0.01	0.27	0.01	0.05	0.00	0.00	0.08
Leaning Juniper IIA, OR	0.41	0.18	0.16	0.03	0.00	0.00	0.02	0.02
Leaning Juniper IIB, OR	0.40	0.19	0.13	0.06	0.00	0.00	0.02	0.00
Wheat Field, OR	0.26	0.06	0.12	0.03	0.00	0.00	0.06	0.00
Golden Hills, OR	0.25	0.04	0.16	0.00	0.00	0.00	0.00	0.05
Pebble Springs, OR	0.24 (2009 Project area only***)	0.18	0.06	0.00	0.00	0.00	0.00	0.00
Klondike I and II, OR	0.23 (5 mile radius survey area)	0.07	0.11	0.00	0.00	0.01	0.00	0.04
Stateline OR/WA	0.21	0.03	0.08	0.03	0.00	0.00	0.00	0.07
Klondike III, OR	0.20	0.04	0.11	0.00	0.01	0.00	0.00	0.03
Wild Horse, WA	0.16	0.00	0.12	0.00	0.00	0.00	0.02	0.02
Klickitat County, WA	0.12	0.00	0.09	0.00	0.00	0.00	0.01	0.03
Big Horn, WA	0.11	0.00	0.06	0.00	0.00	0.00	0.01	0.04
AVERAGE	0.30							

Note: American kestrel, short-eared owl and burrowing owl are omitted due to difficulty in determining nesting of these species with the raptor nest survey method (helicopter survey) employed in this and other studies

Codes:

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

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

** References for projects: Big Horn (Johnson and Erickson, 2004), Leaning Juniper II (LJWP, 2006; Kronner et al., 2005), Klondike I and II (Johnson et al., 2002a), Klondike III (Mabee et al., 2005), Golden Hills (Jeffrey et al., 2008), Stateline (Erickson et al., 2004; NWC and WEST, 2001), Klickitat County (Johnson et al., 2003b), Hopkins Ridge (Young et al., 2003b), Wild Horse (Erickson et al., 2003b), Rattlesnake Road (Kronner et al., 2007a), Wheat Field (Kronner et al., 2008b); Pebble Springs (Gritski et al., 2009b); Willow Creek Winds (Kronner et al., 2007b).

*** Post-construction study of operating project

Other data not listed above:

Shepherd's Flat Wind Farm nest densities from ground-based field surveys:
For 122 square mile 2003 study area: all raptor species combined – 0.11, red-tailed hawk – 0.057, ferruginous hawk – 0.0082, great-horned owl – 0.016, golden eagle – 0.016, Swainson's hawk – 0.0082. Email letter from Pilz and Co. to Oregon Dept. of Energy dated October 25, 2007. Shepherd's Flat Wind Farm Application Supplement dated November 19, 2007.

Saddle Butte Wind Park:
"Eight occupied raptor nests found on the facility or in its vicinity. One, a Swainson's hawk nest (SWHA) is within the site boundary (page G-18). Two nests are outside of the boundary but within the study area – one SWHA and one red-tailed hawk (RTHA). The remaining five nests are all RTHA." Notice of Intent to Apply for a Site Certificate for the Saddle Butte Wind Park. August 4, 2009.

Table 15. Washington ground squirrel detections within the Montague site boundary*.

WGS Site #	Soils	Mapped Habitat Type (2009)	Estimated Size	General Notes	General Location
1	4C	SSA	Very small	Holes plus droppings	Western portion of Facility
2	4C	SSA	Very small	3 holes, fresh pellet	Western portion of Facility
3	4C	SSA	Small	7-8 holes	Western portion of Facility
4	23B	SSB	Small	Approx. 10 holes	Western portion of Facility
5	23C	SSB	Very small	1 fresh hole, 1 fresh pellet	Western portion of Facility
6	56B	GA	Small	10+ holes, vocalization	Western portion of Facility
7	23B	SSB	Very small	3 holes, 1 dropping	Northeastern portion of Facility
8	55B	SSB	Very small	1 dropping, 1 hole	Northeastern portion of Facility
9	55D	SSB	Small	Numerous holes, dropping	Northeastern portion of Facility
10	40D	SSB	Very small	WGS seen + lots of holes	Northeastern portion of Facility
11	40D	SSB	Very small	WGS seen, old dropping	Northeastern portion of Facility
12	55C,55E	SSA, GB	unknown	WGS seen from Tree Lane in 2006 and 2007	Central portion of Facility
13	55B	SSB	Very Small	1 hole with WGS dropping found incidentally while onsite	Northeastern portion of Facility

* Known WGS sites inside Site Boundary that were first found in 2009, 2008, 2007, 2006

Note: WGS Site 25 on Figure 5 was previously described and presented in Leaning Juniper IIB documents, it is not included in this table.

Estimated Size (based on one survey in March (Sites 1-11) and incidental observations obtained from other sources (Sites 12 and 13). Very Small = < 10 individuals, usually single to several holes, may be one or a few individuals. Small = 10 to 30 individuals. Medium = 30 to 40 individuals. Large = 40 to 100+ individuals.

Soils
4C – Blalock loam
23B, 23C – Olex silt loam
40D – Sagehill fine sandy loam
55B, 55C, 55D, 55E – Warden silt loam
56B – Willis silt loam

Mapped Habitat Types
SSA – Shrub-steppe, Sagebrush
SSB – Shrub-steppe, Rabbitbrush/Snakeweed
GA – Grassland, Exotic Annual Grass
GB – Grassland, Native Perennial

Table 16. Project and turbine characteristics of regional wind energy facilities where fatality monitoring studies* have been completed.

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

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

** Projects are sorted by MW of turbine type.

*** RD= turbine rotor diameter

Table 17. Annual fatality estimates on a per turbine and per MW nameplate basis for all birds and for all raptors in the Columbia Plateau Ecoregion where fatality monitoring studies have been completed.

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

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

[2] Raptor estimates include diurnal raptors and owls.

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

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

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

Table 18. Number and species composition of bird fatalities found at Columbia Plateau Ecoregion wind projects where fatality monitoring studies* have been completed or are in progress (data obtained from public files).

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

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

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

* with similar study protocols.

** not all project data was verified. Includes most, but not all incidentals found during formal monitoring studies, and one incidental found after monitoring was complete.

n = non-native species

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

Erickson et al. 2000. Avian and bat mortality associated with the Vansycle Wind Plant, Umatilla County Oregon. 1999 study year.

Erickson et al. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002–August 2003.

Erickson et al. 2004. Stateline Wind Project Wildlife Monitoring Final Report, July 2001–December 2003.

Erickson et al. 2007. Stateline Wind Project Wildlife Monitoring Annual Report, January–December 2006.

Erickson et al., 2008. Wild Horse Wind Facility Construction Avian and Bat Monitoring First Annual Report, January–December, 2007.

Gritski et al., 2008a. Leaning Juniper Wind Power Project, 2006–2008. Wildlife monitoring final report.

Gritski et al., 2008b. White Creek Wind I wildlife monitoring annual summary, winter 2007–2008 through fall 2008.

Gritski et al., 2009a. Rattlesnake Road Wind Farm, - mid-year 2009 progress report.

Gritski et al., 2009b. Pebble Springs Wind Power Project wildlife monitoring - mid-year 2009 progress report.

Gritski et al., 2009c. Klondike III (Phase 1) Wind Power Project Wildlife Monitoring Year One Summary, October 2007–October 2008.

Jeffrey et al., 2008. Elkhorn Wind Project monitoring 2nd quarterly report, 2008.

Jeffrey, et al., 2009. Biglow Canyon Wind Farm Phase I post-construction avian and bat monitoring first annual report, January 2008–December 2008

Johnson, et al. 2003b. Avian and bat mortality at the Klondike, Oregon Phase I Wind Plant, Sherman County, Oregon. February 2002–February 2003.

Kidder, B. and D. Every. 2009. Goodnoe Hills avian/bat mortality monitoring first quarterly findings.

Kronner et al., 2008a. Big Horn Wind Power Project Wildlife Monitoring Study, 2006–2007.

Kronner et al., 2009. White Creek Wind I – Results of monitoring year 2 winter season wildlife monitoring study and the clean-up search prior to formal monitoring of year 2 turbines, November 4, 2008–March 19, 2009.

Kronner, K. and S. Downes. 2009a. White Creek Wind I – Results of wildlife monitoring year 2 spring season, for the period March 20 through May 25, 2009.

Kronner. K. and S. Downes. 2009b. White Creek Wind I – Results of wildlife monitoring year 2 summer season, for the period June 1 through August 21, 2009.

NWC and WEST 2007. Avian and Bat Monitoring Report for the Klondike II Wind Power Project, Sherman County, Oregon. August 2005–August 2006.

Young et al. 2006. Eurus Combine Hills Turbine Ranch Phase 1 Post Construction Wildlife Monitoring First Annual Report February 2004–February 2005.

Young et al. 2007. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1 Post-Construction Avian and Bat Monitoring First Annual Report. January–December 2006.

Young, Jr., D.P., J.D. Jeffrey, K. Bay, and W.P. Erickson. 2009. Puget Sound Energy, Hopkins Ridge Wind Project Phase 1, post-construction avian and bat monitoring, second annual report, January–December 2008.

Table 19. Annual bat mortality estimates at existing wind projects in the Columbia Plateau Ecoregion with completed fatality monitoring studies (data obtained from public files).

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

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

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

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

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

9.0 APPENDICES

Appendix A. United States Fish and Wildlife Service Gilliam County species list

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

PROPOSED SPECIES

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Mammals

Terrestrial:

Washington ground squirrel	*Spermophilus washingtoni*

SPECIES OF CONCERN

Mammals

Pallid bat	*Antrozous pallidus pacificus*
Spotted bat	*Euderma maculatum*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis bat	*Myotis ciliolabrum*
Yuma myotis bat	*Myotis yumanensis*

Birds

Western burrowing owl	*Athene cunicularia hypugaea*
Ferruginous hawk	*Buteo regalis*
Greater sage-grouse	*Centrocercus urophasianus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*

Reptiles and Amphibians

Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Fish

Pacific lamprey	*Lampetra tridentata*

Invertebrates

Insects:

Lynn's clubtail dragonfly	*Gomphus lynnae*

Plants

Robinson's onion	*Allium robinsonii*
Laurence's milk-vetch	*Astragalus collinus var. laurentii*
Dwarf evening-primrose	*Camissonia pygmaea*
disappearing monkeyflower	*Mimulus evanescens*
Sessile mousetail	*Myosurus sessilis*

Last Updated April 4, 2009 (2:38:22 PM)
U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office
Page 1 of 2

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

DELISTED SPECIES

Birds

American Peregrine falcon	*Falco peregrinus anatum*
Bald eagle	*Haliaeetus leucocephalus*

Definitions:

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

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

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

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

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

Key:

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

Notes:

Marine & Anadromous Species: Please consult the National Marine Fisheries Service (NMFS) (http://www.nmfs.noaa.gov/pr/species/) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

Appendix B. Oregon Natural Heritage Information Center response letter

OREGON NATURAL HERITAGE INFORMATION CENTER

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

Wednesday, October 07, 2009

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

Dear Ms. Ruhlen:

Thank you for requesting information from the Oregon Natural Heritage Information Center (ORNHIC). We have conducted a data system search for rare, threatened and endangered plant and animal records for your Motague Wind Project at portions of Morrow and Gilliam Counties.

Forty (40) records total were noted within a five-mile radius of your project site and are included on the enclosed computer printouts.

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

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

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

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

Sincerely,

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

encl.: **invoice (H-100709-LAK1)**
computer printouts and data key

Appendix C. Special status/sensitive vertebrate wildlife species of known or potential occurrence within the Montague Wind Power Facility and surrounding area.

Common Name and Scientific Name	Federal Status	ODFW Status*	Occurrence Within or Near the Montague Facility area D = Documented N = Not Documented
Mammals			
Washington ground squirrel *Urocitellus washingtoni (*formerly *Spermophilus washingtoni)*	C Priority List 2	E	**D**—WGS, holes, and droppings were observed during March 2008 WGS surveys in several locations within the Montague Facility site boundary and in one location in 2006/2007 observed from a public road (not surveyed) (Table 15, Figure 5). ORNHIC records (7) of individuals and holes within the 5-mile database search area (ORNHIC, 2009). Active WGS colonies at Leaning Juniper IIA and IIB, and Pebble Springs Wind Projects (NWC, 2009; LJWP, 2006; PPM, 2006). Most sites at Leaning Juniper IIA and IIB were in Shrub-steppe (including Rabbitbrush-Snakeweed subtypes), and a couple of sightings were in Juniper Woodland and at the edge of a disturbed old field. The Montague site #12 (Figure 4) discovered by K. Kronner in 2006 and 2007 (pers. Field Notes) is in native Shrub-steppe/Grassland mosaic. Within the 2009 Montague site boundary, within Pebble Springs in 2006, one WGS hole was found in perennial grassland habitat (PPM, 2006) located within what is now the northern part of Montague site boundary near the proposed transmission line, but this location was checked and not found to be active in 2009 (Gritski et al., 2009b). The one active colony found at Pebble Springs was in CRP habitat adjacent to native habitat (not within the Montague site boundary; PPM, 2006; Gritski et al., 2009b). Five active sites were found in 2007 at and near Shepherds Flat Wind Farm (Caithness Shepherds Flat, 2007). Known to occur on nearby BLM-managed land (Kronner pers. field notes, 2001–2009).
white-tailed jackrabbit *Lepus townsendii*	–	SV	**D**—Documented within the site boundary during Montague special status wildlife surveys in 2008 in 3 locations (Figure 5). Two records within the 5-mile database search area (ORNHIC, 2009). Recorded at Leaning Juniper IIA (LJWP, 2006) and at LJIIB in two locations during ground transect surveys (NWC, 2009). Observed in the general area (Kronner et al., 2007a; Kronner et al., 2007b; PPM, 2006; Caithness Shepherds Flat, 2007. Known to occur on nearby BLM land (G. Wing Pers. Comm, 2009). Prefers open, bunchgrass steppe and frequents Conservation Reserve Program (CRP) grasslands.
Note for all bat species listed below: no bat surveys were conducted in the Montague area			
pallid bat *Antrozous pallidis*	SoC	SV	**N**—Roosts in rock crevices, tree hollows, mines, caves, buildings and forages in rocky deserts, grasslands; take large insects, often from the ground. Presence will depend on availability of deep rock crevices as other roost types are mostly lacking.
spotted bat *Euderma maculatum*	SoC	SV	**N**—Roosts in rock crevices in cliff faces. Nearest record is Cottonwood Creek at the John Day River. Forages in riparian areas, meadows, old agricultural fields, forest openings. This species has very patchy distribution; it is hard to capture and many “sightings” are based on its audible echolocation signal.

Common Name and Scientific Name	Federal Status	ODFW Status*	Occurrence Within or Near the Montague Facility area D = Documented N = Not Documented
Townsend's big-eared bat *Corynorhinus townsendii*	SoC	SC	**N**—Habitat is typically coniferous forests, desert scrub, pinyon-juniper, sometimes found in arid grassland and agricultural areas. Appropriate roost sites (mines, caves, building) are mostly lacking with the exception of farm buildings, suitability unknown. One record for Gilliam County (although not an easily detected species) (Kronner and Gritski, field notes 2006–2009). Closest known breeding population in Klickitat County, WA.
hoary bat *Lasiurus cinereus*	–	SV	**N**—Foraging habitat includes riparian areas, grasslands, shrub-steppe, forest edges and opening, urban areas. Roosts in coniferous and deciduous trees. Likely to occur during fall migration, based on fatality records at regional and nearby wind projects and this species was recorded during acoustical monitoring conducted at Blalock Canyon in early September 2005 and along Rock Creek in 2008 and 2009 (Kronner and Gritski, personal field notes).
silver-haired bat *Lasionycteris noctivagans*	SoC	SV	**N**—Area lacks tree roost sites. Likely to occur during fall migration based on fatality records at regional and nearby wind projects and pre-construction sampling conducted in July and September 2000 for the Condon Wind Project, Gilliam County, OR (Kronner and Gritski, field notes 2006–2009).
western small-footed myotis *Myotis ciliolabrum*	SoC	–	**N**—Roosts in rock crevices, caves, mines, talus slopes and buildings. Forages in desert, semi-arid shrubland, riparian areas, and coniferous forest habitat. Known to occur in Rock Creek area and along Willow Creek (Kronner and Gritski, field notes 2006–2009).
long-eared myotis Myotis evotis	SoC	–	**N**—More common in forests than arid grassland and shrub-steppe. Roosts in rock crevices, tree cavities, under loose bark, tree stumps, caves, mines, buildings.
fringed myotis *Myotis thysanodes*	SoC	SV	**D**—Most common roosts are in caves, mines, and snags; there are no records of this species for the Columbia Basin. Recorded during acoustical monitoring conducted along Rock Creek, near Olex, in August 2009 (Kronner and Gritski, field notes 2009).
long-legged myotis *Myotis volans*	SoC	SV	**N**—More common in forests than arid grassland and shrub-steppe. Roosts in tree cavities, under loose bark, rock crevices, and buildings.
yuma myotis *Myotis yumanensis*	SoC	–	**N**—Might roost in rock crevices or old abandoned buildings, but would most likely forage near or over the Columbia River. Documented August 25, 2005, through acoustical monitoring at the town of Arlington (Kronner and Gritski, personal field notes 2005).
Birds			
greater sandhill crane *Grus canadensis tabida*	–	SV	**N**—Not observed. May occur as migrant during migration seasons. Usually flies higher than rotor swept area during migration. Documented during Willow Creek Winds avian use study once during fall and once during winter (Kronner et al., 2007b) and two observations in spring season at Shepherds Flat (Caithness Shepherds Flat, 2007),

Common Name and Scientific Name	Federal Status	ODFW Status*	Occurrence Within or Near the Montague Facility area D = Documented N = Not Documented
long-billed curlew *Numenius americanus*	BoCC	SV	**D**—Numerous detections of this species during spring and summer season point counts at Montague Facility within five plots (A, B, C, J, K). Two ORNHIC records within the 5-mile search area (ORNHIC, 2009). Recorded at Leaning Juniper IIB during avian use surveys (at 6 plots) and Leaning Juniper IIA (NWC, 2009; LJWP, 2006), and some nesting documented. Two detections of this species within the Montague site boundary found during LJIIB ground transect surveys as well as 10 other detections at LJIIB during ground-based surveys near the Montague Facility (NWC, 2009). Also observed frequently elsewhere in the general vicinity (Kronner et al., 2007a and b; Kronner et al., 2008b, PPM, 2006; Caithness Shepherds Flat, 2007; Saddle Butte Wind, 2009). Most observations were on open low/shrub grassland gentle terrain. Nests in grassland flats and plateaus. Considered "Highly Imperiled" (U.S. and Canadian shorebird conservation plans) due to declines throughout its geographic range. The northeastern portion of the Montague Facility is adjacent to part of BLM's Horn Butte Area of Critical Environmental Concern (ACEC) established for nesting long-billed curlew. The Horn Butte Curlew ACEC is approx. 6,000 acres, contains curlew nests and nesting habitat (some of it is being restored or enhanced), and is located 5 miles east of Arlington (BLM, 2008; G. Wing Pers. Comm., 2009).
bald eagle *Haliaeetus leucocephalus*	NW EPA BoCC	T	**N**—May occasionally occur during winter months, but not documented during surveys. Wintering population in the Columbia Basin, primarily along watercourses. Known to hunt uplands for carrion and small mammals. Nearest known nest is ~22 miles from the Facility (C. Flick, Pers. Comm., 2009). One recorded in winter during avian use study at Rattlesnake Road Wind Power Facility and at Willow Creek Winds in winter (Kronner et al., 2007a and b). One observed in the northern portion of Shepherds Flat Wind Farm area during winter (Caithness Shepherds Flat, 2007).
golden eagle *Aquila chrysaetos*	EPA BoCC	–	**D**—One observed in winter in-transit to 2008-2009 avian use study plots (J and K), one observed in fall 2009 outside of 800m study plot GG, and one observed in-transit in fall 2009 at plot BB. Observed infrequently during avian use study of Leaning Juniper IIA, at Willow Creek Winds Project, and elsewhere in the general vicinity (Kronner et al., 2007a and b; PPM, 2006; LJWP, 2006). Two historic nests within 1.88 and 5 miles of the Facility site, and one located approximately 10 miles away (undisclosed location). The nest closest to the Facility was not active in 2009, but the nest site and general area will be checked in 2010 for raptor nesting.
American peregrine falcon *Falco peregrinus anatum*	NW BoCC	SV	**N**—Not observed within the site boundary during surveys or in the immediate area. Has been seen in Arlington area (Morgan, pers. comm., 2004). Basalt cliffs along Columbia River are potentially suitable for nesting but lesser quality than further west along the Columbia River. Historic nest sites are present within approximately 8 to 50 miles of the Facility (S/ Cherry Pers. Comm., 2007).

Common Name and Scientific Name	Federal Status	ODFW Status*	Occurrence Within or Near the Montague Facility area D = Documented N = Not Documented
ferruginous hawk *Buteo regalis*	SoC BoCC	SC FS	**D**—Nests within the site boundary and within 2-miles of the Facility (10 known active nests in 2009; Figure 4). One individual documented during winter season and 2 in summer season point counts at the Montague site. This species was detected within the site boundary in multiple locations during special status wildlife surveys in March 2008. Two documented during avian use surveys of LJIIB, one at plot D which overlaps with the western portion of the Montague site. Nests in and near the Leaning Juniper I and LJIIB project sites and general vicinity (Gritski et al., 2008; LJWP, 2009; Kronner et al., 2007a and b; Caithness Shepherds Flat, 2007). A total of 1–4 nests known to occur on nearby BLM land (G. Wing Pers. Comm., 2009). Nests in juniper trees. One ORNHIC record within 5 miles of the Facility (ORNHIC, 2009).
Swainson's hawk *Buteo swainsoni*	-	SV	**D**—Nests within the Montague Facility site boundary and within 2-miles of the Facility (18 known nests in 2009; Figure 4). This species was detected during Montague avian use surveys at all plots and all seasons, with greatest use in summer season (12 detections). Nests onsite the Leaning Juniper I and LJIIB project sites and in the general vicinity in junipers or isolated deciduous trees (Gritski et al., 2008; LJWP, 2006; NWC, 2009; Kronner et al., 2007a and b ; Kronner et al., 2008b; PPM, 2006; Caithness Shepherds Flat, 2007; Saddle Butte Wind, 2009). Known to occur on nearby BLM land (G. Wing Pers. Comm, 2009). One ORNHIC records within 5 miles of the Facility (ORNHIC, 2009).
western burrowing owl *Athene cunicularia*	SoC	SC	**D**—Not confirmed within Montague survey corridors to date, but nesting confirmed in one location at Leaning Juniper IIB during spring 2009 and one confirmed nest observed nearby the Leaning Juniper I Project in 2005 (one also observed in fall at this site (NWC, 2009; LJWP, 2006). Nesting and observations in the general vicinity (Kronner et al., 2007a and b; PPM, 2006; Caithness Shepherds Flat, 2007). Known to occur on nearby BLM land (G. Wing Pers. Comm, 2009). One ORNHIC record of nesting within 5 miles of the Facility (ORNHIC, 2009).
loggerhead shrike *Lanius ludovicianus*	BoCC	SV	**D**—One detection of this species at Montague Facility during spring avian use surveys, observed in-transit to avian use surveys (2 detections in spring, 1 in winter), and documented during 2008 special status wildlife surveys in two locations in March within the site boundary. Individuals and nests were found at Leaning Juniper IIA and IIB and the general vicinity in areas with mature sagebrush cover or in juniper woodlands or isolated juniper trees (NWC, 2009; LJWP, 2006; Kronner et al., 2007a and b; Kronner et al., 2008b; PPM, 2006; Caithness Shepherds Flat, 2007; Saddle Butte Wind, 2009); 3 of the LJIIB detections during ground transect surveys are within what is now also the Montague site boundary. Known to occur on nearby BLM land (G. Wing Pers. Comm, 2009). Not typically found in the Columbia Basin in winter. Observed along Hwy. 19 ~8.5 miles south of Arlington in December 1999 and 2009 (Kronner, personal field notes).
sage sparrow *Amphispiza belli*	BoCC	SC FS	**D**—Documented during special status wildlife surveys in March 2008 in one location. Needs extensive sagebrush shrub habitat to support breeding populations. Known to nest in the general area in larger patches of sagebrush and are seen occasionally in smaller patches during migration (Kronner 2001 and 2009). Breeds at Boardman Conservation Area to the east of the Facility. Observed (1) in northern portion of Shepherds Flat Project in Eightmile Canyon in June (Caithness Shepherds Flat, 2007).

Common Name and Scientific Name	Federal Status	ODFW Status*	Occurrence Within or Near the Montague Facility area D = Documented N = Not Documented
grasshopper sparrow *Ammodramus savannarum*	–	SV FS	**D**—Two detections of this species during summer avian use surveys for the Montague Facility. One detection within the Montague site boundary observed during LJIIB ground transect surveys, along with multiple detections at LJIIB near the Montague Facility (NWC, 2009). Observed during spring and summer point count surveys at LJIIB, plot L, which intersects with the Montague site boundary. Observed within the LJIIA area during the nesting season and in the general vicinity (Caithness Shepherds Flat, 2007; LJWP, 2006; Kronner et al., 2007a and b; Kronner et al., 2008b; PPM, 2006). One ORNHIC record within 5 miles of the Facility (ORNHIC, 2009). Known to occur on nearby BLM land (G. Wing Pers. Comm, 2009).Requires sufficient grassland with good vertical structure for nesting cover and perching.
Lewis's woodpecker *Melanerpes lewis*	SoC BoCC	SC	**N**—May fly through during migration. Two detections of this species at the Shepherds Flat Wind Farm in May (Caithness Shepherds Flat, 2007).
willow flycatcher *Empidonax traillii brewsteri*	SoC BoCC	SV	**N**—May fly through during migration. Observed during surveys for Shepherds Flat Wind Farm (Caithness Shepherds Flat, 2007). Utilizes riparian habitat.
yellow-breasted chat *Iceria virens*	Soc	SC	**N**—Observed along Rock Creek near Olex (Kronner and Gritski field notes, 2009) in riparian habitat. May fly through the Montague Facility during local dispersal and migration, the Facility (Eightmile drainage) lacks perennial streams and riparian shrub cover sufficient to support this species breeding.
Reptiles and Amphibians			
northern sagebrush lizard *Sceloparus graciosus graciosus*	SoC	SV	**D**—Documented within the Montague site boundary during 2009 surveys for LJIIB in 4 locations in juniper woodland habitat (Figure 5). Suitable habitat where there is less dense grass cover; also found in sandy soils with sagebrush and juniper or sagebrush. Observed within LJIIA site and in the general vicinity (LJWP, 2006; PPM, 2006). Documented at LJIIB during spring 2009 special status wildlife surveys
western toad *Bufo boreus*	–	SV	**N**—One ORNHIC record with 5 miles of the Facility (ORNHIC, 2009). No aquatic habitat, very limited potential for upland movements during wet periods. Known to occur along perennial streams such as Rock Creek, (Kronner and Gritski, field notes 2006–2009).

Status Key:

Federal: T Threatened; E Endangered; C Candidate; SoC Species of Concern; NW Not Warranted; delisted

EPA Eagle Protection Act (16 U.S.C. 668-668d, June 8, 1940, as amended 1959, 1962, 1972, 1978)

BoCC USFWS Birds of Conservation Concern (Table 7 BCR 9, Great Basin Region).

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

Oregon:

T Threatened E Endangered

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

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

FS Focal Species highlighted in the Draft John Day Subbasin Plan (CBMRCD/NWPPC, 2004)

Sources for status = CBMRCD/NWPPC, 2004; ODFW, 2008; ORNHIC, 2009, USFWS, 2008a; USFWS, 2009

Appendix D. Comprehensive species list from avian use surveys conducted at five plots September 4, 2008 through August 7, 2009, and at six plots from in fall season 2009 from September 19–October 30, 2009 at Montague Wind Power Facility (includes incidental and in-transit sightings).

COMMON NAME (listed alphabetically)	**SCIENTIFIC NAME**
Birds	
American crow	*Corvus brachyrhunchos*
American kestrel	*Falco sparverius*
American pipit	*Anthus spinoletta*
American robin	*Turdus migratorius*
barn swallow	*Hirundo rustica*
black-billed magpie	*Pica hudsonia*
Brewer's blackbird	*Euphagus cyanocephalus*
Canada goose	*Branta canadensis*
common raven	*Corvus corax*
Cooper's hawk	*Accipiter cooperii*
dark-eyed junco	*Junco hyemalis*
European starling	*Sturnus vulgaris*
ferruginous hawk	*Buteo regalis*
golden eagle	*Aquila chrysaetos*
grasshopper sparrow	*Ammodramus savannarum*
gray partridge	*Perdix perdix*
great blue heron	*Ardea herodias*
great horned owl	*Bubo virginiaus*
house finch	*Carpodacus mexicanus*
horned lark	*Eremophila alpestris*
lark sparrow	*Chondestes grammacus*
loggerhead shrike	*Lanius ludovicianus*
long-billed curlew	*Numenius americanus*
mountain bluebird	*Sialia currucoides*
mourning dove	*Zenaida macroura*
northern harrier	*Circus cyaneus*
prairie falcon	*Falco mexicanus*
red-tailed hawk	*Buteo lineatus*
red-winged blackbird	*Agelaius phoeniceus*
rough-legged hawk	*Buteo lagopus*
savannah sparrow	*Passerculus sandwichensis*
Swainson's hawk	*Buteo swainsoni*
Townsend's solitaire	*Myadestes townsendi*
turkey vulture	*Cathartes aura*
unidentified blackbird	
unidentified buteo	
unidentified falcon	
unidentified finch	
unidentified passerine	
unidentified sparrow	
vesper sparrow	*Pooecetes gramineus*

COMMON NAME (listed alphabetically)	SCIENTIFIC NAME
western kingbird	*Tyrannus verticalis*
western meadowlark	*Sturnella neglecta*
white-crowned sparrow	*Zonotrichia leucophrys*
yellow-rumped warbler	*Dendroica coronata*
Mammals	
black-tailed jackrabbit	*Lepus californicus*
coyote	*Cannis latrans*
mule deer	*Odocoileus hemionus*
pronghorn antelope	*Antilocapra Americana*

Note: Includes all species at all distances, includes birds observed but unidentifiable due to various reasons.

Appendix E. Comprehensive species list from special status vertebrate wildlife surveys at the Montague Wind Power Facility, March 3–March 13, 2008.

COMMON NAME (listed alphabetically)	SCIENTIFIC NAME
Birds	
American robin	*Turdus migratorius*
black-billed magpie	*Pica hudsonia*
California quail	*Callipepla californica*
chukar	*Alectoris chukar*
common raven	*Corvus corax*
dark-eyed junco	*Junco hyemalis*
European starling	*Sturnus vulgaris*
ferruginous hawk	*Buteo regalis*
house finch	*Carpodacus mexicanus*
house sparrow	*Passer domesticus*
horned lark	*Eremophila alpestris*
killdeer	*Charadrius vociferus*
loggerhead shrike	*Lanius ludovicianus*
long-billed curlew	*Numenius americanus*
long-eared owl	*Lanius ludovicianus*
mountain bluebird	*Sialia currucoides*
northern flicker	*Colaptes auratus*
northern harrier	*Circus cyaneus*
northern shrike	*Lanius excubitor*
red-tailed hawk	*Buteo lineatus*
ring-necked pheasant	*Phasianus colchicus*
rough-legged hawk	*Buteo lagopus*
sage sparrow	*Amphispiza belli*
savannah sparrow	*Passerculus sandwichensis*
Say's phoebe	*Sayornis saya*
sharp-shinned hawk	*Accipiter striatus*
unidentified blackbird	
western meadowlark	*Sturnella neglecta*

Appendix F. Memorandum from NWC to IBR documenting correspondence with Oregon Department of Fish and Wildlife regarding the Montague Wind Power Facility.

Northwest Wildlife Consultants, Inc.

MEMORANDUM

Date: November 19, 2009

To: Sara Parsons, Iberdrola Renewables

From: Karen Kronner, Senior Wildlife biologist

Subject: Montague Project: Record of Fall 2009 Correspondence with ODFW Biologist Steve Cherry

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During Fall 2009 I discussed the Montague Wind Project with ODFW District Biologist Steve Cherry on two occasions: once by phone and once onsite (site tour). The objectives were to brief him on the project, its location and extent, permitting timeline, biological study protocols and to document his approval of the ongoing and planned study protocols as well as any subject of concern he had.

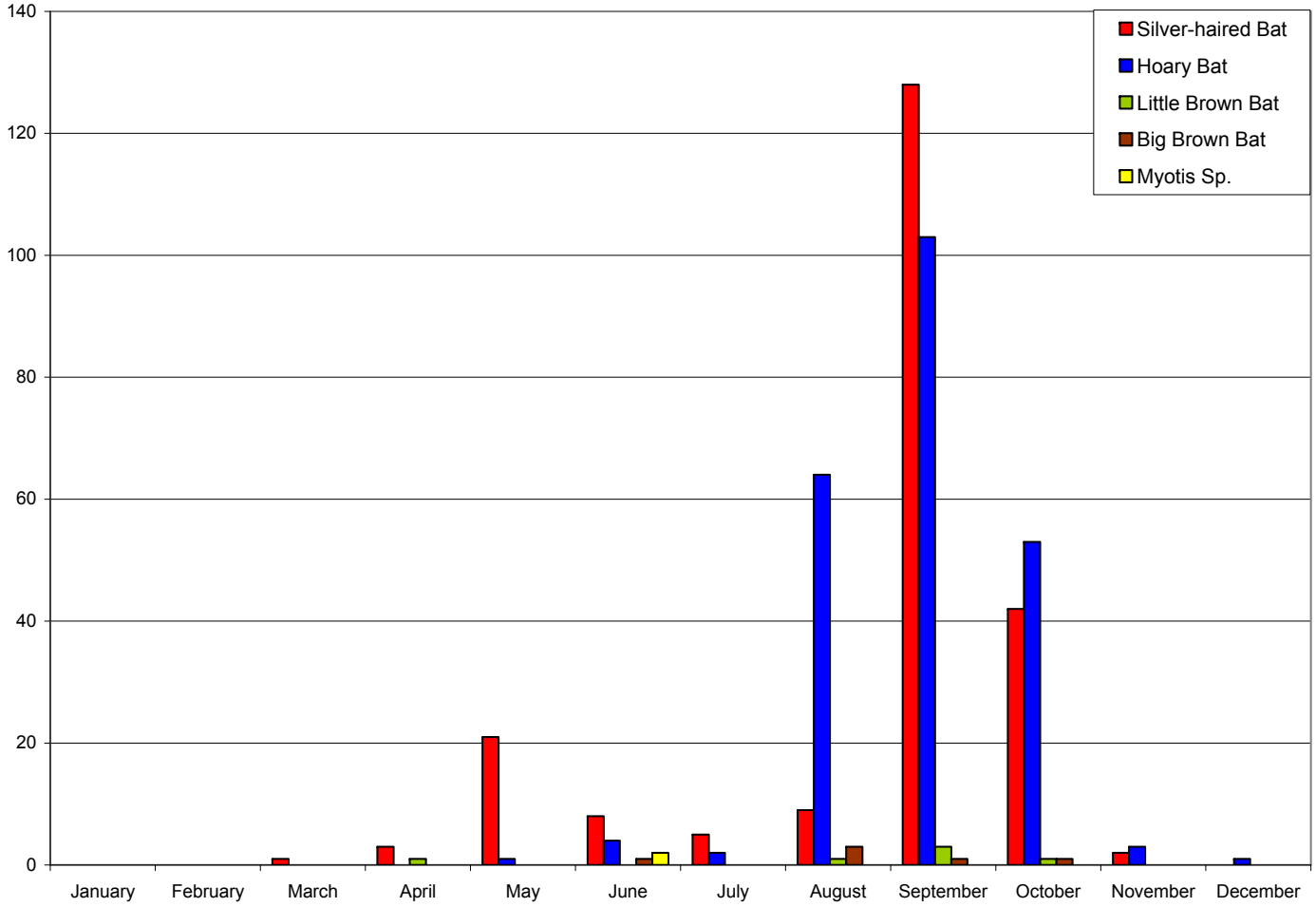
On October 15 I briefed Steve about the project. I reviewed the standard study protocols to be implemented, including habitat mapping/rating, multi-species wildlife/Washington ground squirrel surveys to be conducted in 2010 and raptor nest survey protocols. For the raptor nest survey protocols, I discussed two items with him: 1) multiple prior years of nest survey data and areas where 2010 Montague nest surveys may not be needed and 2) locations where the Montague planned 2010 aerial nest survey areas overlap with aerial nest surveys for the Saddle Butte Wind Project or another project's possible survey buffer.

Steve said he commented through the Saddle Butte NOI process that the ODFW wants a 2-mi. buffer surveyed for raptor nests. He did not specify whether aerial or ground surveys should be implemented. Steve does not know if Saddle Butte surveys will occur in 2010. He did say that he doesn't expect that each developer would fly the same nest twice in the overlapping 2-mi area but would leave that up to the two (or three?) parties to discuss or each can survey on their own.

We discussed the possibility of a one-mile survey area because the area has been well-studied. ODFW's position for pre-construction surveys is still a 2-mile nest survey buffer until they learn more about wind project impacts on nesting raptors. We discussed all the local wind projects' prior year's surveys dating back to 2003 and all their overlapping survey buffers. We discussed what could be eliminated from the Montague 2010 2-mile buffer. He said 2009 surveyed areas could be eliminated but that he would like the known (historic) ferruginous and Swainson's hawk nests inside Montague's 2-mile aerial survey area checked for status.

On November 3 Bob Gritski of NWC and I provided Steve a general overview site tour of the project. He was pleased that there were extensive agriculture fields in the project area. He commented that he would like Iberdrola to avoid sagebrush shrub-steppe and juniper habitats, if at all possible. He had no particular issues to discuss. *End*.

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



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

10.0 FIGURES

The following figures are confidential and not for public distribution:

Figure 4. Raptor and Other Large Bird Nests for Montague Wind Power Facility and 2-mile Survey Area
Figure 5. Montague Wind Power Facility Washington Ground Squirrel and Other Special Status Wildlife Locations

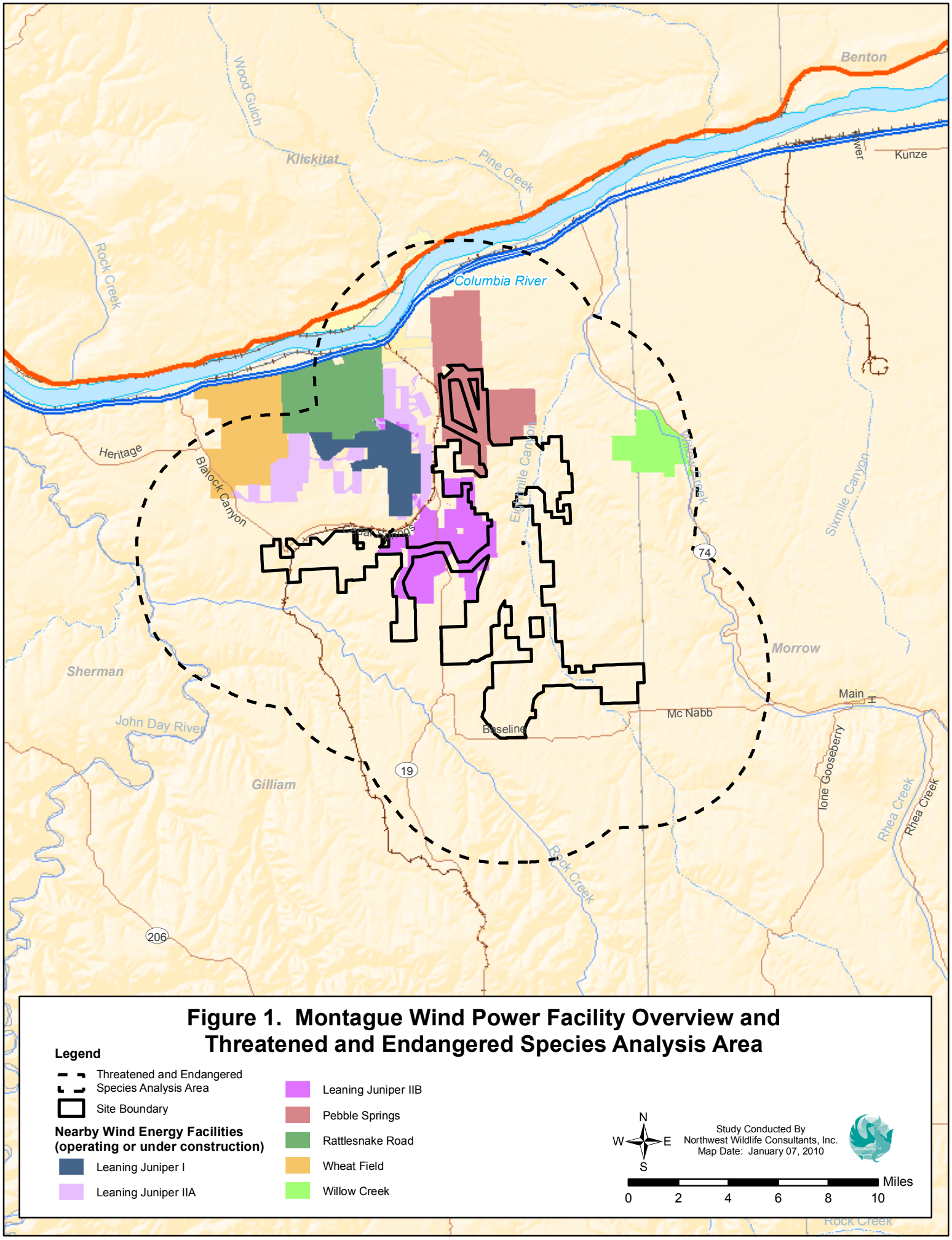


Figure 1. Montague Wind Power Facility Overview and Threatened and Endangered Species Analysis Area

Legend

- Threatened and Endangered Species Analysis Area
- Site Boundary

Nearby Wind Energy Facilities (operating or under construction)

- Leaning Juniper I
- Leaning Juniper IIA
- Leaning Juniper IIB
- Pebble Springs
- Rattlesnake Road
- Wheat Field
- Willow Creek

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: January 07, 2010

0 2 4 6 8 10 Miles

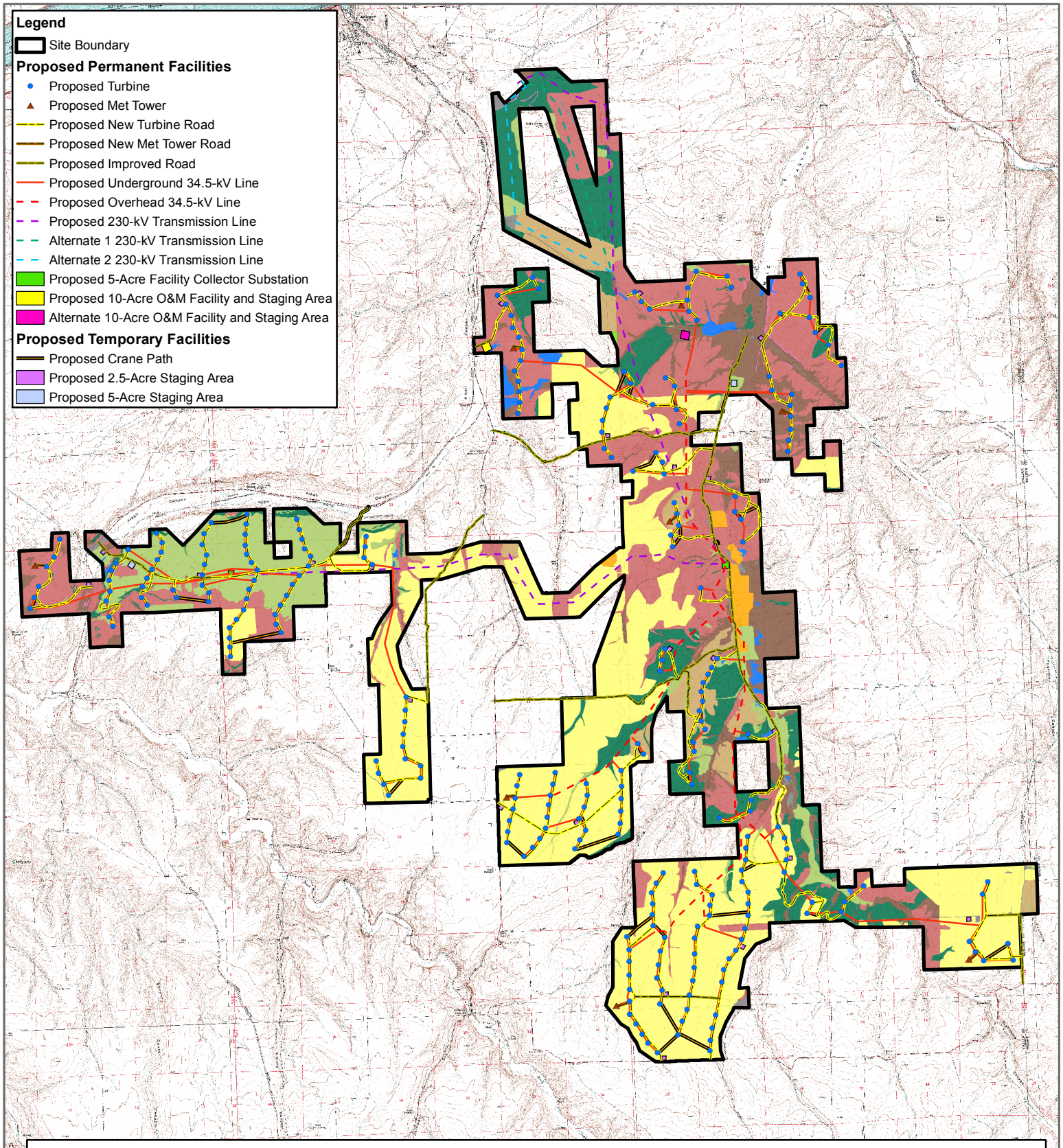

Figure 2a. Montague Wind Power Facility Habitat Types

Legend

Habitat Codes and Types

- (DC) Developed-CRP or Other Planted Grassland
- (DW) Developed-Dryland Wheat
- (DI) Developed-Irrigated Agriculture
- (DB) Developed-Old Field
- (DX) Developed-Other
- (ESC) Escarpment
- (GA) Exotic Annual Grassland
- (WJ) Juniper Woodland
- (GB) Native Perennial Grassland
- (SSB) Rabbitbrush/Snakeweed Shrub-steppe
- (WR) Riparian Woodland
- (SSA) Sagebrush Shrub-steppe

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Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: January 05, 2010

0 1 2 3 4 5 Miles

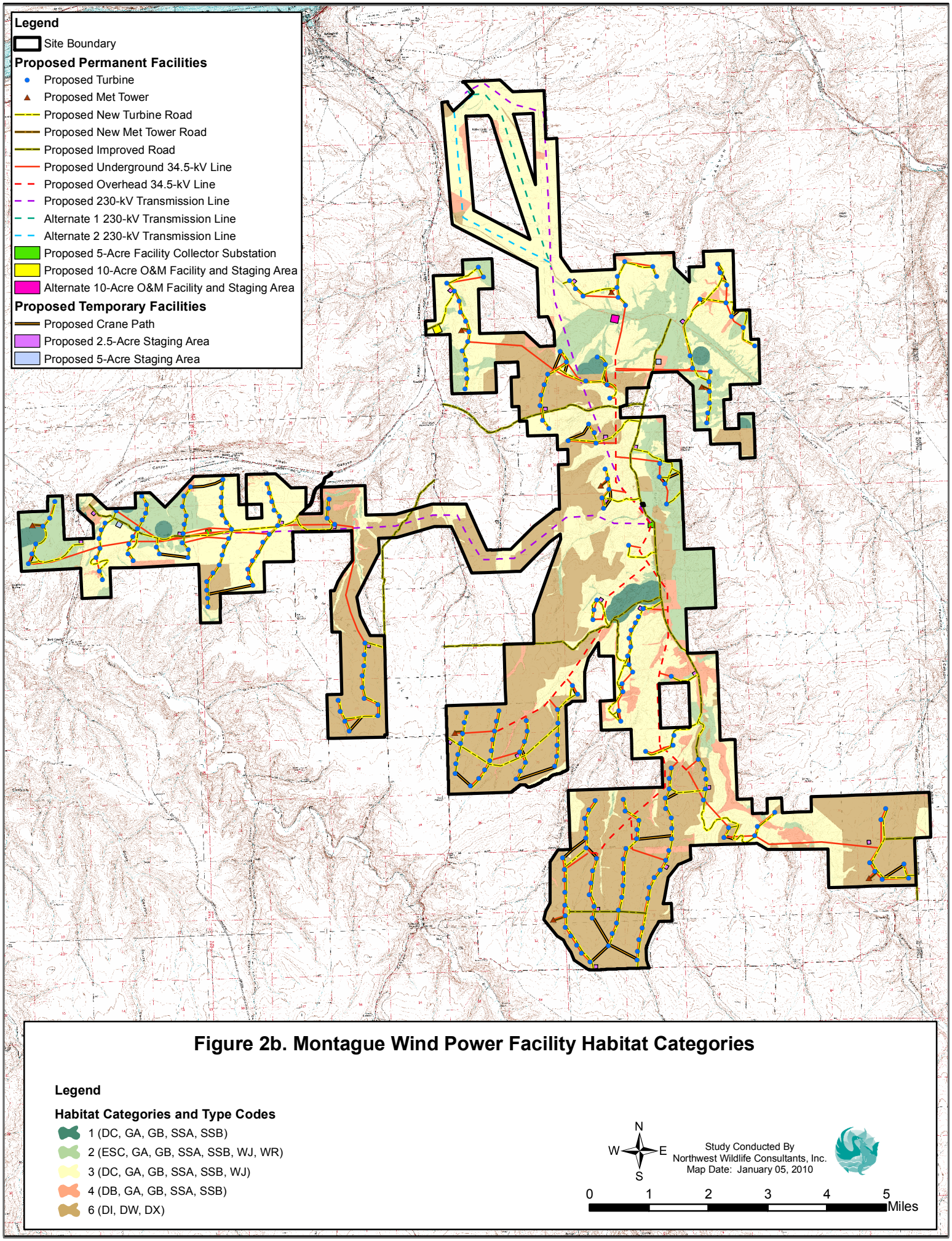

Figure 2b. Montague Wind Power Facility Habitat Categories

Legend

Habitat Categories and Type Codes

- 1 (DC, GA, GB, SSA, SSB)
- 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- 3 (DC, GA, GB, SSA, SSB, WJ)
- 4 (DB, GA, GB, SSA, SSB)
- 6 (DI, DW, DX)

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Study Conducted By
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Map Date: January 05, 2010

0 1 2 3 4 5 Miles

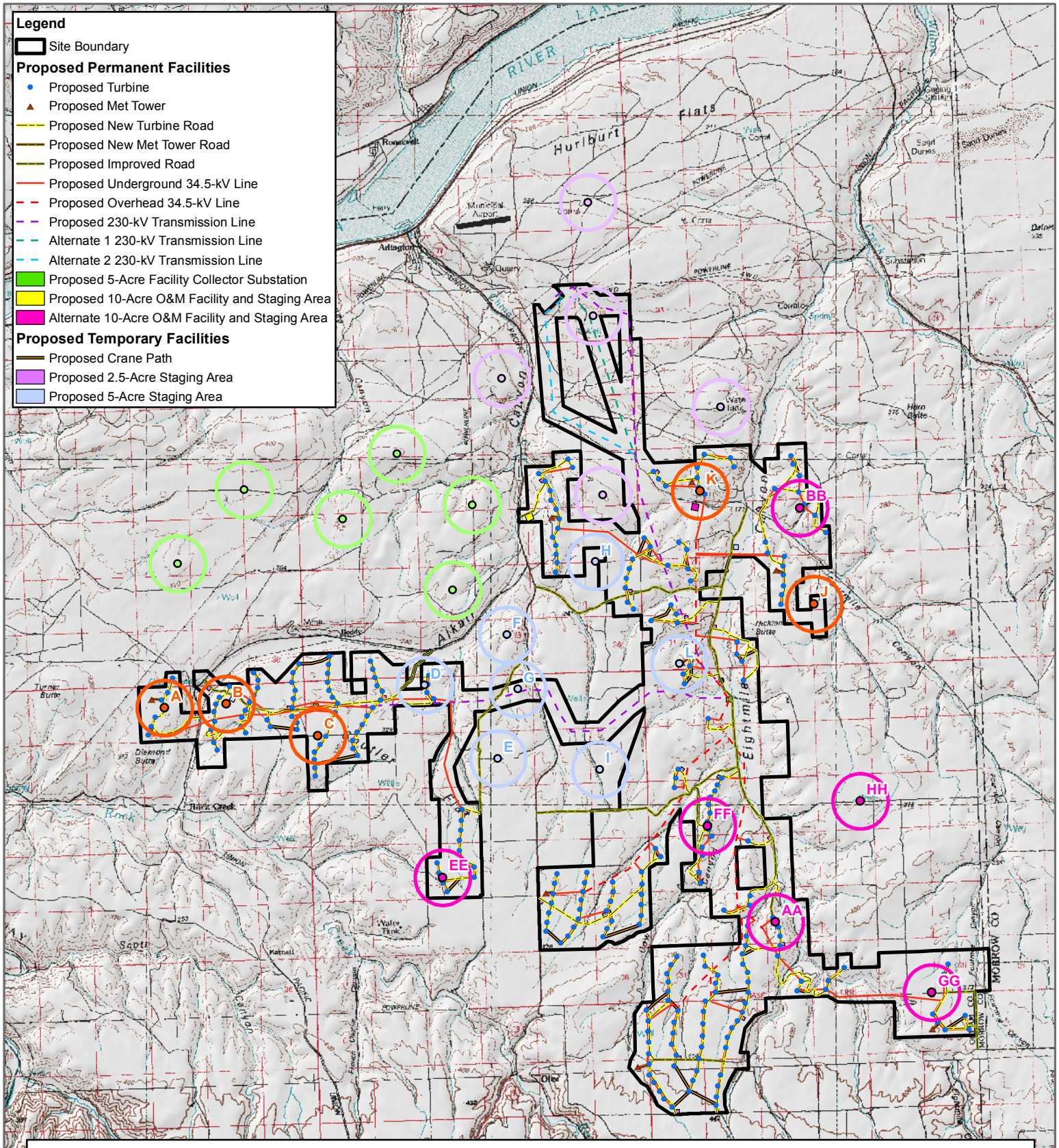

Figure 3. Montague Wind Power Facility Avian Use Study Overview

Legend

- Montague 2009-2010 Avian Use Study Plot Center
- Montague 2009-2010 Avian Use Study Plot Perimeter - 800-meter buffer
- Montague 2008-2009 Avian Use Study Plot Center
- Montague 2008-2009 Avian Use Study Plot Perimeter - 800-meter buffer
- Leaning Juniper IIB 2008-2009 Avian Use Study Plot Center
- Leaning Juniper IIB 2008-2009 Avian Use Study Plot Perimeter - 800-meter buffer
- Leaning Juniper IIA 2004-2005 Avian Use Study Plot Center
- Leaning Juniper IIA 2004-2005 Avian Use Study Plot Perimeter - 800-meter buffer
- Pebble Springs 2006 Avian Use Study Plot Center
- Pebble Springs 2006 Avian Use Study Plot Perimeter - 800-meter buffer

N W E S

Study Conducted By
Northwest Wildlife Consultants, Inc.
Map Date: January 05, 2010

0 1 2 3 4 5 Miles

FINAL REPORT

AVIAN AND BAT CUMULATIVE IMPACTS ASSOCIATED WITH WIND ENERGY DEVELOPMENT IN THE COLUMBIA PLATEAU ECOREGION OF EASTERN WASHINGTON AND OREGON

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October 30, 2008

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INTRODUCTION AND BACKGROUND

Over the last decade, there has been a surge of interest in wind energy development in Oregon and Washington within the Columbia Plateau physiographic region (ecoregion). A central issue for wind power development is the potential for direct impacts to birds and bats through collision mortality and for indirect effects through habitat fragmentation or displacement of birds and other wildlife. Proposals for wind energy developments are commonly reviewed by natural resource agencies, private conservation groups, permitting authorities and other stakeholders. Frequently, baseline studies are conducted to estimate bird and bat abundance at proposed development sites for use in impact assessments and siting project features, followed by post-construction monitoring studies to measure actual impacts from the wind-energy facility. As more wind energy developments are constructed within the Columbia Plateau Ecoregion, cumulative impacts from multiple wind-energy facilities have become a concern.

With the possible exception of golden eagles (*Aquila chrysaetos*) at the Altamont Pass wind-energy facility, California, where an estimated 40–70 golden eagles are killed each year (Hunt 2002, Smallwood and Thelander 2004), no wind-energy facilities have been documented to cause population declines of any species. The purpose of this report is to estimate cumulative impacts associated with all existing, permitted, and currently proposed wind-energy facilities within the Columbia Plateau Ecoregion (CPE) of eastern Washington and Oregon. For the purpose of this analysis, we assumed that for cumulative impacts to occur, there must be a potential for a long-term reduction in the size of a population of birds or bats. When assessing the potential for cumulative impacts, it is necessary to first define the population potentially affected by wind energy development. Because birds and other animals do not recognize geopolitical boundaries, we have defined the affected population as those birds and bats of each species that breed, winter, or migrate through the CPE.

ANALYSIS AREA AND WIND ENERGY PROJECTS

As of mid–2008, 17 wind-energy facilities totaling 2464 MW were in operation in the CPE (Table 1), and an additional 30 wind-energy facilities are currently planned or being constructed within the CPE (Table 1). There are currently approximately 6665 MW of existing or proposed wind-energy facilities in the CPE. For the purpose of this analysis, we assumed that 6700 MW of wind power would be present in the CPE. However, past experience indicates that not all permitted projects are built, so these figures likely overestimate what will actually be constructed.

Most wind energy 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, land enrolled in the Conservation Reserve Program (CRP), and rangeland (Figure 2). Precipitation through the region is 6 to 12 inches (about 15-30 centimeters) per year (Thorson et al. 2003). Surrounding

ecoregions are more mountainous, receive more precipitation, and are more forested than the Columbia Plateau.

METHODS

This report provides a broad, qualitative analysis using existing public information about existing and proposed wind-energy facilities in the region, estimated population sizes of birds in the CPE, results of fatality monitoring studies, and published literature to compile a cumulative impact analysis for bird and bat resources. The analysis relies heavily on existing information from studies in the CPE. Information about wind project proposals was gathered from a variety of sources such as federal and state agencies (e.g., Bonneville Power Administration (BPA), Oregon Energy Facility Siting Council (EFSC)), permitting agencies (e.g., Klickitat County, WA), non-profit renewable energy advocates (e.g. Renewable Northwest Project), wind energy developers, and other public sources such as internet resources. Basic information such as the proposed capacity and location of each wind-energy facility identified was gathered and summarized to the extent possible.

The general approach to the cumulative effects analysis was to summarize results of fatality monitoring studies at operational wind-energy facilities within the CPE, and then use those results to estimate impacts for all constructed and proposed wind-energy facilities within the same ecoregion. Habitat and land use throughout the entire CPE are similar.

This cumulative effects analysis relies heavily on data from 11 wind-energy facilities in the CPE where monitoring for fatalities has occurred. Most of the operating facilities have had or will have some sort of bird or casualty monitoring associated with them, and post-construction fatality monitoring data are available from 11 operational wind energy facilities in the CPE (Table 2). 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-energy facilities are being planned is similar in vegetation types (Quigley and Arbelbeide 1997), although, for any given facility, the amount of each type varies. It is assumed for the analysis that results from the existing studies would be applicable to new proposed facilities.

With the exception of the Condon, Oregon, wind-energy facility, where no scavenging or searcher efficiency trials were conducted to estimate total mortality, 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 bird and bat communities are similar across all wind-energy facilities because of habitat and land use similarities throughout the ecoregion, and thus are applicable to proposed facilities in this same ecoregion. Details about results, methods, and estimates of potential bird and bat impacts from each individual wind-energy facility are available in the referenced facility reports.

To define population sizes of those species most likely to be affected by wind energy development in the CPE, we used data from a recent publication that estimates breeding size of bird species by Bird Conservation Region, and then by that portion of each state within the Bird Conservation Region (see Blancher et al. 2007). Those portions of Washington and Oregon within the Great Basin Bird Conservation Region (see US NABCI Committee (2000) for a description) essentially comprise the same area that we have defined as the CPE.

Raptors

Pre–construction raptor use estimates and post-construction raptor fatality estimates are available for 11 facilities in eastern Washington and Oregon. Based on available data, it is likely that raptor mortality throughout the CPE would be on the same order of magnitude as other wind-energy facilities in the western US outside California. Raptor use (raptors/survey) at wind resource areas (WRAs) in the CPE ranges from 0.26 to 1.64, and averages 0.68 observations per 20-min survey (Table 3). This use is substantially lower than that at Altamont Pass and High Winds, two facilities in California that have had relatively high levels of raptor mortality. Similar levels of raptor mortality in the CPE would not be expected. To predict raptor mortality for all existing and proposed wind-energy facilities in the CPE, we assumed it would be similar to the other existing wind-energy facilities in the CPE. Mean annual raptor mortality (fatalities/MW/year) at the 11 existing wind-energy facilities in eastern Washington and Oregon ranges from 0 to 0.15/MW/year, with a mean of 0.07/MW/year. Because the 1.5–3.0 MW turbines constructed or proposed for most new-generation wind-energy facilities are larger than turbines used at most of the existing wind-energy facilities, it is likely not appropriate to predict raptor mortality in the CPE using per turbine estimates from the other wind-energy facilities, as several of the existing facilities used smaller turbines, ranging from 0.66 – 1.5 MW in size. Therefore, we used per megawatt estimates of raptor mortality for extrapolating the estimated numbers of raptor fatalities in the CPE. We used a range of 0.07 (mean) to 0.15 (maximum) raptor fatalities/MW/year for estimating raptor mortality at each of the CPE wind energy facilities. To estimate cumulative mortality of individual species, we assumed that species composition of bird and bat fatalities associated with 6700 MW of wind energy would be similar to species composition of fatalities found at the 11 existing facilities in the CPE. For example, American kestrels (*Falco sparverius*) composed 38.6% of the raptor fatalities found at existing wind-energy facilities. To estimate the total number of American kestrel fatalities associated with 6700 MW of wind energy development, we assumed that they would also compose 38.6% of the total cumulative number of raptor fatalities per year.

All Birds

Compared with raptors, there is little correlation between total numbers of birds (all species) observed during pre-construction surveys (most of which are song birds) and post-construction mortality, presumably because many of the collision fatalities are nocturnal migrants, which are not accounted for during diurnal surveys. In addition, the survey methods for quantifying use are more relevant for large birds than for small birds. Total bird use at 24 wind-energy facilities in the CPE has ranged from 5–23.6 birds/survey and averaged 13.4 birds/survey (Table 3). Total bird use at the 11 wind-energy facilities in eastern Washington and Oregon with post-construction fatality data ranged from 5.0 birds/survey at Wild Horse to 23.6 birds/survey at Leaning Juniper, and averaged 12.4 birds/survey (Table 2). Because total bird use at proposed

wind-energy facilities with pre-construction bird use data is within the range of similar bird use values for existing wind-energy facilities in the CPE, it is reasonable to assume that mortality of all birds combined at CPE wind-energy facilities would be similar to that observed at the 11 existing wind-energy facilities in the CPE. Therefore, we multiplied the total number of MW by 2.1 fatalities/MW/year (the mean among the 11 CPE wind-energy facilities) to estimate total bird mortality. Based on the range of fatality rates at existing wind energy projects in Washington and Oregon (0.9–3.2 fatalities/MW/year), we multiplied the total number of MW by 0.9 fatalities/MW/year to get a more conservative estimate, and by 3.2 fatalities/MW/year to get a more liberal estimate of total bird mortality. To estimate total cumulative mortality by bird type and/or species, we assumed the fatalities associated with 6700 MW of wind energy would have the same group and species composition as fatalities found at existing wind-energy facilities in the CPE.

Bats

To estimate cumulative bat mortality for all projects in the CPE, we assumed that bat mortality would be similar to the existing wind-energy facilities located in the CPE. Therefore, we multiplied the total number of MW by the mean number of bat fatalities/MW/year at the other CPE Projects (1.18/MW/year). Based on the range of fatality rates at existing wind energy projects in Washington and Oregon (0.39–2.46 fatalities/MW/year), we multiplied the number of MW by 0.39 fatalities/MW/year to get a more conservative estimate, and by 2.46 fatalities/MW/year to get a more liberal estimate of cumulative bat mortality. We estimated the total number of fatalities by species assuming species composition would be similar to the species composition of bat fatalities found at existing wind-energy facilities in the CPE.

RESULTS

Existing Data for CPE Projects

Raptors

Pre–construction raptor use estimates and post-construction raptor fatality estimates are available for 11 wind-energy facilities in eastern Washington and Oregon. Pre-construction raptor use estimates at these wind-energy facilities have ranged from 0.26 raptors/survey at Nine Canyon, to 0.90 raptors/survey at Bighorn I, and averaged 0.50/survey (Table 2). Raptor mortality was not documented at three of these wind-energy facilities (Klondike I, Vansycle and Combine Hills) during one-year post-construction mortality surveys, and was relatively low at the other eight, ranging from 0.05/MW/year at Nine Canyon, Washington to 0.15/MW/year at Bighorn I, Washington. Quantitative mortality estimates were not made for Condon, but only one raptor fatality was documented at that facility.

The 57 raptor fatalities found at CPE wind-energy facilities have composed 8.6% of the total bird mortality. Most of the raptor fatalities have been American kestrels (22 fatalities; 38.6%), red-tailed hawks (*Buteo jamaicensis*; 14 fatalities; 24.6%) and short-eared owls (*Asio flammeus*; 7 fatalities; 12.3%). Other raptors found as fatalities at CPE wind-energy facilities include four ferruginous hawks (*Buteo regalis*), three Swainson's hawks (*Buteo swainsonii*) and one each of

the following: rough-legged hawk (*Buteo lagopus*), Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), barn owl (*Tyto alba*) and unidentified accipiter (Table 4).

All Birds

Seventy-seven species have occurred as fatalities at existing wind energy facilities in the CPE. Passerines (songbirds) have been the most abundant bird fatality at wind-energy facilities outside California, often comprising more than 80% of total bird fatalities (Erickson et al. 2001a). Passerines are also the most commonly observed birds during pre-construction fixed-point bird use surveys at all of these sites. Both migrant and resident passerine fatalities have been observed. Songbird mortality at wind-energy facilities in eastern Oregon and Washington has been reasonably consistent among sites. Songbirds have composed 69.5% of the bird mortality at CPE wind-energy facilities. Horned larks (*Eremophila alpestris*) have been the most commonly observed songbird fatality in the CPE, composing 31.1% of all bird fatalities (Table 4), and have been the most abundant songbird observed during pre-construction fixed point bird use surveys at these sites. Based on long term Breeding Bird Survey (BBS) data, horned larks are likely one of the most common birds in the Columbia Plateau. No other resident songbird species comprised a large proportion of the fatalities observed at the wind-energy facilities in the CPE (Table 4). The one apparent migrant with the highest number of fatalities is the golden-crowned kinglet (*Regulus satrapa*; 43 fatalities; 6.5% of all fatalities).

Mourning doves (*Zenaida macroura*) and rock pigeons (*Columba livia*) have composed 3.2% of the mortality at CPE wind-energy facilities. Waterfowl, waterbirds and shorebirds have composed only 1.7% of the fatalities, and include four Canada geese (*Branta canadensis*), two mallards (*Anas platyrhynchos*), and one each of the following species: great blue heron (*Ardea herodias*), American coot (*Fulica americana*), bufflehead (*Bucephala albeola*), killdeer (*Charadrius vociferous*), and western grebe (*Aechmophorus occidentalis*). Mortality compared to use by these groups is very low. For example, only two Canada goose fatalities were documented at the Klondike, Oregon wind-energy facility (Johnson et al. 2003a), even though 43 flocks totaling 4845 individual Canada geese were observed during pre-construction fixed-point bird use surveys (Johnson et al. 2002a). Shorebird use of wind-energy facilities in the CPE has been low, with the most common species being killdeer. Shorebirds as a group are rarely killed at wind-energy facilities; of 1036 avian fatalities collected at US wind-energy facilities and summarized in Erickson et al. (2001), only one was a shorebird (a killdeer found at Buffalo Ridge wind-energy facility, Minnesota). Low shorebird mortality has occurred even though shorebirds have been recorded at virtually every wind-energy facility evaluated. Some waterfowl, shorebird and other waterbird mortality will occur at CPE wind-energy facilities, but based on all available data from other facilities, the numbers are expected to be low relative to the use of each area. Upland gamebirds documented during surveys of CPE wind-energy facilities include ring-necked pheasant (*Phasianus colchicus*), gray partridge (*Perdix perdix*), chukar (*Alectoris chukar*), and California quail (*Callipepla californica*). Some upland gamebird mortality has been documented at many wind-energy facilities (Erickson et al. 2001a; Erickson et al. 2002). In the CPE, upland gamebirds are one of the most common fatalities, composing 14.5% of all identified fatalities (Table 5). Based on habitat present, results from other regional wind-energy facilities, and the presence of upland gamebirds during baseline surveys, some mortality of upland gamebirds is expected to occur at nearly all wind-energy facilities in the CPE.

Bats

Bat mortality estimates have been made for 10 existing wind-energy facilities in the CPE, where they ranged from 0.39–2.46 fatalities/MW/year, and averaged 1.18 fatalities/MW/year (Table 6). Bat mortality patterns at wind-energy facilities in Washington and Oregon have followed patterns similar to the rest of the country. Of 337 bat fatalities collected at existing wind-energy facilities in eastern Oregon and Washington, 315 (93.5%) have been the two migratory species that occur in the CPE, including 152 hoary bats (*Lasiurus cinereus*) and 163 silver-haired bats (*Lasionycteris noctivagans*). The other mortalities have consisted of small numbers of big brown bats (*Eptesicus fuscus*), little brown bats (*Myotis lucifugus*), and unidentified bats (Table 7). Virtually all of the mortality has occurred in late summer and early fall, during the fall migration period for hoary and silver-haired bats.

Mortality Estimates and Population Consequences

Birds (Excluding Raptors)

For all birds combined, we estimate that total annual mortality in the CPE would be 14,070 birds/year, with a reasonable range of 6,030 to 21,440 birds/year. Despite several thousand bird fatalities from 6700 MW of wind power, these impacts are spread across numerous species and bird groups, as well as across seasons. Therefore, the overall impact to any given species or population of a species is substantially less. Based on species composition of fatalities at existing CPE wind-energy facilities (Table 4), passerines would compose approximately 69.5% of the fatalities, upland gamebirds would compose 14.5%, doves/pigeons would compose 3.2%, waterfowl/waterbirds/shorebirds would compose 1.7% and other bird types, such as woodpeckers, nighthawks and swifts, would compose 2.6%. Approximately 3.3% of the mortality would be composed of non-protected European starlings (*Sturnus vulgaris*) and rock pigeons.

Raptors

Using raptor mortality estimates from existing wind energy facilities in the CPE, we estimate total raptor mortality in the CPE would be 469 fatalities per year, with an upper bound of 1005 per year. The upper bound assumes that all projects would have raptor fatality rates similar to those experienced at the wind farm with the highest raptor mortality rate (0.15/MW/year), which is unlikely. Therefore, we feel the projected number of fatalities using the mean raptor fatality rate at existing CPE wind projects is the most appropriate metric for cumulative impacts analysis. American kestrels account for 38.6%, red-tailed hawks account for 24.6% and short-eared owls account for 12.3% of the raptor fatalities recorded at the regional wind projects studied (see Table 4). Assuming this trend holds true for all proposed wind-energy facilities in the CPE, and assuming there would be 469 raptor fatalities per year, it would be expected that on average 181 American kestrels, 115 red-tailed hawks and 58 short-eared owls would be killed each year.

The other species of raptors occurring in the CPE have had no or few fatalities at existing wind-energy facilities, and would likely represent a much smaller number of fatalities. For example, no golden eagle, peregrine falcon (*Falcon peregrinus*) or prairie falcon (*Falcon mexicanus*) fatalities have been found to date; therefore, our mortality estimate for these species is

necessarily zero. Two species of concern in the region, ferruginous hawk and Swainson's hawk, have both been found as turbine collision victims in the CPE. Ferruginous hawks have composed 7.0% of the raptor fatalities (four of 57), while Swainson's hawks have composed 5.3% (three of 57). Assuming a total of 469 raptor fatalities could occur each year in the CPE, this would result in 33 ferruginous hawk and 25 Swainson's hawk fatalities per year.

The three species of raptors with the largest expected numbers of fatalities due to wind energy development in the CPE are American kestrel, red-tailed hawk and short-eared owl. Raptor fatalities in the CPE have occurred throughout the year, with 22.8% in the spring, 45.6% in the summer, 17.5% in the fall, and 12.3% in the winter (Table 8). Approximately 52.6% of the raptor fatalities have occurred during the spring and fall migration, and during winter periods, when the affected population could contain birds from numerous local breeding populations in the Pacific Northwest as well as further north in Canada. Assuming approximately 45.6% of the mortality would occur during the breeding season, it would be expected that approximately 83 American kestrel, 52 red-tailed hawk and 26 short-eared owl 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 170,000 breeding American kestrels, 77,000 breeding red-tailed hawks and 21,000 breeding short-eared owls (Blancher et al. 2007). Annual collision mortality in the CPE would represent approximately 0.05% of the breeding population of American kestrels, 0.07% of the breeding population of red-tailed hawks and 0.12% of the breeding population of short-eared owls. Even if we assumed all mortality (instead of 45.6%) would occur to adult breeding birds, this would still represent only 0.11%, 0.15% and 0.28% of the breeding American kestrels, red-tailed hawks and short-eared owls, respectively, in the CPE. Background mortality for these species is much higher than this estimate and the additional wind energy related mortality is likely insignificant from a population standpoint. Typical annual mortality rates for red-tailed hawks are 54% of juveniles, 20% of subadults, and 20% of adults. American kestrels suffer even higher mortality, as the annual mortality rate is 69% of juveniles and 45% of adults (Millsap and Allen 2006). Annual survival data are not available for short-eared owls (Wiggins et al. 2006). Given these numbers, plus the fact that most raptor populations can withstand additional harvest of nestlings and migrating birds by falconers of 10-20% or even higher (Millsap and Allen 2006), it is unlikely that the additional mortality of <0.30% associated with projected wind power development in the CPE would lead to measurable population effects for American kestrels, red-tailed hawks and short-eared owls. Based on an analysis of population sizes and survival rates, the US Fish & Wildlife Service conservatively estimates that falconers could harvest 13,216 juvenile red-tailed hawks and 19,575 juvenile American kestrels each year in the US without any consequences to populations (Millsap and Allen 2006). Actual harvest by falconers in 2004 was only 1,062 raptors comprising 15 species (Milsap and Allen 2006). Given these estimates of a sustainable harvest and the actual number of birds harvested, the number of birds killed in 2004 by wind turbines in North America should have fallen into a range of sustainable mortality.

Even though only four ferruginous and three Swainson's hawk fatalities have been found at existing wind energy facilities in the CPE, these raptors are species of concern and warrant additional analysis. The ferruginous hawk is listed as threatened by the Washington Department of Fish and Wildlife (WDFW) and as "critical" by the Oregon Department of Fish and Wildlife (ODFW), while the Swainson's hawk is listed as "vulnerable" by the ODFW. The estimated breeding population in

the CPE is 1,000 ferruginous hawks (Blancher et al. 2007). Ferruginous hawks may occur in the CPE throughout the year and their populations include breeders, migrants and winter residents, as well as juveniles and adults. Given our estimate of 33 ferruginous hawk fatalities on an annual basis, even if all turbine mortality occurred to resident breeding adult birds, this would represent 3.3% of the breeding ferruginous hawks in the CPE. Because mortality would likely be spread out among migrants, winter residents, resident breeders, and juveniles as well as adults, mortality of adult ferruginous hawks actually breeding in the CPE would be less than 3.3%, likely on the order of 1–2%. According to Millsap and Allen (2006), ferruginous hawk populations can sustain 1% harvest rates (limited to juveniles) without affecting populations. This harvest rate was considered conservative because it was modeled using data obtained from red-tailed hawk banding or marking studies, which typically greatly underestimate survival in raptors compared to telemetry studies. Therefore, the sustainable harvest rate is likely greater than 1%. To put a 1-2% mortality rate into perspective, we examined existing mortality rates of ferruginous hawks. A study of ferruginous hawks in Washington State found that annual adult mortality was 24%, and mortality of juvenile ferruginous hawks was 57% between the first and second year (Watson 2003). A ferruginous hawk banding study in Alberta, Canada found that first year mortality was 60% (Schmutz and Fyfe 1987), and a study of ferruginous hawks in Utah found that annual mortality was 25% for adults and 66% for juveniles the first year (Woffinden and Murphy 1989). Another study in Canada (Alberta and Saskatchewan) found that annual adult mortality was 29.2%, and first year mortality of nestlings was 45.5%. Despite annual adult mortality of 29.2%, the authors concluded that adult survival was not limiting the population; abundance of ground squirrels, which affected nesting success, appeared to be the primary factor regulating population size (Schmutz et al. 2008). Given published annual mortality rates for adult ferruginous hawks of 24–30%, additional losses of 1–2% of resident breeders associated with 6700 MW of wind energy development in the CPE would not likely have measurable population consequences.

The above analysis is for the entire population of 1000 ferruginous hawks in the CPE. It assumes that wind energy development and ferruginous hawk populations are spread uniformly across the entire CPE, which is not the case. Given the actual locations of existing and proposed wind energy facilities and ferruginous hawk population centers, actual impacts are likely lower. For example, the existing and proposed wind energy development in Klickitat County, Washington is approximately 1751 MW, or 26% of all wind energy development in the CPE. However, only three breeding pairs of ferruginous hawk are known to occur in the county (Jim Watson, Wildlife Research Scientist, Washington Department of Fish and Wildlife, pers. commun). Therefore, the county with the largest amount of wind energy development has a low breeding population of ferruginous hawks, which reduces the potential for significant impacts to this species across its entire range in the CPE. According to Watson (2003), the core breeding area for ferruginous hawks in Washington is in Benton and Franklin Counties. To date, no wind energy facilities have been proposed in Franklin County and only three of the existing/proposed facilities are in Benton County (Figure 1). Therefore, there is little overlap between areas of intensive wind energy development and core breeding areas for ferruginous hawk, which further reduces the potential for cumulative impacts to this species. Although local populations of ferruginous hawk may be reduced in areas of intensive wind energy development, the evidence suggests that this impact is not likely to affect the ferruginous hawk population in the entire CPE.

Breeding Bird Survey data collected over the last 27 years (1980–2007) show a negative trend in population growth for ferruginous hawks in the CPE (Sauer et al. 2008), but the negative trend is not statistically significantly due to low sample sizes and uncertainty (Sauer et al. 2008). If ferruginous hawk populations are declining in the region, and wind energy development continues at its current rate of growth in the CPE, ferruginous hawk collision mortality could eventually reach a point that populations may begin to decline without some form of mitigation. Mitigation could include establishing appropriate buffers around ferruginous hawk breeding territories at future wind energy facilities, erecting artificial nest structures, or otherwise improving habitat for ferruginous hawks in the CPE (Johnson et al. 2007).

The estimated Swainson's hawk breeding population in the CPE is 10,000 (Blancher et al. 2007). Unlike ferruginous hawks, Swainson's hawks occur in the CPE only during summer and most are resident breeders. Given our mortality estimate of 25 Swainson's hawks per year, this would represent only 0.25% of the Swainson's hawks in the CPE. Compared to many other raptor species, there is little data on annual survival of Swainson's hawks (England et al. 1997). The annual mortality rate of Swainson's hawks was reported in one study from western Canada, where it was estimated to be 15.7%, and nestling mortality rates ranged from 56–81% over the multi-year study (Schmutz et al. 2006). Given these mortality rates, additional losses of <0.3% would be considered sustainable and would not have measurable population consequences.

Upland Gamebirds

Upland gamebirds represent a higher percentage (14.5%) of the bird fatalities in the Columbia Plateau than in other regions in the US. No native upland gamebirds have been found as fatalities at wind-energy facilities in the CPE. All of the fatalities have been ring-necked pheasant, gray partridge, and chukar, which are all introduced species. Given our total bird mortality estimate of 14,070, approximately 2,040 upland gamebird fatalities would be expected to occur on an annual basis.

The species most impacted, ring-necked pheasant, gray partridge, and chukar, are all common in mixed agricultural native grass/steppe habitats. Habitats throughout the Columbia Plateau are highly suitable for these species and the large populations likely influence the higher mortality rate for the regional wind-energy facilities. The total estimated population size of these three species combined in the CPE of Oregon and Washington is 370,900 (Blancher et al. 2007); therefore, wind energy fatalities would compose approximately 0.55% of the population. As with non-native (non-protected) passerine species, there is generally lower concern over impacts to exotic upland gamebirds. Given the vast amount of suitable habitat and the ability of these species to withstand harvest rates substantially higher than 0.55%, it is unlikely that additional fatalities from wind energy development would be significant from a population standpoint.

Waterfowl, Waterbirds and Shorebirds

Waterfowl, waterbirds and shorebirds represent a very small percentage (1.7%) of all fatalities at existing wind energy projects in the CPE. Based on our total bird mortality estimate of 14,070, approximately 239 fatalities could result on an annual basis, including 152 waterfowl, 65 waterbirds, and 22 shorebirds.

Populations of waterfowl, waterbirds and shorebirds in the CPE are considerable. In addition, members of these groups are present year-round in the form of resident breeders, migrants, and winter residents. Given that we estimate only a few hundred individuals will be killed by turbine collisions on an annual basis, no cumulative impacts on these species are likely. In addition to killdeer, another shorebird commonly associated with upland habitats where wind-energy facilities are placed, is long-billed curlew. To date, however, no fatalities of this sensitive species have been documented at any wind-energy facility in the CPE, and no cumulative impacts are likely from collision mortality.

Passerines

For projects in the CPE, approximately 69.5% of the bird fatalities have been passerines (Table 5). Assuming that 69.5% of all bird mortality would be composed of passerines, approximately 9,779 passerine fatalities would occur annually in the CPE. Of all passerine fatalities recorded during the regional monitoring studies, horned lark made up nearly half (44.7%) of the fatalities. Assuming this pattern holds for all CPE wind-energy facilities, it could be expected that on average there would be 4,371 horned lark fatalities per year. Another common grassland breeder in the CPE, western meadowlark (*Sturnella neglecta*), composed approximately 4.6% of the passerine fatalities at wind-energy facilities, and therefore total annual mortality of this species related to wind turbine collisions would be approximately 450 individuals. At wind-energy facilities in the CPE, migrant passerines of several species generally composed approximately 32.9% of the bird fatalities. Assuming these estimates are representative of all CPE wind-energy facilities, approximately 3,217 nocturnal migrant fatalities would be expected per year if 6700 MW of wind power were constructed. The most common migrant fatality at existing wind-energy facilities in the CPE was golden-crowned kinglet (Table 4). Approximately 9.3% of the passerine fatalities were of this species; therefore, estimated annual mortality for this species would be approximately 909 individuals.

According to Blancher et al. (2007), the estimated size of the breeding population of horned larks in that portion of the CPE in Washington and Oregon is 2.2 million. Given our estimate of 4,371 horned lark fatalities, and if it is assumed that the horned lark fatalities are spread equally over the year, then roughly 25% (~1,093) of these fatalities would be during the breeding season. This represents approximately 0.05% of the breeding horned lark population. Given that most of the mortality will be composed of common species with widespread distribution and large populations, that annual mortality rates of song birds typically range from 30–70% (Lack 1966; Welty 1982), losses amounting to less than one percent are impacts to individuals, and therefore not significant from a population standpoint.

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 comprise the largest portion of the fatalities. Similar examples could be used for the other species that illustrate lower effects. For example, the BBS data indicate the breeding population of western meadowlarks in the CPE of Oregon and Washington is one million (Blancher et al. 2007). Given our estimate of 450 western meadowlark fatalities, 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 4) and unlikely to have any population effects.

In general, while modern turbines are getting taller, new wind-energy facilities do not appear to have a large impact on migrant birds. Results of marine radar surveys for proposed wind-energy facilities 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-energy facilities in the US. 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. 2002b), and 33 migrating passerine fatalities (mostly warblers) were observed near one turbine and a well-lit substation at the Mountaineer, West Virginia, wind-energy facility in May 2004 (Kerns and Kerlinger 2004). At wind-energy facilities in the CPE, migrant passerines of several species generally composed approximately 30% of the bird fatalities. Some impacts are expected for nocturnal migrating species; however, impacts are not expected to be great for the CPE. The apparent migrant with the greatest number of collision fatalities is golden-crowned kinglet. Our annual mortality estimate for golden-crowned kinglet was 909, which would represent 0.13% of the estimated breeding population size of this species in the CPE of Oregon and Washington, which is 720,000 (Blancher et al. 2007). Golden-crowned kinglets are typically associated with forested habitats during the breeding season, so it is assumed that many of the impacted individuals were from surrounding mountainous ecoregions or populations further north (e.g., Canada), rather than from the CPE. As with horned lark, estimating the potential population size from which these birds came requires a number of assumptions. However, while the potential population size is unknown, it is possible that the individual fatalities came from several populations in surrounding or more northern ecoregions, thus further 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.

Sensitive Bird Species

In addition to ferruginous and Swainson's hawks discussed above, other species classified as sensitive species by the WDFW and/or ODFW have been found as fatalities at CPE wind energy projects. These include Lewis's woodpecker (*Melanerpes lewis*), grasshopper sparrow (*Ammodramus savannarum*), sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*) and Vaux's swift (*Chaetura vauxi*). Only one fatality of each of the above species has been found at CPE wind energy projects. Given that 663 bird fatalities have been found at these projects and estimated total bird mortality is 14,070, the estimated mortality for each of these species would be approximately 21 fatalities per year. The estimated population sizes of each of these species in the CPE based on Blancher et al. (2007) is 25,000 Lewis's woodpeckers, 149,000 grasshopper sparrows, 1,060,000 sage thrashers, 314,000 sage sparrows, and 110,000 Vaux's swifts. Given these estimated populations sizes, the loss of 21 individuals per year would not have measurable populations consequences.

Bats

Based on bat mortality estimates at the other regional wind-energy facilities, total bat mortality in the CPE was estimated at 7,906 per year, with an expected range of 2,613–16,482 fatalities per

year. Based on species composition of bat fatalities found at CPE wind-energy facilities, approximately 3,827 silver-haired and 3,566 hoary bat fatalities would occur in the CPE on an annual basis.

Unlike birds, there is little information available about population sizes of most bat species, especially the non-hibernating, solitary tree-roosting species that compose most of the wind-energy facility related mortality in North America. Results of monitoring studies across the US and Canada have found similar trends in impacts. Risk to bats from wind turbines is unequal across species and across seasons. The majority of bat fatalities at wind projects in the US and Canada have been tree roosting bats that are long-distance migrants. Silver-haired bats throughout the US and species in the *Lasiurus* genus, the hoary bat in the west and the eastern red bat (*L. borealis*) in the east, are the most abundant fatalities found at wind-energy facilities. Less common fatalities include big brown bats and *Myotis* species (Johnson 2005). The highest mortality occurs during the fall migration period for bats, from roughly late-July through September (Arnett et al. 2007, Johnson 2005). Much lower mortality rates occur in the spring and summer, particularly in the CPE.

More recently, studies at different locations in the US and Canada appear to indicate that bat mortality is not related to site features or habitat, and dissimilar results for ecologically similar facilities have been found. While it is hypothesized that eastern deciduous forests in mountainous areas may be the highest risk areas, relatively high bat mortality has also occurred at wind-energy facilities 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 seven to eight bats per MW per year (Baerwald 2007). In contrast, other nearby (within 15.5 miles or 25 km) wind-energy facilities to that site have reported similar bat mortality (one to two bats per MW per year) to the wind-energy facilities studied in the CPE (Baerwald, pers. comm.). Bat mortality in the CPE would involve primarily silver-haired and hoary bats. Most mortality is observed during the fall migration period. The regional monitoring studies suggest resident bats do not appear to be significantly affected because very low numbers of resident bat species have been observed as fatalities. One species of potential concern is the Townsend's big-eared bat (*Corynorhinus townsendii*), a state candidate species in Washington. Very little is known about the current distribution of Townsend's big-eared bat in Washington. According to Marshall et al. (1996) the subspecies *Corynorhinus townsendii pallescens* occurs east of the Cascade Range, within the CPE. A Biological Assessment prepared to address the potential for a wind-energy facility in West Virginia to impact the federally endangered Virginia big-eared bat (*Corynorhinus townsendii virginianus*), a subspecies of Townsend's big-eared bat, concluded that the collision risk to this species is very low because it is non-migratory and forages well below the space occupied by turbine blades (Johnson and Strickland 2003). These conclusions are also likely applicable to Townsend's big-eared bat, and to date no fatalities of this species have been found at any wind energy facility in the CPE.

Hoary bats and silver-haired bats occupy forested habitats during the breeding season – habitat distinctly lacking and localized throughout the CPE. The significance of wind energy impacts on

hoary and silver-haired bat populations is difficult to predict, as there is very little information available regarding the overall population sizes of these bats. However, hoary and silver-haired bats are widely distributed throughout North America. Most concern over impacts to bats is with wind-energy facilities built on ridgetops in the Appalachian Mountains, where mortality levels have been as high as 47.5 bat fatalities/turbine/ year (Kerns et al. 2005), substantially higher than the average of 1.18 bat fatalities/MW/year observed in the Pacific Northwest.

In general, mortality levels on the order of one to two bats per turbine or per MW are likely not significant to populations, although cumulative effects may have greater consequences for long-lived, low-fecundity species such as bats. Unlike many bird species that may have multiple clutches of multiple young per year, hoary bats and silver-haired bats typically raise only 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 longer breeding lifespan. The impact of the loss of breeding individuals to populations such as these may have greater consequences.

Since it is most likely breeding populations from surrounding mountainous/forested ecoregions or from more northern areas (e.g., Canada) are affected at the Columbia Plateau wind-energy facilities during the fall migration, the dynamics of these populations would need to be known to predict population effects. For large and stable populations the level of impact is not expected to be significant, although impacts could be more pronounced for less stable populations. Bat Conservation International (BCI), the American Wind Energy Association (AWEA), the US Fish & Wildlife Service (USFWS), and the US Department of Energy National Renewable Energy Laboratory (NREL) have initiated a research effort termed the Bat Wind Energy Cooperative to conduct research and further understand bat and wind turbine interactions and how to prevent or minimize bat fatalities at wind energy facilities.

Indirect Effects

Grassland and shrub-steppe communities are the most abundant native communities in the CPE, but they are 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 energy generation in the region will result in more roads (mostly dirt and gravel) and increased human activity due to turbine construction and maintenance. A substantial portion of these impacts will be to already heavily disturbed agricultural fields and moderately disturbed rangeland used for livestock grazing. The percent of direct impacts actually occurring in native grassland or shrub-steppe habitat are difficult to predict and would be based on individual facility design and layout. However, based on the community types that existing wind-energy facilities are located in, we assume that approximately 25% of the existing and proposed facilities would be in cultivated cropland. Based on terrestrial vegetative communities in the CPE (Figure 2), only seven of the 47 existing or proposed wind energy facilities are in communities classified as shrub steppe, with two additional facilities in areas classified as grasslands. The remainder is all within vegetative communities classified by Quigley and Arbelbeide (1997) as agricultural lands. These lands include croplands as well as rangelands used for cattle grazing, but are apparently degraded such that they are no longer classified as shrublands or grasslands. Therefore, most of the wind

energy facilities in the CPE are in areas already degraded to some extent from conversion to pastures and cultivated cropland.

Assuming that on average the permanent impacts associated with a turbine and the associated access roads are 1.5 acres per turbine, and that 1.5-3.0 MW turbines are used for all new projects in the foreseeable future, then approximately 5,000 acres (7.8 mi^2) of non-agricultural vegetation types, primarily grassland shrub-steppe vegetation, would be lost in the CPE with 6,700 MW of wind energy. These impacts would be spread over a large area geographically (see Figure 1). Given that the CPE is 32,096 mi^2 in size, permanent impacts associated with 6700 MW of wind energy development would represent only 0.02% of the area.

While the CPE 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 greater 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 important wildlife habitat, habitat loss impacts are not expected to be a significant loss to any given species within the entire CPE. However, because existing and proposed wind-energy facilities tend to be concentrated within certain regions within the CPE (see Figure 1), habitat loss may lead to localized population declines of some species.

The presence of wind turbines may alter the landscape so that wildlife habitat use patterns are altered, thereby displacing wildlife away from the wind-energy facilities. Development of wind turbines near raptor nests may result in indirect impacts to the nesting birds; however, the only published report of avoidance of wind turbines by raptors occurred at Buffalo Ridge, Minnesota, where raptor nest density on 101 mi^2 (261.59 km^2) of land surrounding a wind project was 5.94/39 mi^2 (5.94/ 101.01 km^2), yet no nests were present in the 12 mi^2 (31.08 km^2) wind-energy facility itself, even though habitat was similar (Usgaard et al. 1997). However, this analysis assumes that raptor nests are uniformly distributed across the landscape, an unlikely event, and even though no nests were found, only two would be expected for an area 12 mi^2 in size if the nests were distributed uniformly. No red-tailed hawks or golden eagles are known to nest within the Altamont Pass WRA (APWRA), suggesting that the large numbers of turbines present within that area may discourage nesting by raptors, or that collision mortality prevents nesting in the APWRA. At the Foote Creek Rim wind-energy facility in southern Wyoming, one pair of red-tailed hawks nested within 0.3 miles (0.48 km) of the turbine strings, and seven red-tailed hawk, one great horned owl, and one golden eagle nests located within one mile (1.61 km) of the wind-energy facility successfully fledged young (Johnson et al. 2000a). The golden eagle pair successfully nested a half-mile (0.80

km) from the wind-energy facility for three different years after it became operational. Additionally, a Swainson's hawk nested within a half-mile mile of the Klondike, Oregon Wind Project (Johnson et al. 2003a). Studies at the Stateline Wind Project in Oregon and Washington have shown no measurable short-term effects to nesting raptors (Erickson et al. 2004). Maintaining permanent nest buffers would reduce the potential for indirect impacts.

At the Foote Creek Rim wind-energy facility in Carbon County, Wyoming, results of a long-term mountain plover monitoring study found that mountain plover use of the of the area declined during and immediately after construction of the facility. Mountain plover use slowly increased following operation of the facility, although not to the same level as it was prior to construction. It is possible that construction of the wind-energy facility resulted in some displacement of plovers, although a regional decline in mountain plover populations may also have contributed to the decline. Mountain plover use also declined during this same period at a nearby reference area and a more regional decline was documented by Fritz Knopf (Personal communication) and the USFWS (1999). Some mountain plovers have apparently become habituated to the turbines, as several mountain plover nests have been located within 246 ft (75 m) of turbines, many of which were successful (Young et al. 2005).

At a large wind-energy facility at Buffalo Ridge in Minnesota, the abundance of shorebirds, waterfowl, upland game birds, woodpeckers, and several groups of passerines was found to be statistically significantly lower at survey plots with turbines than at plots without turbines. There were fewer differences in avian use as a function of distance from turbines; however, suggesting that the area of reduced use was limited primarily to those areas within 328 ft (100 m) of the turbines (Johnson et al. 2000b). These results are similar to those of Osborn et al. (1998), who reported that birds at Buffalo Ridge avoided flying in areas with turbines. Also at Buffalo Ridge, Leddy et al. (1999) found that densities of male songbirds were significantly lower in Conservation Reserve Program grasslands containing turbines than in CRP grasslands without turbines. Grasslands without turbines and portions of grasslands located at least 590 ft (180 m) from turbines had bird densities four times greater than grasslands located near turbines. Reduced bird use near turbines was attributed to avoidance of turbine noise and maintenance activities and reduced habitat effectiveness because of the presence of access roads and large gravel pads surrounding turbines (Leddy 1996; Johnson et al. 2000b). Some birds apparently do become accustomed to turbines, as Osborn et al. (1998) reported a mallard nest within 102 ft (31 m) of a turbine in Minnesota.

Preliminary results from the Stateline Wind Project in Oregon and Washington (Erickson et al. 2004) suggest a relatively small-scale impact of the wind-energy facility on grassland nesting passerines. Transect surveys conducted prior to and after construction of the wind-energy facility indicated that grassland songbird use was significantly reduced only within 164 ft (50 m) of turbine strings; areas further away from turbine strings did not have reduced avian use. The reduced use was attributed to temporary and permanent habitat disturbance near the turbines. Horned larks appeared least impacted, likely because this species prefers areas of bare ground such as those created by turbine pads and access roads (Beason 1995). A long-term grassland bird displacement study at a wind energy facility in South Dakota found that chestnut-collared longspur (*Calcarius ornatus*) and western meadowlarks did not appear to avoid turbines, whereas grasshopper sparrows appeared to avoid turbines out to a distance of 200 m (D. H. Johnson and J.A. Shaffer, US Geological Survey,

personal communication).

The CPE wind energy facilities will be sited in vegetation communities common to the region, and other similar vegetation types are abundant. Furthermore, the actual area occupied by turbines and other infrastructure in a typical modern wind energy facility is only 5-10% of the total project area. However, it is not known if displaced individuals simply move somewhere else and breed successfully, have reduced breeding success, do not breed at all, or some combination of the above. In addition, habitat fragmentation and disturbance from turbines and maintenance activities may make the entire wind-energy facility unsuitable for some species. If this occurs, a reduction in the number of breeding birds within the wind-energy facility and adjacent areas may occur, and the effect may be more pronounced in areas with concentrated facilities in circumstances where habitat is a limiting factor. However, the total area occupied by wind-energy facilities is only a small fraction of the CPE (see Figure 1), and measurable population impacts are not likely for the entire region.

DISCUSSION

Mortality estimates for this analysis were based on species composition of fatalities found at 11 existing wind energy facilities in the CPE. Sample sizes for this analysis were relatively small for some groups. For example, we estimated ferruginous hawk mortality assuming that they would compose 7.0% of all raptor fatalities based on four ferruginous hawk fatalities out of 57 raptor fatalities found at the existing wind energy facilities. This ratio could easily change as additional fatality data are collected at new wind energy facilities in the CPE.

Our cumulative mortality estimates should be considered tentative, as no comparable fatality data exist for the large 2.0-3.0 MW turbines proposed for many of the future wind-energy facilities in the CPE. These estimates assume bird and bat fatality rates for a 2.0-MW turbine would be twice as high than for a 1.0-MW turbine, which may not be accurate. Although the 2.0-3.0 MW turbines have a larger rotor diameter, which may increase collision risk to raptors, the rotor-swept area is higher off the ground and the turbine rotates at slower speeds, which may actually reduce risk to some raptors. Based on an analysis of avian fatality data at wind farms with turbines ranging in size from 0.04–1.8 MW, tower heights ranging from 24–94 m and rotor diameters ranging from 15–80 m, Barclay et al. (2007) concluded that avian fatality rates were not affected by any of these parameters. Therefore, inflating our estimates to account for larger turbines may lead to over-estimates of avian mortality.

This cumulative effects analysis was based largely on results of existing studies of wind-energy facilities in the region, and in particular monitoring studies that estimated the direct impacts of a particular wind-energy 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 assumptions is that the analyses provide a conservative estimate (an overestimate) of mortality.

A few studies of wind-energy facilities 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 bird fatalities comprising 15 species were found (Johnson et al. 2000a). 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-energy facility in Montana (Harmata et al. 1998). Three bird fatalities were found during eight searches of five transects, totaling 10.94 miles (17.61 km) per search. On average, approximately 1.12 miles (1.8 km) of transect are searched within each turbine plot in the referenced studies for the CPE (Table 2). The amount of transect searched at the Montana site per search was equivalent to searching approximately seven to nine 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 fatalities not related to turbine collision, and this factor alone would lead to an over-estimate of actual bird collision mortality for wind-energy facilities.

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Table 1. Wind power projects constructed or planned in the Columbia Plateau Ecoregion of Washington and Oregon.

Project	Max. Capacity (MW)	Project Information Source
Existing		
Combine Hills I (Umatilla Co., OR)	41	http://www.rnp.org/News/pr_EurusCombineJun03.html
Vansycle Ridge (Umatilla Co., OR)	25	http://www.rnp.org/Projects/vansycle.html
Stateline (Umatilla Co., OR)	300	http://www.ppmenergy.com/cs_stateline.html
Klondike I (Sherman Co., OR)	24	http://www.rnp.org/Resources/Klondike%201%20pager.pdf
Klondike II (Sherman Co., OR)	75	http://www.portlandgeneral.com/about_pge/ current_issues/klondikeII/Default.asp?bhcp=1
Condon (Gilliam Co., OR)	50	http://www.efw.bpa.gov/environmental_services/ Document_Library/Condon_Wind/RODwMAP.pdf
Leaning Juniper I (Gilliam Co., OR)	104	http://www.efw.bpa.gov/environmental_services/ Document_Library/Arlington_PPM/ROD031105.pdf
Nine Canyon I (Benton Co., WA)	64	http://www.energy-northwest.com/downloads/ninecan.pdf
Nine Canyon II (Benton Co., WA)	16	http://www.energy-northwest.com/downloads/9Canyon.pdf
Hopkins Ridge (Columbia Co., WA)	157	http://www.rnp.org/News/pr_PSEHopkinsDec05.htm Adding 4 more towers according to Columbia Co. Planning 1/15/08
White Creek/Last Mile (Klickitat Co., WA)	206	Klickitat Co. Planning Dept.
Big Horn (Klickitat Co., WA)	250	http://www.efw.bpa.gov/environmental_services/ Document_Library/Big_Horn/BigHornROD03242005.pdf
Hoctor Ridge (Klickitat Co., WA)	60	Klickitat Co. Planning Dept.
Marengo (Columbia Co., WA)	140	http://www.pacificpower.net/Homepage/Homepage35750.html
Wild Horse (Kittitas Co., WA)	230	http://www.res-ltd.com/wind-farms/wf-wildhorse/htm
Biglow Canyon (Sherman Co., OR)	450	http://www.bpa.gov/corporate/pubs/ RODS/2006/RODKlondikeIIIBiglowCanyon.pdf
Klondike III (Sherman Co., OR)	272	http://egov.oregon.gov/ENERGY/SITING/docs/ KWPPublicFilingNotice.pdf
Permitted/Proposed		
Marengo II (Columbia Co., WA)	90	http://www.pacificpower.net/Homepage/Homepage35750.html Under construction Jan 2008
Seven Mile Hill (Wasco Co., OR)	50	http://www.oregon.gov/ENERGY/SITING/ review.shtml#Seven_Mile_Hill_Wind_Project
Leaning Juniper II (Gilliam Co., OR)	279	http://www.oregon.gov/ENERGY/SITING/ review.shtml#Leaning_Juniper_Wind_Power
Arlington CEP/Rattlesnake Rd. (Gilliam Co., OR)	104	http://www.bpa.gov/corporate/pubs/rods/2005/EFW/ Arlington-Wind-Interconnection-ROD-1-14-05.pdf
Shepherds Flat (Gilliam & Morrow Co., OR)	909	Data provided by BPA, Morrow County Planning Dept.
Willow Creek (Morrow Co./Gilliam Co., OR)	50	http://www.transmission.bpa.gov/PlanProj/Wind/willow.cfm

Project	Max. Capacity (MW)	Project Information Source
Combine Hills II (Umatilla Co., OR)	63	http://www.efw.bpa.gov/environmental_services/Document_Library/Combine_Hills/Combine_Hills_Cx.pdf
Windy Point (Klickitat Co., WA)	242.5	Klickitat Co. Planning Dept.
Windy Point II (Klickitat Co., WA)	152.5	Klickitat Co. Planning Dept.
Windy Flats (Klickitat Co., WA)	190	Klickitat Co. Planning Dept.
Goodnoe II (Klickitat Co., WA)	34	Klickitat Co. Planning Dept.
Juniper Canyon (Klickitat Co., WA)	250	Klickitat Co. Planning Dept.
Harvest (Klickitat Co., WA)	100	Klickitat Co. Planning Dept.
Linden Ranch (Klickitat Co., WA)	58	Klickitat Co. Planning Dept.
Miller Ranch (Klickitat Co., WA)	98	Klickitat Co. Planning Dept.
Imrie (Klickitat Co., WA)	100	Klickitat Co. Planning Dept.
Mariah (Klickitat Co., WA)	16	Klickitat Co. Planning Dept.
Nine Canyon III (Benton Co., WA)	32	http://www.energy-northwest.com/news/2006/06_07.php
Desert Claim (Kittitas Co., WA)	180	
Kittitas Valley (Kittitas Co., WA)	130	
Scenic Vista (Umatilla Co., OR)	60-80	Umatilla County Planning Dept.
Helix (Umatilla Co., OR)	102	Iberdrola Renewables, Inc.
Oregon Trail (Sherman Co., OR)	10	Sherman County Planning Dept.
Star Point (Sherman Co., OR)	102.9	Iberdrola Renewables, Inc.
Hay Canyon (Sherman Co., OR)	<105 MW	Sherman County Planning Dept.
Golden Hills (Sherman Co., OR)	400	Sherman County Planning Dept.
Three Mile (Morrow Co., OR)	15	Morrow County Planning Dept.
Oregon Wind Farms, LLC (Morrow Co., OR)	60	Morrow County Planning Dept.
Pebble Springs (PPM) (Gilliam Co, OR)	104	Gilliam Co. Planning
Wheat Field Wind (AWP) (Gilliam Co, OR)	104	Gilliam Co. Planning
Totals	**~6665**	

Table 2. Avian use estimates and avian fatality estimates for existing wind energy projects in the Columbia Plateau Ecoregion.

Project	Mean annual avian use (#/20-min survey)		Mean annual mortality (#/MW/year)			
	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, I OR	0.47	17.5	0	0.9	0.35	Johnson et al. 2003a
Klondike II, OR	0.47	17.5	0.11	3.1	2.11	NWC and WEST, 2007
Vansycle, OR	0.41	13.1	0	1.0	0.32	Erickson et al. 2000
Stateline, WA/OR	0.41	13.1	0.10	2.4	0.78	Erickson et al. 2004, 2007
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. 2003
Wild Horse, WA	0.40	5.0	0.09	1.6	0.88	Erickson et al. 2008
Bighorn I, WA	0.90	16.6	0.15	2.6	0.57	Kronner et al. 2008
Leaning Juniper, OR	0.52	23.6	0.06	3.2	na	Kronner et al. 2007
Condon, OR	0.37	5.8	0.02[a]	0.05[a]	NR	Fishman Ecological Services 2003
Mean	**0.50**	**12.4**	**0.07**	**2.1**	**0.69**	

[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.

Table 3. Avian use estimates (# observed per 20 minutes per plot with 800-m radius viewshed) for Wind Resource Areas in the Columbia Plateau Ecoregion.

		Mean avian use	
Wind Resource Area	**Location**	**Raptors**	**All birds**
Hopkins Ridge	Columbia Co., WA	0.64	8.7
Nine Canyon	Benton Co., WA	0.26	9.4
Desert Claim	Kittitas Co., WA	0.77	15.3
Kittitas Valley	Kittitas Co., WA	0.90	12
Wild Horse	Kittitas Co., WA	0.40	5
Big Horn I	Klickitat Co., WA	0.90	16.6
White Creek	Klickitat Co., WA	0.66	11.9
Linden Ranch	Klickitat Co., WA	1.64	11.1
Hoctor Ridge	Klickitat Co., WA	1.38	15.3
Imrie	Klickitat Co., WA	0.70	19.2
Windy Point	Klickitat Co., WA	0.77	16.0
Windy Flats	Klickitat Co., WA	0.83	19.9
Reardan	Lincoln Co., WA	0.90	13
Zintel Canyon	Benton Co., WA	0.44	19
Maiden	Benton/Yakima Co., WA	0.38	11.6
Combine Hills	Umatilla Co., OR	0.60	6
Klondike I & II	Sherman Co., OR	0.47	17.5
Biglow	Sherman Co., OR	0.30	9.1
Vansycle	Umatilla Co., OR	0.41	13.1
Elkhorn	Union Co., OR	1.05	21.7
Shepherd's Ridge	Morrow Co., OR	0.61	6.5
Leaning Juniper	Gilliam Co., OR	0.52	23.6
Condon	Gilliam Co., OR	0.37	5.8
Stateline	Walla Walla Co., WA/Umatilla Co., OR	0.41	13.1
Mean		**0.68**	**13.4**
Range		**0.26 – 1.64**	**5 – 23.6**

Table 4. Number and species composition of bird fatalities found at the existing Columbia Plateau Ecoregion wind energy projects.

Species	Number of Fatalities	Percent Composition
horned lark	206	31.1
golden-crowned kinglet	43	6.5
ring-necked pheasant	37	5.6
gray partridge	36	5.4
American kestrel	22	3.3
chukar	22	3.3
western meadowlark	21	3.2
unidentified passerine	19	2.9
dark-eyed junco	18	2.7
European starling	17	2.6
white-crowned sparrow	17	2.6
mourning dove	16	2.4
red-tailed hawk	14	2.1
ruby-crowned kinglet	9	1.4
unidentified bird	9	1.4
yellow-rumped warbler	9	1.4
short-eared owl	7	1.1
winter wren	7	1.1
house wren	6	0.9
unidentified kinglet	6	0.9
black-billed magpie	5	0.8
Brewer’s sparrow	5	0.8
golden-crowned sparrow	5	0.8
rock dove	5	0.8
Townsend’s warbler	5	0.8
unidentified sparrow	5	0.8
American robin	4	0.6
Canada goose	4	0.6
common nighthawk	4	0.6
ferruginous hawk	4	0.6
northern flicker	4	0.6
rock pigeon	4	0.6
red-breasted nuthatch	3	0.5
song sparrow	3	0.5
Swainson's hawk	3	0.5
white-throated swift	3	0.5
Cassin’s vireo	2	0.3
house finch	2	0.3
Macgillivray's warbler	2	0.3

Species	Number of Fatalities	Percent Composition
mallard	2	0.3
sage thrasher	2	0.3
savannah sparrow	2	0.3
vesper sparrow	2	0.3
American coot	1	0.2
American goldfinch	1	0.2
American pipit	1	0.2
barn owl	1	0.2
black-throated sparrow	1	0.2
brown-headed cowbird	1	0.2
bufflehead	1	0.2
chipping sparrow	1	0.2
common raven	1	0.2
Cooper’s hawk	1	0.2
downy woodpecker	1	0.2
grasshopper sparrow	1	0.2
gray catbird	1	0.2
great blue heron	1	0.2
great horned owl	1	0.2
hairy woodpecker	1	0.2
house sparrow	1	0.2
killdeer	1	0.2
Lewis's woodpecker	1	0.2
long-eared owl	1	0.2
mountain bluebird	1	0.2
northern harrier	1	0.2
orange-crowned warbler	1	0.2
red-shafted flicker	1	0.2
red-winged blackbird	1	0.2
rough-legged hawk	1	0.2
sage sparrow	1	0.2
spotted towhee	1	0.2
Swainson's thrush	1	0.2
Townsend’s solitaire	1	0.2
unidentified accipiter	1	0.2
unidentified empidonax	1	0.2
unidentified partridge	1	0.2
unidentified thrush	1	0.2
varied thrush	1	0.2
Vaux’s swift	1	0.2
warbling vireo	1	0.2
western grebe	1	0.2

Species	Number of Fatalities	Percent Composition
western kingbird	1	0.2
western tanager	1	0.2
Williamson's sapsucker	1	0.2
yellow warbler	1	0.2
Totals (77 species)	**663**	**100.0**

Table 5. Percent composition of avian fatalities by species group for existing Columbia Plateau Ecoregion wind energy projects.

Species	Number of Fatalities	Percent Composition
Passerines	461	69.5
Upland gamebirds	96	14.5
Raptors	57	8.6
Doves/pigeons	21	3.2
Waterbirds/waterfowl/shorebirds	11	1.7
Other birds[a]	17	2.6
Totals	**663**	**100**

[a] woodpeckers, nighthawks, swifts

Table 6. Summary of bat mortality at existing wind energy projects in the Columbia Plateau Ecoregion.

Project Name [state]	No. Bats /turbine/year	Bats per MW[1]	Reference
Stateline [OR/WA]	0.95	1.44	Erickson et al. 2004, 2007
Vansycle [OR]	0.74	1.12	Erickson et al. 2000
Klondike [OR]	1.16	0.77	Johnson et al. 2003b
Klondike II [OR]	0.63	0.41	NWC and WEST, Inc. 2007
Hopkins Ridge [WA]	1.13	0.63	Young et al 2007
Wild Horse [WA]	0.70	0.39	Erickson et al. 2008
Nine Canyon [WA]	3.21	2.46	Erickson et al. 2001b
Leaning Juniper [OR]	1.28	0.86	Kronner et al. 2007
Big Horn I [WA]	2.85	1.90	Kronner et al. 2008
Combine Hills [OR]	1.88	1.88	Young et al. 2005
Average	**1.46**	**1.18**	

[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.

Table 7. Number and species composition of bat fatalities found at eight existing Columbia Plateau wind energy projects.

Species	Number of Fatalities	Percent Composition
silver-haired bat	163	48.4
hoary bat	152	45.1
unidentified bat	9	2.7
little brown bat	8	2.4
big brown bat	5	1.5
Totals (4 species)	**337**	**100**

Table 8. Seasonal timing of raptor fatalities at existing wind energy facilities in the Columbia Plateau.

Wind Energy Project	Season				
	Spring	Summer	Fall	Winter	Overall
Combine Hills, OR	0	0	0	0	0
Klondike I, OR	0	0	0	0	0
Klondike II, OR	0	1	1	0	2
Vancycle, OR	0	0	0	0	0
Stateline, WA/OR	3	8	6	1	18
Hopkins Ridge, WA	1	3	1	1	6
Nine Canyon, WA	1	0	0	0	1
Wild Horse, WA	1	5	0	0	6
Bighorn I, WA	4	5	2	5	16
Leaning Juniper, OR	2	1	0	0	3
Condon, OR	1	0	0	0	1
Totals	**13**	**26**	**10**	**7**	**57**
Percent	**22.8**	**45.6**	**17.5**	**12.3**	**100**

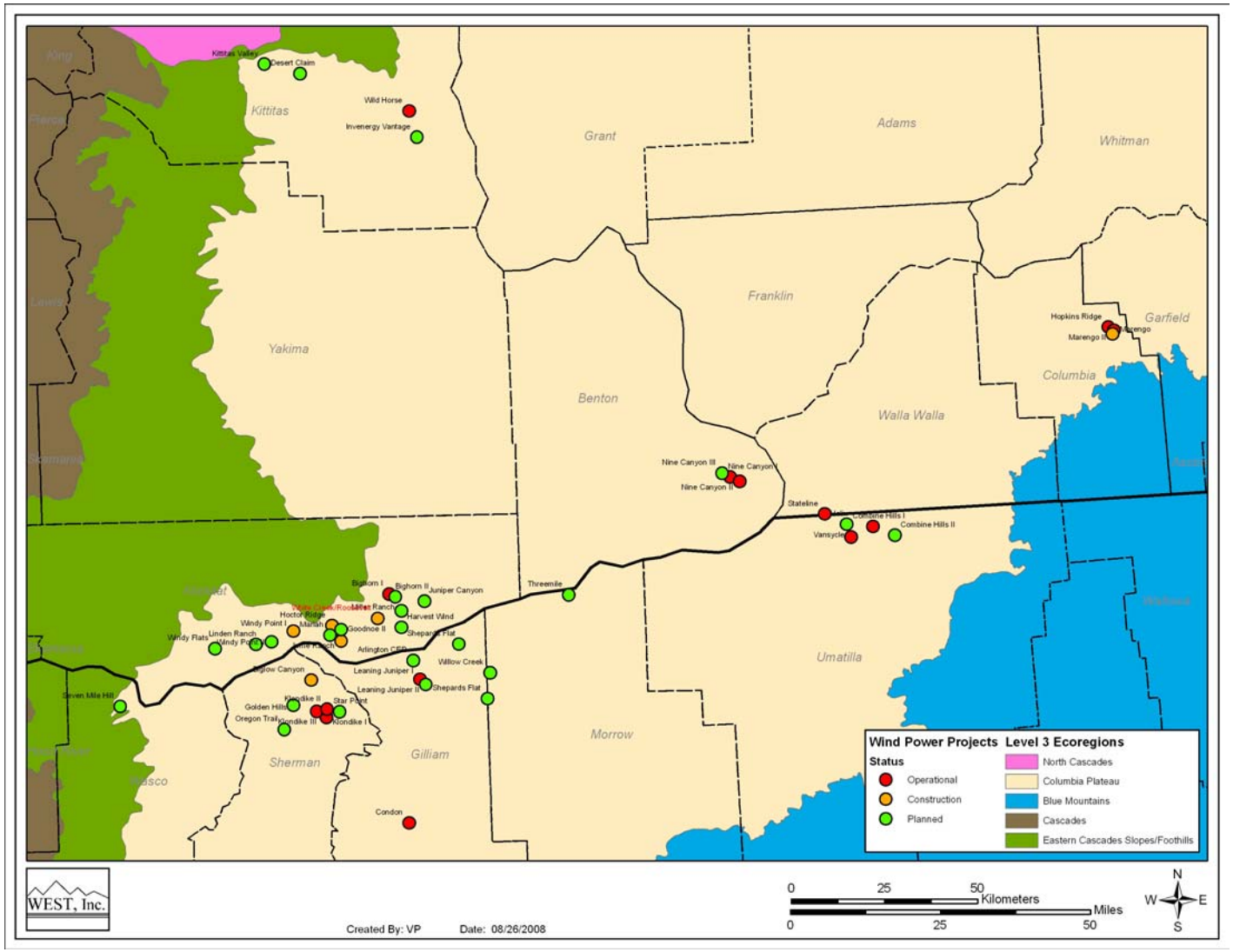

Figure 1. Location of existing and proposed wind energy facilities in the Columbia Plateau Ecoregion of southeastern Washington and northeastern Oregon.

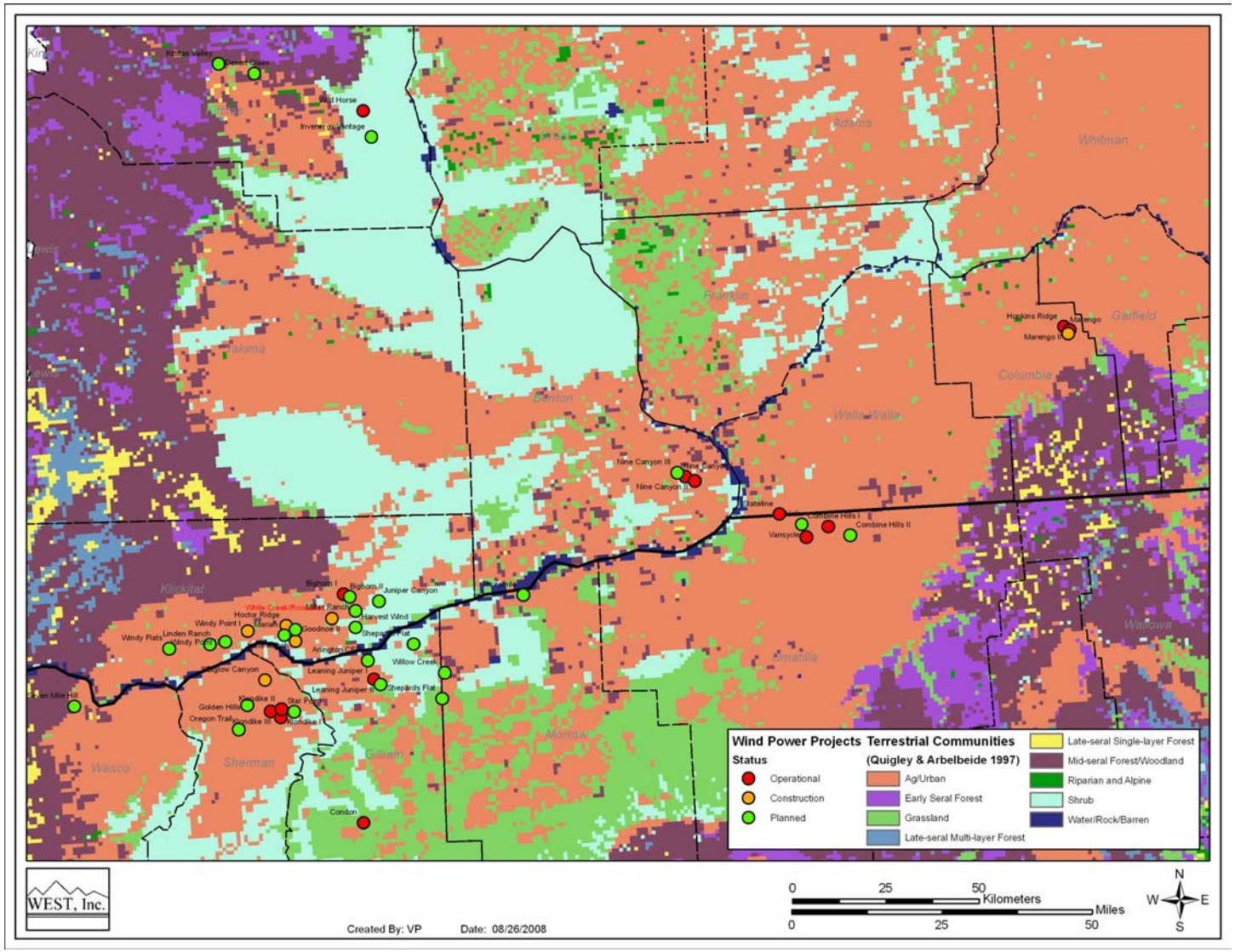

Figure 2. Terrestrial vegetative communities within the Columbia Plateau Ecoregion.

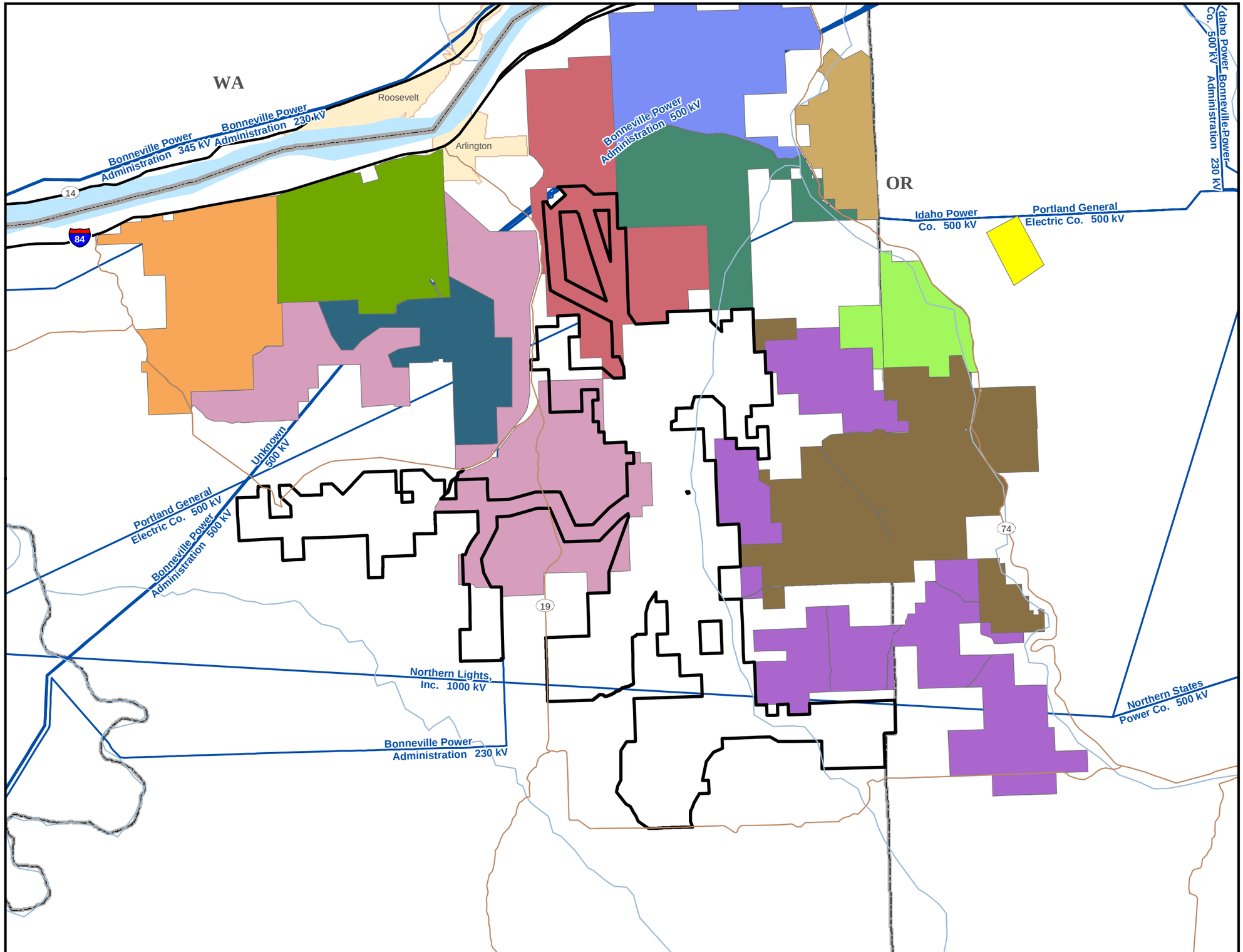

Figure P-1

Wind Energy Facilities in Surrounding Areas

Montague Wind Power Facility

Legend

- Existing Transmission Line
- Local Road
- Major Road
- Highway
- Montague Site Boundary/Micrositing Corridor

Approximate Boundary of Nearby Wind Energy Facilities

- Horn Butte
- Leaning Juniper I
- Leaning Juniper II
- Pebble Springs
- Rattlesnake
- Saddle Butte
- Shepherds Flat North
- Shepherds Flat Central
- Shepherds Flat South
- Threemile Wind
- Wheat Field
- Willow Creek

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Sources:
ODFW Map of Commercial Wind Energy Projects in the Columbia Basin, Oregon, 2007.
Local knowledge.

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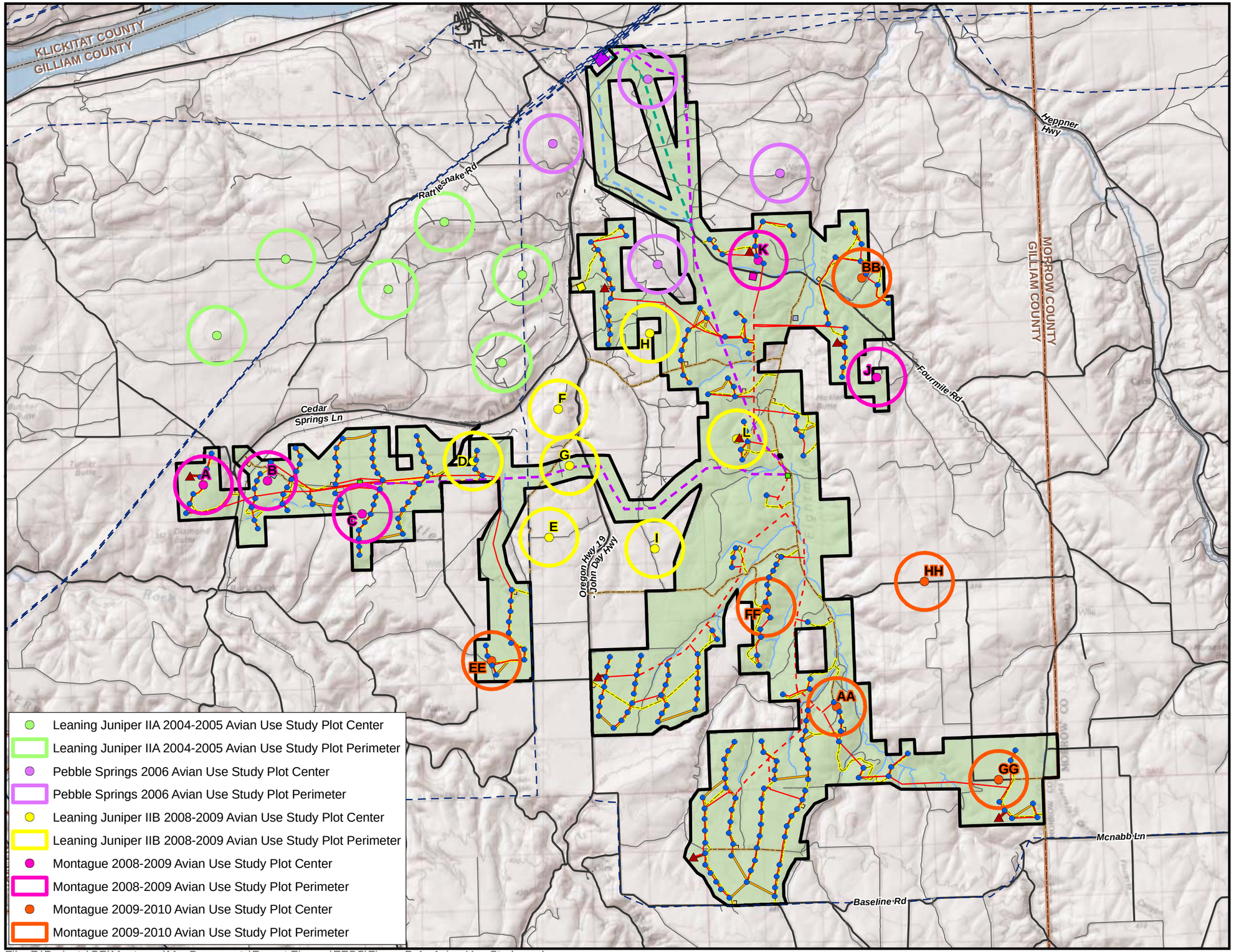
Figure P-4

Avian Use Study

1.5-MW Turbine Layout
(Maximum Turbine Layout)
Montague Wind Power Facility



- Leaning Juniper IIA 2004-2005 Avian Use Study Plot Center
- Leaning Juniper IIA 2004-2005 Avian Use Study Plot Perimeter
- Pebble Springs 2006 Avian Use Study Plot Center
- Pebble Springs 2006 Avian Use Study Plot Perimeter
- Leaning Juniper IIB 2008-2009 Avian Use Study Plot Center
- Leaning Juniper IIB 2008-2009 Avian Use Study Plot Perimeter
- Montague 2008-2009 Avian Use Study Plot Center
- Montague 2008-2009 Avian Use Study Plot Perimeter
- Montague 2009-2010 Avian Use Study Plot Center
- Montague 2009-2010 Avian Use Study Plot Perimeter

- Site Boundary
- Micrositing Corridor

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- Streams
- State Boundary
- BPA Slatt Interconnection Substation
- County Boundary

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Figure P-5

Aerial Photograph

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

KLICKITAT COUNTY
GILLIAM COUNTY
Rattlesnake Rd
Heppner Hwy
MORROW COUNTY
GILLIAM COUNTY
Fourmile Rd
Cedar Springs Ln
Oregon Hwy 19 / John Day Hwy
GILLIAM COUNTY
Mcnabb Ln
Baseline Rd

- Site Boundary/Micrositing Corridor

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- Streams
- State Boundary
- BPA Slatt Interconnection Substation
- County Boundary

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Figure P-7

Habitat Types

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Habitat Types
- Developed-CRP or Other Planted Grassland (DC)
- Developed-Dryland Wheat (DW)
- Developed-Irrigated Agriculture (DI)
- Developed-Old Field (DB)
- Developed-Other (DX)
- Escarpment (ESC)
- Exotic Annual Grassland (GA)
- Juniper Woodland (WJ)
- Native Perennial Grassland (GB)
- Rabbitbrush/Snakeweed Shrub-steppe (SSB)
- Riparian Woodland (WR)
- Sagebrush Shrub-steppe (SSA)

- Site Boundary/Micrositing Corridor

Proposed Permanent Facilities
- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities
- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities
- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- Streams
- State Boundary
- BPA Slatt Interconnection Substation
- County Boundary

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Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

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Rattlesnake Rd
Heppner Hwy
MORROW COUNTY
GILLIAM COUNTY
Fourmile Rd
Cedar Springs Ln
Oregon Hwy 19
John Day Hwy
GILLIAM COUNTY
Mcnabb Ln
Baseline Rd

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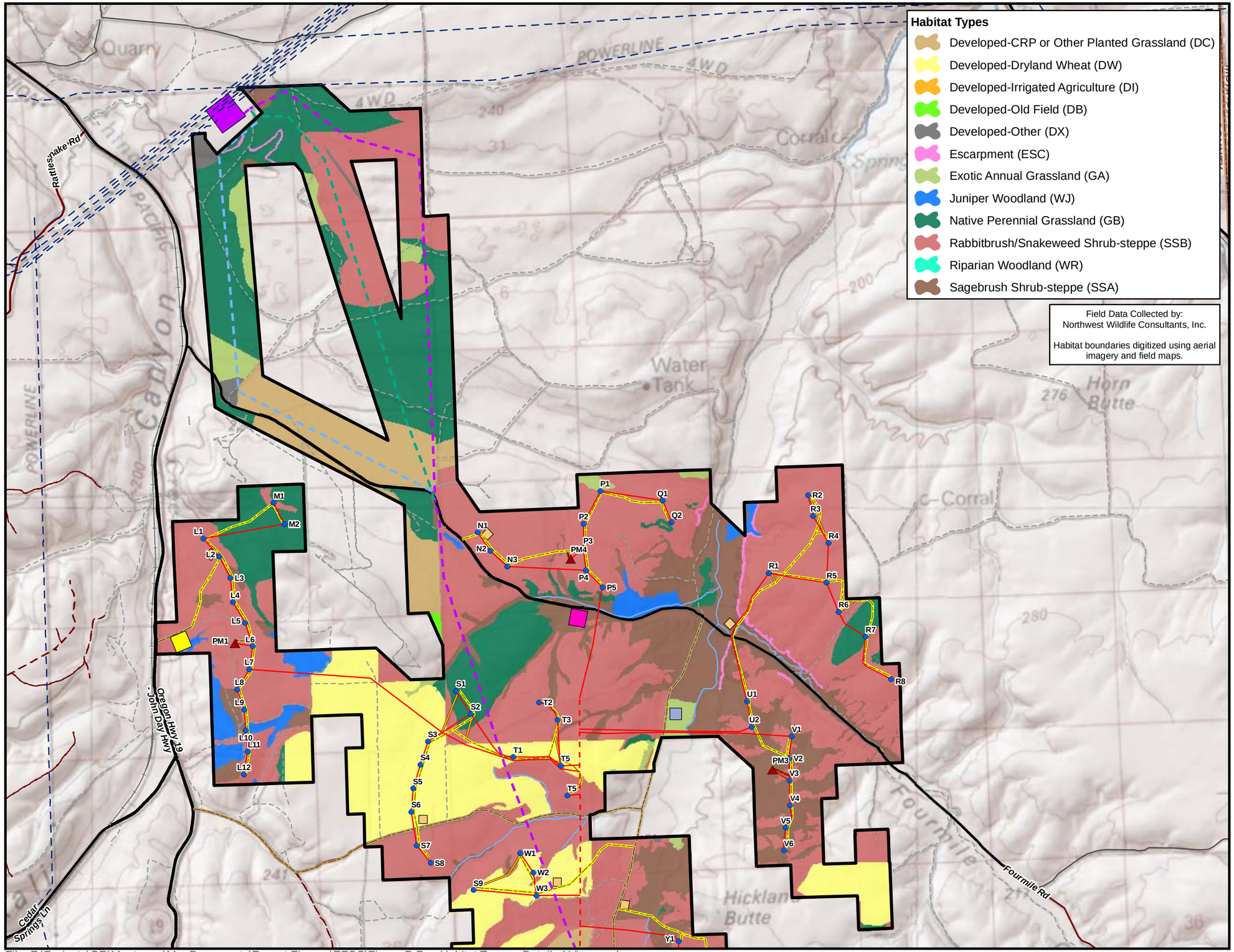
Figure P-7a

Habitat Types - Detailed View 1 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)
Montague Wind Power Facility



Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- BPA Slatt Interconnection Substation
- County Boundary

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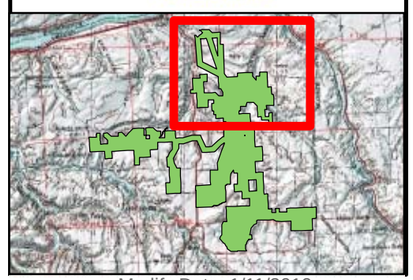

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Figure P-7b

Habitat Types -
Detailed View 2 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

Habitat Types

- Developed-CRP or Other Planted Grassland (DC)
- Developed-Dryland Wheat (DW)
- Developed-Irrigated Agriculture (DI)
- Developed-Old Field (DB)
- Developed-Other (DX)
- Escarpment (ESC)
- Exotic Annual Grassland (GA)
- Juniper Woodland (WJ)
- Native Perennial Grassland (GB)
- Rabbitbrush/Snakeweed Shrub-steppe (SSB)
- Riparian Woodland (WR)
- Sagebrush Shrub-steppe (SSA)

- Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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Figure P-7c

Habitat Types - Detailed View 3 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

Habitat Types

- Developed-CRP or Other Planted Grassland (DC)
- Developed-Dryland Wheat (DW)
- Developed-Irrigated Agriculture (DI)
- Developed-Old Field (DB)
- Developed-Other (DX)
- Escarpment (ESC)
- Exotic Annual Grassland (GA)
- Juniper Woodland (WJ)
- Native Perennial Grassland (GB)
- Rabbitbrush/Snakeweed Shrub-steppe (SSB)
- Riparian Woodland (WR)
- Sagebrush Shrub-steppe (SSA)

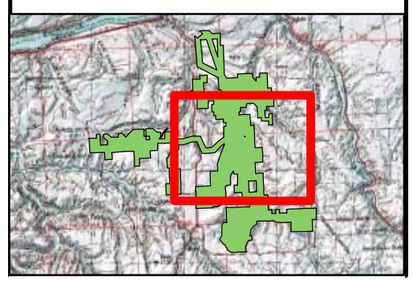

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Figure P-7d

Habitat Types - Detailed View 4 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Habitat Types

- Developed-CRP or Other Planted Grassland (DC)
- Developed-Dryland Wheat (DW)
- Developed-Irrigated Agriculture (DI)
- Developed-Old Field (DB)
- Developed-Other (DX)
- Escarpment (ESC)
- Exotic Annual Grassland (GA)
- Juniper Woodland (WJ)
- Native Perennial Grassland (GB)
- Rabbitbrush/Snakeweed Shrub-steppe (SSB)
- Riparian Woodland (WR)
- Sagebrush Shrub-steppe (SSA)

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

- Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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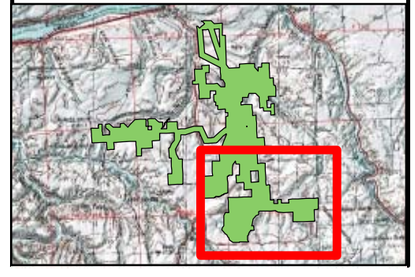

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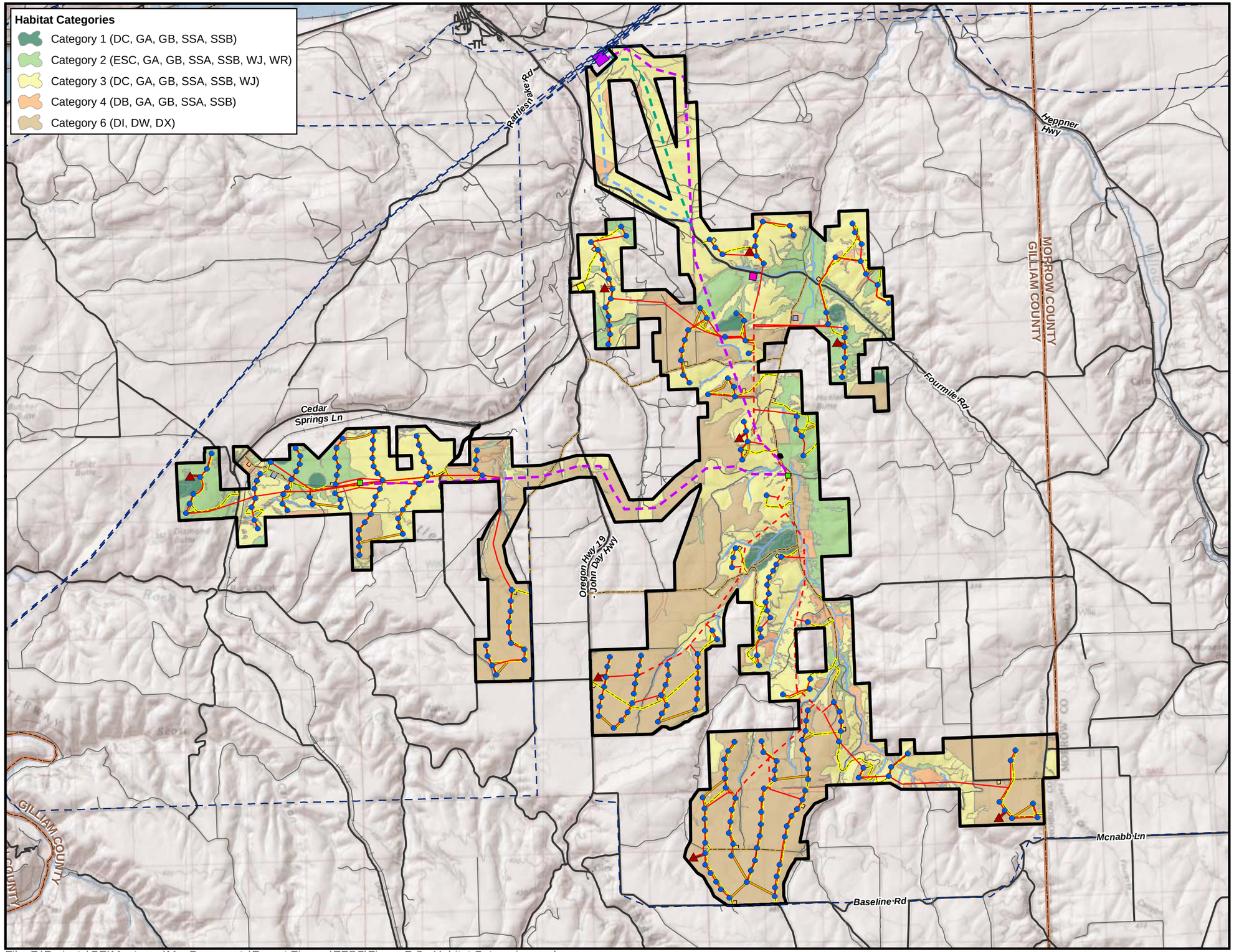

Figure P-8

Habitat Categories

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

- Site Boundary/Micrositing Corridor

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- Streams
- State Boundary
- BPA Slatt Interconnection Substation
- County Boundary

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Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

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Figure P-8a

Habitat Categories - Detailed View 1 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)
Montague Wind Power Facility

Habitat Categories

- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

- Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- BPA Slatt Interconnection Substation
- County Boundary

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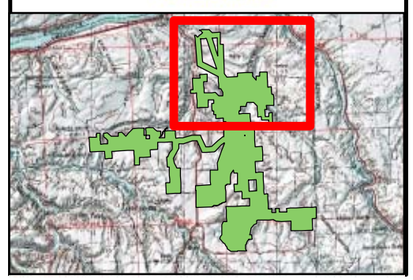

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Figure P-8 b

Habitat Categories - Detailed View 2 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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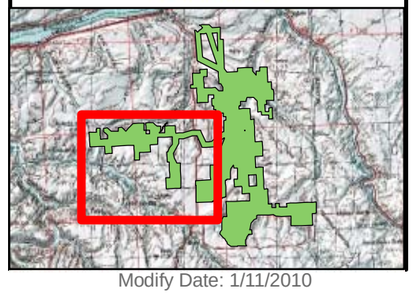
IBERDROLA RENEWABLES

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

Habitat Categories

- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)



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Modify Date: 1/11/2010

Figure P-8c

Habitat Categories - Detailed View 3 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

- Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

N
W E
S

0 0.5 1 1.5
Miles

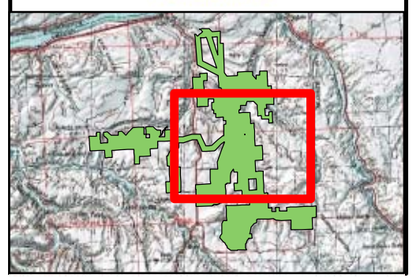
IBERDROLA RENEWABLES

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

Habitat Categories

- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)



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Modify Date: 1/11/2010

Figure P-8d

Habitat Categories - Detailed View 4 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Habitat Categories

- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

- Site Boundary

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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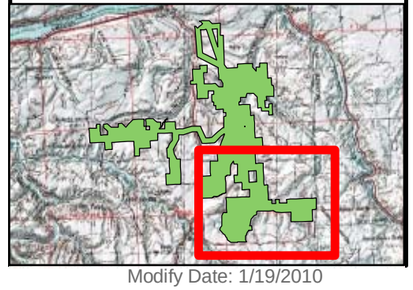
Miles

IBERDROLA RENEWABLES



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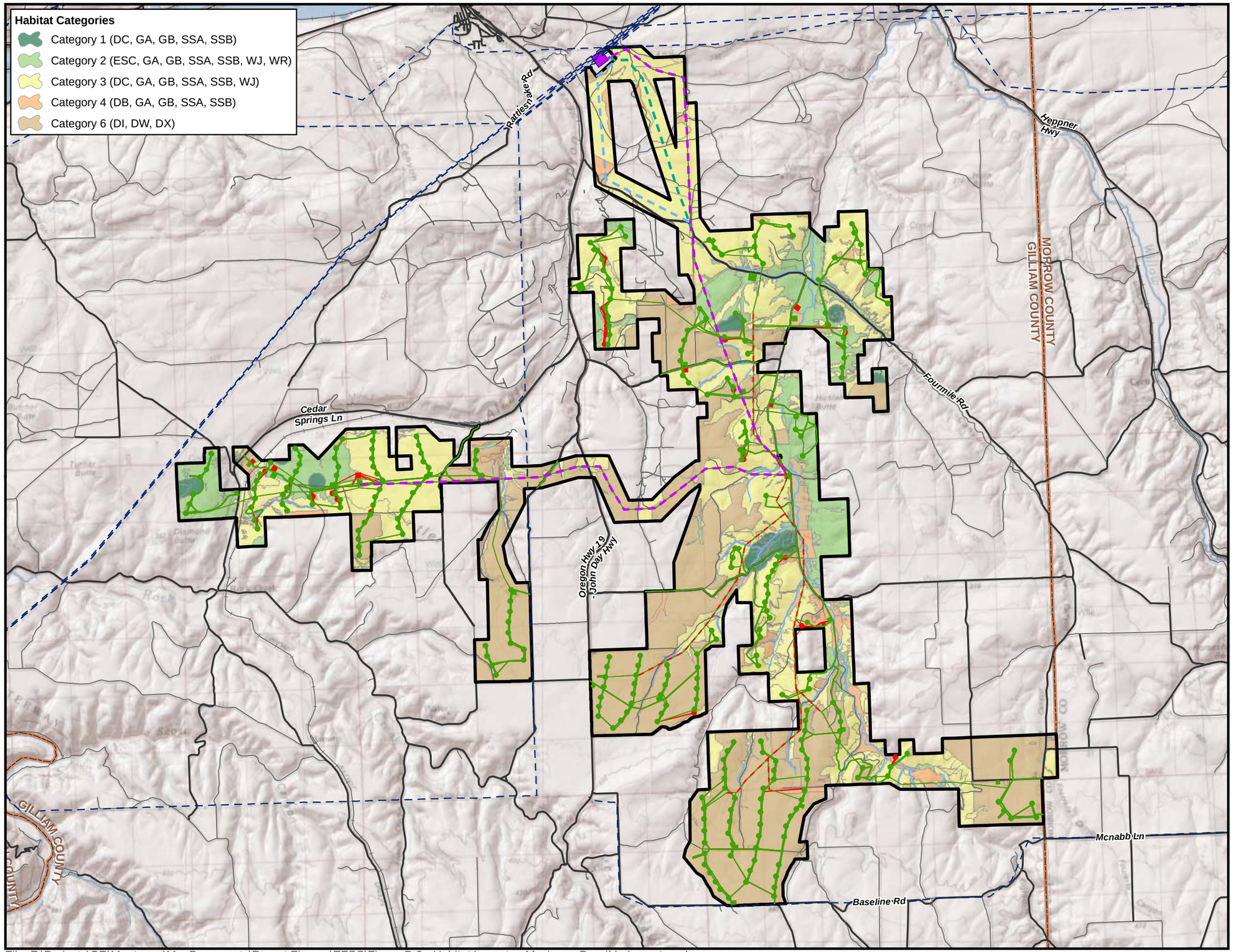

Figure P-9

Habitat Categories: Maximum Possible Impact

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

- Site Boundary/Micrositing Corridor
- Current Footprint (Permanent and Temporary)
- Worst Case-Scenario Footprint (Permanent and Temporary)

Proposed Permanent Facilities

- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line

Existing Facilities

- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- Streams
- State Boundary
- BPA Slatt Interconnection Substation
- County Boundary

N
W E
S

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

0 1 2 3 4
Miles

IBERDROLA RENEWABLES

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Modify Date: 1/11/2010

Figure P-9 a

Habitat Categories: Maximum Possible Impact - Detailed View 1 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)
Montague Wind Power Facility

Habitat Categories
- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

- Site Boundary
- Current Footprint (Permanent and Temporary)
- Worst Case-Scenario Footprint (Permanent and Temporary)

Proposed Permanent Facilities
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line

Existing Facilities
- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- BPA Slatt Interconnection Substation
- County Boundary

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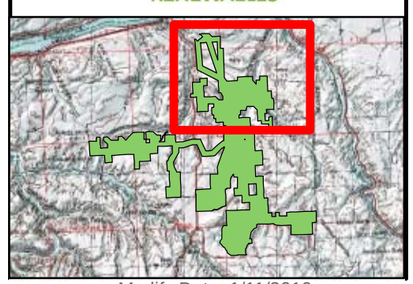
Miles

IBERDROLA RENEWABLES



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Modify Date: 1/11/2010

Figure P-9 b

Habitat Categories:
Maximum Possible Impact -
Detailed View 2 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Site Boundary
Current Footprint (Permanent and Temporary)
Worst Case-Scenario Footprint (Permanent and Temporary)

Proposed Permanent Facilities
Proposed Overhead 34.5-kV Line
Proposed 230-kV Transmission Line

Existing Facilities
Existing Transmission Line
Public, Paved
Public, Gravel
Other Public Road
Private, Gravel
Other Private Road
Major Railroad Line
Streams
County Boundary

N
W E
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0 0.5 1 1.5
Miles

IBERDROLA RENEWABLES

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

Habitat Categories
- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)

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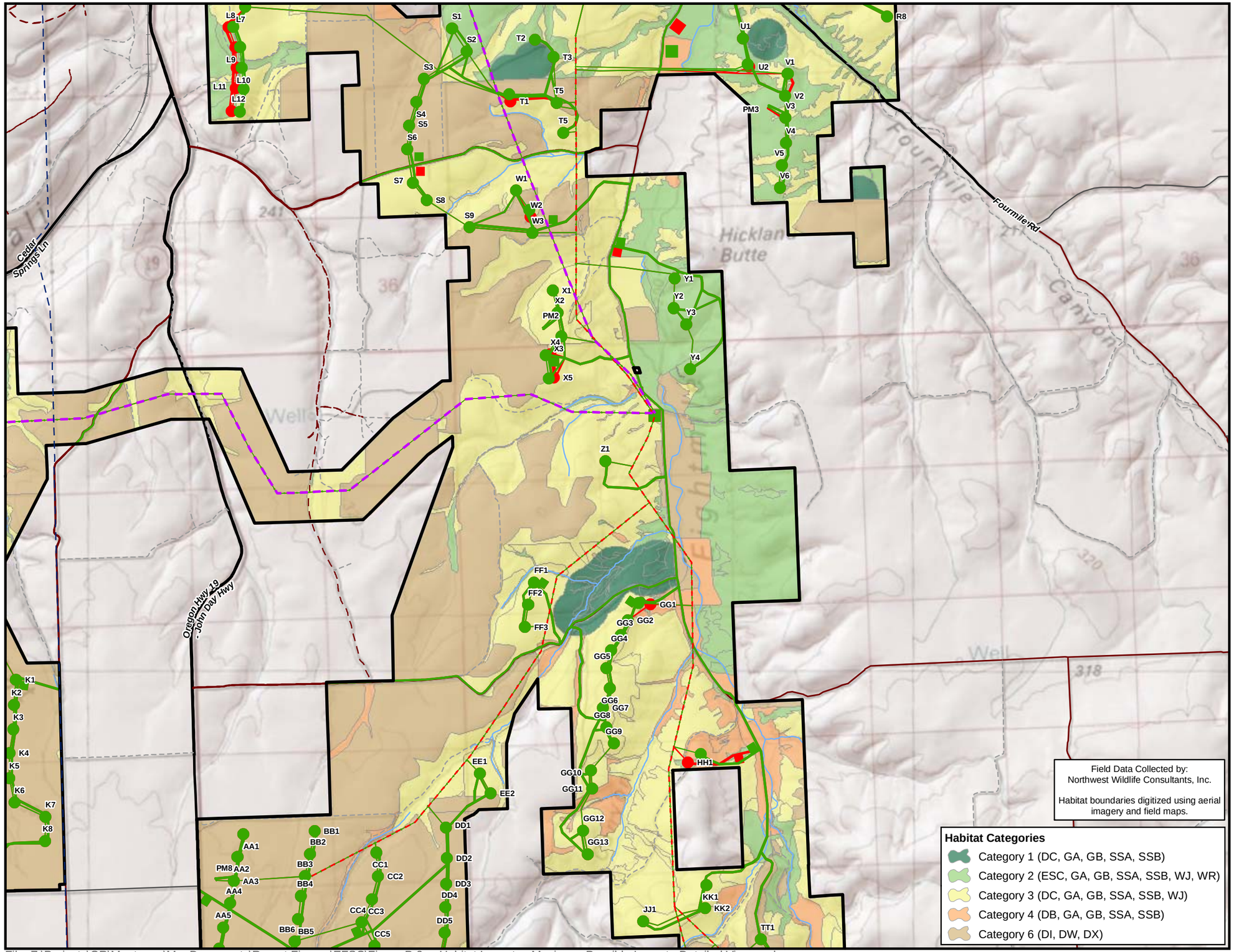
Modify Date: 1/11/2010

Figure P-9c

Habitat Categories:
Maximum Possible Impact -
Detailed View 3 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility



Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

Habitat Categories

- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)

- Site Boundary
- Current Footprint (Permanent and Temporary)
- Worst Case-Scenario Footprint (Permanent and Temporary)

Proposed Permanent Facilities

- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line

Existing Facilities

- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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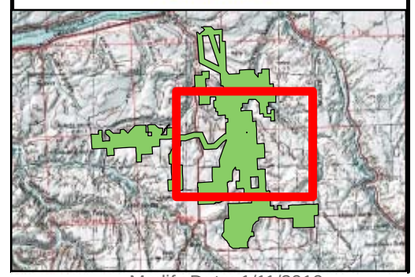
Miles

IBERDROLA RENEWABLES



File: Z:\Projects\OR\Montague\MapDocuments\Report Figures\EFSC\Figure P-9c - Habitat Impacts - Maximum Possible Impact - Detailed View.mxd

Modify Date: 1/11/2010

Figure P-9d

Habitat Categories: Maximum Possible Impact - Detailed View 4 of 4

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Habitat Categories
- Category 1 (DC, GA, GB, SSA, SSB)
- Category 2 (ESC, GA, GB, SSA, SSB, WJ, WR)
- Category 3 (DC, GA, GB, SSA, SSB, WJ)
- Category 4 (DB, GA, GB, SSA, SSB)
- Category 6 (DI, DW, DX)

Field Data Collected by:
Northwest Wildlife Consultants, Inc.

Habitat boundaries digitized using aerial imagery and field maps.

- Site Boundary
- Current Footprint (Permanent and Temporary)
- Worst Case-Scenario Footprint (Permanent and Temporary)

Proposed Permanent Facilities
- Proposed Overhead 34.5-kV Line

Existing Facilities
- Existing Transmission Line
- Public, Paved
- Public, Gravel
- Other Public Road
- Private, Gravel
- Other Private Road
- Major Railroad Line
- Streams
- County Boundary

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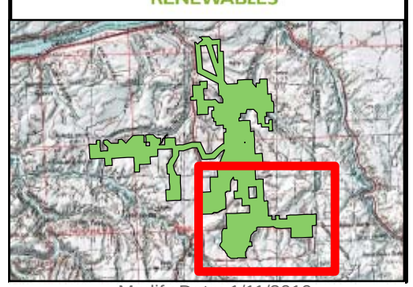
Miles

IBERDROLA RENEWABLES



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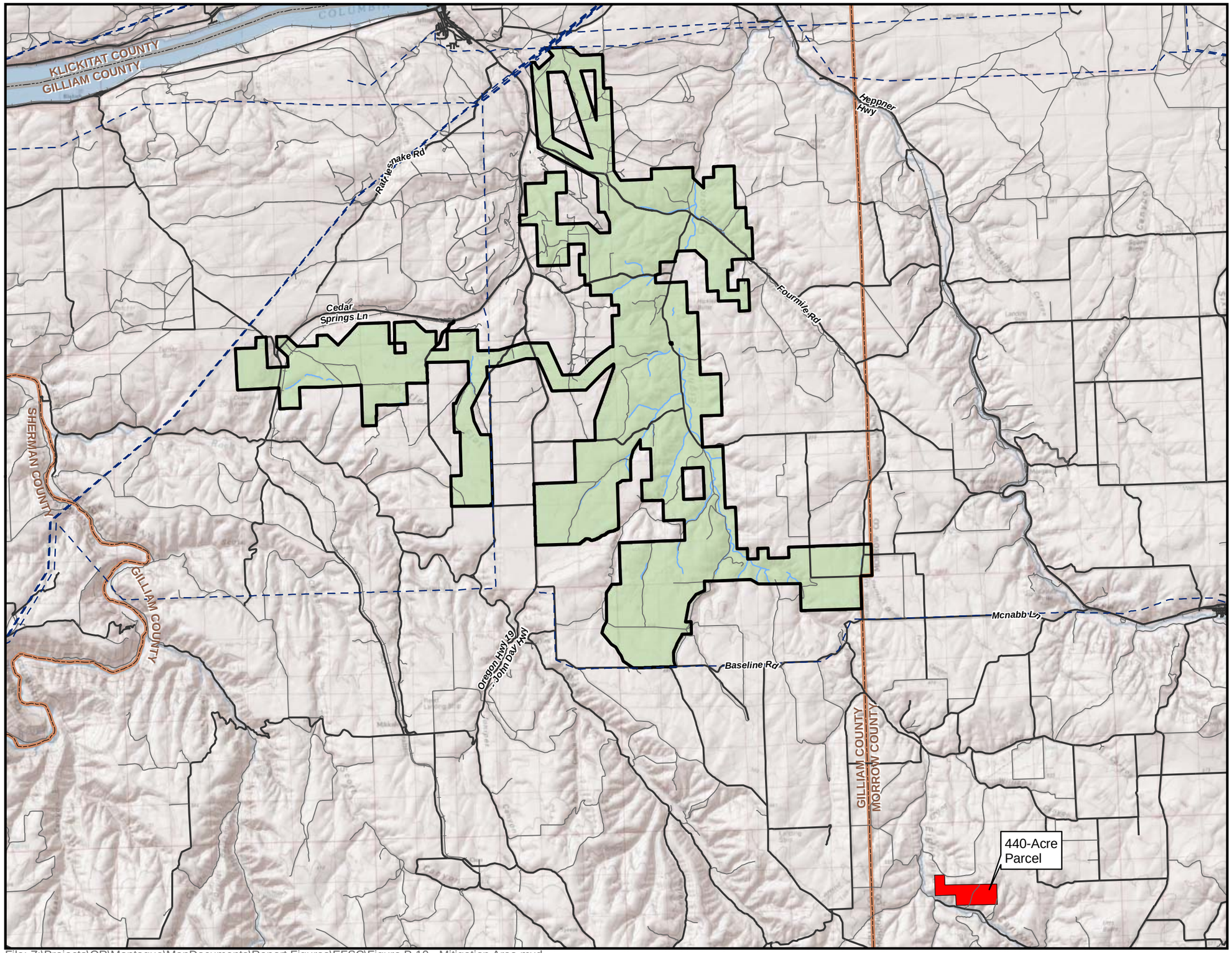
Modify Date: 1/11/2010

Figure P-10

Habitat Mitigation Area

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility



- Site Boundary
- Micrositing Corridor
- Proposed Mitigation Area

Existing Facilities

- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- Streams
- State Boundary
- County Boundary

N
W E
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Miles

IBERDROLA RENEWABLES

File: Z:\Projects\OR\Montague\MapDocuments\Report Figures\EFSC\Figure P-10 - Mitigation Area.mxd

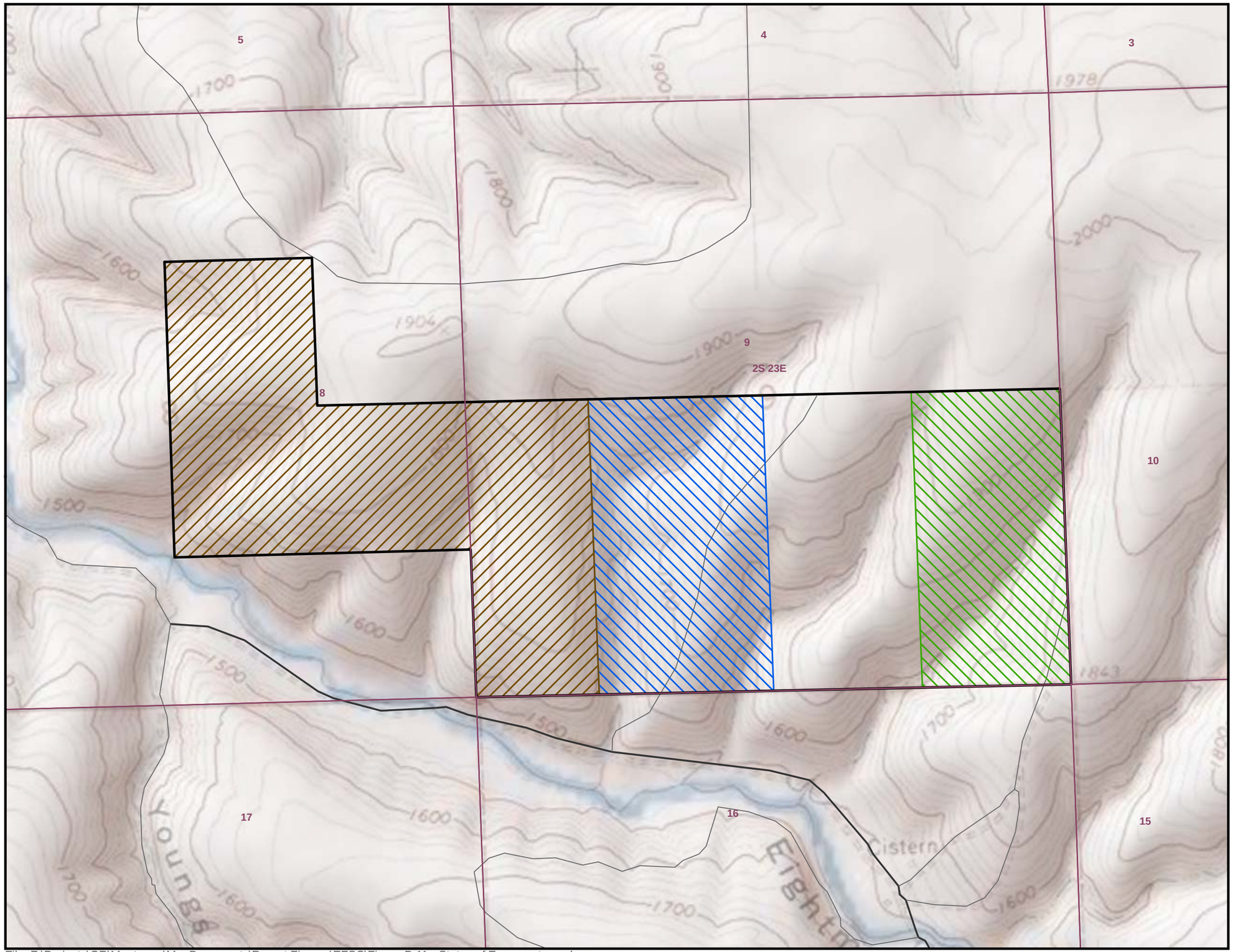
Modify Date: 1/11/2010

Figure P-11

Status of Conservation Easements

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility



- Proposed Mitigation Site
- PacifiCorp's Leaning Juniper I Wind Facility - 80 acre Mitigation Site
- Leaning Juniper II Wind Facility - 92 acre Mitigation Site
- Montague Wind Facility - Mitigation Site to be located within remaining 188 acres

Existing Facilities

- Public Road
- Private Road

N
W E
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0 500 1,000 1,500
Feet

IBERDROLA RENEWABLES

File: Z:\Projects\OR\Montague\MapDocuments\Report Figures\EFSC\Figure P-11 - Status of Easements.mxd

Modify Date: 1/11/2010

EXHIBIT Q

THREATENED AND ENDANGERED PLANT AND ANIMAL SPECIES

OAR 345-021-0010(1)(q) and OAR 345-022-0070

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Attachment

Q-1 Preliminary Rare Plant Evaluation for the Montague Wind Power Facility

Q.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). Up to 269 turbines will be located at the Facility site, depending on the final turbine size and vendor (as further described in Exhibit B, Section B.1.3). This Exhibit provides information under OAR 345-021-0010(1)(q) to demonstrate that the threatened and endangered species standard in OAR 345-022-0070 can be satisfied. OAR 345-022-0070 requires the following:

"[T]he Council, after consultation with appropriate state agencies, must find that:

(1) For plant species that the Oregon Department of Agriculture has listed as threatened or endangered under ORS 564.105(2), the design, construction and operation of the proposed facility, taking into account mitigation:

(a) Are consistent with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3); or

(b) If the Oregon Department of Agriculture has not adopted a protection and conservation program, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species; and

(2) For wildlife species that the Oregon Fish and Wildlife Commission has listed as threatened or endangered under ORS 496.172(2), the design, construction, and operation of the proposed facility, taking into account mitigation, are not likely to cause a significant reduction in the likelihood of survival or recovery of the species."

As discussed in more detail below, Exhibit Q contains evidence upon which the Council can make the required findings under OAR 345-022-0070 and conclude that the Facility will not likely cause a significant reduction in the likelihood of survival or recovery of specified plant and wildlife species within the analysis area (which includes the area within the Facility site boundary and the area within 5 miles of the site boundary (see Figure Q-1[1] Project Order, Section VI.

In short, for plants, one population of the Oregon state threatened Laurent's milk-vetch (*Astragalus collinus* var. *laurentii*) was identified within the Facility site boundary during surveys conducted for LJIIB (Figure Q-3). In addition, two populations of the Oregon candidate plant species, sessile mousetail, were identified within the Facility site boundary during surveys conducted for Pebble Springs (PPM, 2006) (Figure Q-3). Based on habitats present within the site boundary, the Oregon candidate species, dwarf evening primrose, may also occur. There is no plant protection and conservation

[1] As discussed in Exhibit C, the Applicant requests that the Site Certificate authorize a micrositing corridor. Turbines will be placed within a defined corridor rather than at specific points in order to retain flexibility to microsite turbines at the optimal locations for wind capture, impact avoidance, and geotechnical conditions at the Facility site. Because micrositing corridors, for ease of description and depiction, are generally regularly shaped polygons, certain micrositing corridors overlap with patches of Category 1 habitat. However, the Applicant will site all permanent facilities outside such Category 1 habitat when finalizing the layout. No permanent facilities will be located within Category 1 habitat.

program applicable to the site. Therefore, OAR 345-022-0070(1)(a) does not apply, and the Council may make the finding required by OAR 345-022-0070(1)(b).

For wildlife species, extensive information reviews revealed that listed wildlife species are not likely to occur at, or be affected by, the Facility, except for the state endangered and federal candidate Washington ground squirrel (WGS), which was observed within the Facility site boundary. However, as described below and in Exhibit P, the Facility will not cause a significant reduction in the likelihood of WGS survival or recovery, as the Applicant has designed the Facility to avoid Category 1 habitat.[2]

Therefore, based on the information presented in this Exhibit, the Council may find that the Facility will not cause a significant reduction in the likelihood of any threatened or endangered plant or wildlife species' survival or recovery, and OAR 345-022-0070(1) and (2) are satisfied.

Q.2 THREATENED AND ENDANGERED SPECIES THAT MAY BE AFFECTED

OAR 345-021-0010(1)(q) *Information about threatened and endangered plant and animal species that may be affected by the proposed facility, providing evidence to support a finding by the Council as required by OAR 345-022-0070. The applicant shall include:*

OAR 345-021-0010(1)(q)(A) *Based on appropriate literature and field study, identification of all threatened or endangered species listed under ORS 496.172(2), ORS 564.105(2) or 16 USC § 1533 that may be affected by the proposed facility;*

Q.2.1 Summary Table of Threatened and Endangered Species

Response: Species data were obtained from the U.S. Fish and Wildlife Service (USFWS) County lists for Gilliam and Morrow, Oregon and Klickitat, Washington and from the Oregon Natural Heritage Information Center (ORNHIC) database query (see Exhibit P, Attachment P-6). Based on these data, 47 state and federal threatened, endangered, and candidate species were identified as potentially occurring within the Facility site boundary and a 5-mile buffer area. Of these, 18 species are only listed or candidates in Washington State and are not listed federally or in the state of Oregon. These species, as well as other state sensitive species and federal species of concern (non-listed special-status species) are addressed in Exhibit P. State and federal threatened, endangered and candidate species are discussed in Exhibit Q.

Table Q-1 provides a summary of the threatened, endangered, and candidate plant and wildlife species with known or potential occurrence within the analysis area, and the corresponding impact potential. The only federal or Oregon State-listed or candidate species with known records within 5 miles of the Facility are Laurent's milk-vetch, sessile mousetail, and WGS.

[2] Section P.4.1 in Exhibit P explains how the Applicant classified Category 1 habitat within the Facility site boundary.

Table Q-1. State and Federal Listed and Candidate Species with Potential Occurrence within 5 miles of the Site Boundary

Species	Federal Status[1]	Oregon Status[1]	Washington Status[1]	Occurrence	Impact Potential[2]
Plants					
Ute-Ladie's-tresses *Spiranthes diluvialis*	LT	--	LE	No	No
Northern Wormwood *Artemisia borealis* ssp. *wormskioldi*	C	LE	LE	No	No
Laurent's milk-vetch *Astragalus collinus* var. *laurentii*	--	LT	--	Yes	Yes
Sessile Mousetail *Myosurus sessilis*	--	C	--	Yes	Yes
Dwarf Evening Primrose *Camissonia pygmaea*	SoC	C	SS	No	No
Clustered Lady's-slipper *Cypripedium fasciculatum*	SoC	C	SS	No	No
Suksdorf's Desert-Parsley *Lomatium suksdorfii*	Soc	C	SS	No	No
White Meconella *Meconella oregana*	SoC	C	T	No	No
Disappearing Monkeyflower *Mimulus evanescens*	SoC	C	--	No	No
Liverwort Monkey-flower *Mimulus jungermanioides*	SoC	C	EX	No	No
Barrett's Beardtongue *Penstemon barrettiae*	SoC	C	T	No	No
Obscure Buttercup *Ranunculus reconditus* (= *triternatus*)	SoC	E	E	No	No
Persistent Sepal Yellowcress *Rorippa columbiae*	SoC	C	E	No	No
Pale Blue-eyed Grass *Sisyrhinchium sarmentosum*	SoC	C	T	No	No
Mammals					
Gray Wolf *Canis lupus*	LE	LE	LE	No	No
Fisher *Martes pennanti*	C	--	LE	No	No
Washington Ground squirrel *Spermophilus washingtoni*	C	LE	C	Yes	Yes
Birds					
Bald Eagle (*Haliaeetus leucocephalus*)	D	LT	SS	No	No
Northern Spotted Owl *Strix occidentalis caurina*	LT	LT	LE	No	No
Yellow-billed Cuckoo (*Coccyzus americanus*)	C	--	C	No	No

Table Q-1. State and Federal Listed and Candidate Species with Potential Occurrence within 5 miles of the Site Boundary

Species	Federal Status[1]	Oregon Status[1]	Washington Status[1]	Occurrence	Impact Potential[2]
Amphibians and Reptiles					
Oregon Spotted Frog *Rana pretiosa*	C	--	LE	No	No
Fish					
Steelhead – Mid-Columbia River ESU, summer run *Oncorhynchus mykiss*	LT	SV	SC	No	No
Steelhead – Upper Columbia River ESU	LE	--	SC	No	No
Steelhead – Snake River Basin ESU	LT	--	SC	No	No
Sockeye Salmon – Salmon River Tributary to the Snake River *Oncorhynchus nerka*	LE	--	SC	No	No
Chinook Salmon – Snake River ESU, spring/summer and fall runs *Oncorhynchus tshawytscha*	LT	LT	SC	No	No
Chinook Salmon – Upper Columbia River ESU *Oncorhynchus tshawytscha*	LE	--	SC	No	No
Bull trout *Salvelinus confluentus*	LT	--	SC	No	No
Invertebrates					
Mardon Skipper *Polites mardon*	C	--	LE	No	No

[1] **State and Federal Status Definitions**

LE Listed Endangered. Taxa listed by the USFWS or National Marine Fisheries Service (NMFS) as Endangered under the Endangered Species Act (ESA), or by the Departments of Agriculture (ODA) and Fish and Wildlife (ODFW) of the state of Oregon under the Oregon Endangered Species Act of 1987 (OESA). Endangered taxa are those which are in danger of becoming extinct within the foreseeable future throughout all or a significant portion of their range.

LT Listed Threatened. Taxa listed by the above agencies as Threatened; defined as those taxa likely to become endangered within the foreseeable future.

PE Proposed Endangered. Taxa proposed by the above agencies to be listed as endangered.

PT Proposed Threatened. Taxa proposed by the above agencies to be listed as threatened.

C Candidate. Candidate taxa for which NMFS or USFWS have sufficient information to support a proposal to list under the ESA, or which is a candidate for listing by the ODA under the OESA.

D Delisted. Removed from the federal list of endangered species.

SS State Sensitive. Any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats

SC State Sensitive-Critical. Species for which listing is pending, or those for which listing may be appropriate if immediate conservation activities are not taken. Also considered critical are some peripheral species which are at risk throughout their range, and some disjunct populations.

Sources: ORNHIC, 2009; USFWS, 2009a, 2009b, 2009c

Q.2.2 Methodology Used to Identify Threatened and Endangered Species

Response: Methods used to identify state and federal threatened and endangered species are described in sections Q.2.2.1 (Literature Review) and Q.2.2.2 (Field Surveys). Section Q.2.2.3 summarizes the methods.

Q.2.2.1 Literature Review

General

Species data were obtained from USFWS for Gilliam, Morrow, and Klickitat county lists and from the ORNHIC database query for state and federal listed and candidate species, as well as state sensitive species and federal species of concern (non-listed special-status species) within the analysis area.

Based on results of the USFWS county lists and the ORNHIC database query, as well as input from biologists knowledgeable in the Facility area, 47 state and federal threatened, endangered and candidate species were identified as potentially occurring within the analysis area. Of these, 18 species are only state listed or candidates in Washington State and are not listed federally or in the state of Oregon, and are therefore discussed in Exhibit P. The only federal or Oregon-state listed or candidate species with known records within 5 miles of the Facility are Laurent's milk-vetch, sessile mousetail, and WGS.

The Applicant reviewed the list of species obtained from the USFWS and ORNHIC and assessed the potential for these species to occur based on suitable habitat, professional experience, and consultation with the Oregon Department of Fish and Wildlife (ODFW).

There are no Oregon Department of Agriculture (ODA) plant protection and conservation programs that apply to the Facility or within the site boundary, nor are wildlife conservation programs in place.

Plants

The USFWS and ORNHIC were queried for information on listed and sensitive plant species in Gilliam, Morrow, and Klickitat counties documented within 5 miles of the site boundary.

To supplement the information provided by the above sources, the following sources were consulted:

- Rare and Endangered Plants of Oregon (Eastman, 1990)
- Flora of the Pacific Northwest (Hitchcock and Cronquist, 1973)
- Threatened and Endangered Vascular Plants of Oregon: an Illustrated Guide (Meinke, 1982)
- A Field Guide to Pacific States Wildflowers: Washington, Oregon, California, and Adjacent Areas (Niehaus and Ripper, 1976)

- Rare, Threatened and Endangered Plants and Animals of Oregon (ORNHIC, 2007)

- Interactive Plant Keys and Color Photos for Oregon (Oregon Flora Project, n.d.)

These sources provided additional information on rare plant species that potentially occur in the analysis area and included critical information such as habitat preferences, morphological characteristics, phonologic development timelines, and species ranges.

State and federal listed, candidate, and proposed special-status plant species potentially occurring within and near the site boundary were identified based on the results of the ORNHIC and USFWS responses, and are listed in Table Q-1 along with the potential for project impacts. Species that are not state or federal listed, candidate, or proposed are discussed in Exhibit P, as are species that are Washington State-listed, but lacking federal or Oregon State listed or candidate status. Habitat preferences were derived from the literature and the specialists' regional knowledge and experience for each species.

Wildlife

The USFWS and ORNHIC were queried for information on listed and sensitive wildlife species in Gilliam, Morrow, and Klickitat counties documented within 5 miles of the site boundary. The responses are listed in Table Q-1 along with the survey results.

Over the past several years, NWC has contacted ODFW for information on wildlife habitat requirements and distribution within and in the site boundary. In addition, the following technical reports were reviewed for relevant biological resource information as part of the baseline study or following completion of the baseline study:

- Current Status of Washington Ground Squirrels in Oregon and Washington (Betts, 1999)

- Status and Habitat Use of the Washington Ground Squirrel (*Spermophilus washingtoni*) on State of Oregon Lands, South Boeing, Oregon, in 1999 (Morgan and Nugent, 1999)

- Dispersal Patterns of Washington Ground Squirrels in Oregon (Klein, 2005)

- Home Range, Movement, and Foraging Behavior of Adult Washington Ground Squirrels (Delevan, 2005)

- Biological Enhancement Study for the Columbia Ridge Landfill and Recycling Center (Waste Management, 1990)

- Survey of Peregrine Falcon Breeding Areas in Oregon during 2003–2007: Final Report (Isaacs, 2008)

- Results of Bald Eagle Nest Monitoring (Isaacs and Anthony, 2007)

In addition, data collected by local wildlife biologists for the general area was reviewed.

State and federal listed, candidate, and proposed special-status wildlife species potentially occurring within and near the site boundary were identified based on the results of the ORNHIC and USFWS responses, and are listed in Table Q-1 along with the potential for project impacts. Species that are not state or federal listed, candidate, or proposed are discussed in Exhibit P, as are species that are Washington State-listed, but lacking federal or Oregon State listed or candidate status. In addition, existing literature and scientific data were reviewed.

Q.2.2.2 Field Surveys

Plants

Rare plant habitat requirements were derived from the literature for each species and the biologists' long-term experience in the general area as well as within the analysis area, as described in Section Q.2.2.1.

Special-status plant surveys were conducted by Northwest Wildlife Consultants (NWC) in areas of the Facility site boundary that overlap with Pebble Springs in spring 2006 (PPM, 2006) and with LJIIB in spring 2009 (NWC, 2009a). The survey methods were similar to those conducted for other wind-energy facilities in the area.

In 2009, the Applicant contracted CH2M HILL to design and conduct a botanical field investigation for the proposed Facility for threatened, endangered, and rare plant species, as described in Attachment Q-1. Based on a preliminary review of existing habitat conditions and the results of the literature review, potentially suitable habitat is present for dwarf evening primrose, as well as the two special-status species that have already been identified within the site boundary: Laurent's milk-vetch and sessile mousetail. CH2M HILL conducted a habitat assessment for state and federal listed plants within portions of the site boundary accessible by roads between October 12 and December 4, 2009 (Attachment Q-1). Biologists will conduct focused botanical surveys in the spring of 2010 to identify additional state or federally listed species located near proposed Facility components. Preliminary survey corridors for the planned botanical surveys are shown in Figure P-2. CH2M HILL will provide a written report of the field investigation to the Department to detail any identified state and federal listed or candidate plant species.

If any state or federally listed plant species are identified during the supplemental field investigation, the Applicant will ensure that construction and operation of the Facility will have no impact on individuals or populations. The Applicant will instruct all construction personnel to avoid these areas and shall implement other appropriate measures to protect the resources. Section Q.4 provides further details on avoidance measures.

Wildlife

Wildlife habitat requirements were derived from the literature for each species and the biologists' long-term experience in the general area as well as within the analysis area, as described in Section Q.2.2.1.

Surveys for state and federal listed and candidate wildlife species were conducted for portions within the Facility site boundary by NWC at Pebble Springs in spring 2006 (PPM, 2006) and at LJIIB in spring 2009 (NWC, 2009a). Survey methods were the same as those described in Attachment P-7 to Exhibit P (NWC, 2009b).

In 2008, the Applicant enlisted the expertise of NWC to design and conduct habitat and wildlife field investigations for the proposed Facility (Exhibit P, Attachment P-7). Suitable habitat for federal and state listed wildlife within the site boundary was evaluated by conducting habitat mapping of broad level habitat types. Special-status species surveys, focused primarily on WGS, were conducted in March 2008 in a portion of the site boundary (see Section 3.2.3.1 and Figure Q-2). In addition, NWC personal field notes were reviewed for WGS locations within the Facility vicinity (Kronner, 2009). Habitats were then assigned habitat quality ratings (Exhibit P, Attachment P-7).

No federal-listed or candidate wildlife species were identified as potentially occurring within the analysis area. The following state-listed or candidate wildlife species were identified as potentially occurring within the analysis area based on existing habitat conditions: WGS and bald eagle. Some areas within the site boundary were previously surveyed for Pebble Springs in spring 2006 (PPM, 2006) and for LJIIB in the spring of 2009 (NWC, 2009a). Additional wildlife surveys are also planned for the spring of 2010. These surveys will be conducted prior to construction, and the Applicant has committed to designing the permanent Facility components and temporary disturbance areas to avoid any threatened, endangered, or candidate species found during these clearance surveys.

Following is a summary of the biological investigations, including those surveys that are ongoing or planned for 2010:

- Pre-field literature review, soil maps review, database queries, site reconnaissance, and agency consultation.

- Wildlife habitat mapping and categorization in 2009; field verification and re-assessment of categories, if needed, pending results of 2010 wildlife surveys.

- Avian use surveys of five plots conducted for a full year: fall season 2008, winter season 2008–2009, spring and summer seasons 2009.

- Avian use surveys of six plots in fall season 2009 in areas not covered by previous avian use surveys. Results of these ongoing surveys for seasons not yet completed will be presented in an addendum to this report.

- Raptor nest surveys in 2009, and planned spring 2010 surveys.

- Washington ground squirrel surveys conducted in spring 2008, and planned 2010 spring season surveys.

- Other special status vertebrate wildlife species surveys conducted in spring 2008, and planned 2010 spring season surveys.

- Bat species review for species occurrence in the general area.

Survey methods are detailed in the NWC Biological Investigations Report (Exhibit P, Attachment P-7).

Before beginning construction, the Applicant will provide to the Department a map showing the final design locations and areas that would be disturbed during construction. Category 1 habitat for WGS, Laurent's milk-vetch, sessile mousetail, and other identified threatened, endangered, or candidate species populations will be avoided. The Applicant will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources. Category 1 WGS habitat, Laurent's milk-vetch, sessile mousetail populations will be avoided as described in Section Q.4.

Q.3 EXISTING CONDITIONS AND POTENTIAL IMPACTS TO SPECIAL-STATUS SPECIES

OAR 345-021-0010(1)(q)(B) *For each species identified under (A), a description of the nature, extent, locations and timing of its occurrence in the analysis area and how the facility might adversely affect it;*

Response:

Q.3.1 Overview

According to the database results received from ORNHIC and the species lists from USFWS, 47 state and federally listed species were identified as potentially occurring within the site boundary or a 5-mile analysis area (see Table Q-1). Species addressed in this Exhibit that potentially occur in Gilliam, Morrow, and Klickitat counties include gray wolf, fisher, WGS, bald eagle, northern spotted owl, yellow-billed cuckoo, Oregon spotted frog, seven fish populations, the Mardon skipper butterfly, Ute ladies'-tresses, northern wormwood, Laurent's milk-vetch, sessile mousetail, dwarf evening primrose, clustered lady's-slipper, Suksdorf's desert-parsley, white meconella, disappearing monkeyflower, Barrett's beardtongue, obscure buttercup, and pale blue-eyed grass (see Table Q-1). The following species: gray wolf, fisher, northern spotted owl, Oregon spotted frog, Mardon skipper, Ute ladies'-tresses, northern wormwood, clustered lady's-slipper, Suksdorf's desert-parsley, white meconella, Barrett's beardtongue, obscure buttercup, persistent sepal yellowcress, and pale blue-eyed grass, which are only found on the USFWS' Klickitat County list, are not likely to occur in or near the Facility site boundary because of the species' ranges and/or lack of suitable habitat at the site or adjacent to the site. In addition, the seven fish populations are unlikely to occur in or near the Facility site boundary because the project area lacks perennial stream habitat. Because there are no impacts expected to these species, they are not addressed further in this Exhibit.

Q.3.2 Identification of Species that Might be Affected

Based on literature review, technical report review, the experience of field surveyors, and preliminary agency contacts, a list was generated of all listed plant and wildlife species either known to occur or having the potential to occur within the analysis area. Table Q-1 lists those species included in the USFWS Gilliam, Morrow, and Klickitat counties, Oregon, and the ORNHIC database search for the 5-mile analysis area, along with a description of potential occurrence based on the literature review and field surveys.

This Exhibit includes state and federally listed, candidate, and proposed species; non-listed special-status species, including federal species of concern, state sensitive species, and other nonlisted, rare species, and species that are only listed or candidates for listing in Washington State (i.e. species that are not also federal or Oregon State-listed or candidates for listing) are addressed in Exhibit P. Candidate and proposed species are included in this Exhibit because of their potential to be listed during the energy facility siting process. A narrative discussion of all species on the broader list follows, along with a more in-depth review for the WGS, bald eagle, Laurent's milk-vetch, sessile mousetail, and dwarf evening primrose, the species with documented habitat and/or occurrence in the general area.

Q.3.2.1 Plants

According to the information reviewed from USFWS and ORNHIC, state and federally listed and candidate wildlife species that occur or possibly occur in Gilliam, Morrow, and Klickitat counties are Ute ladies'-tresses, northern wormwood, Laurent's milk-vetch, sessile mousetail, dwarf evening primrose, and persistent sepal yellowcress. Of these, Laurent's milk-vetch sessile mousetail were confirmed within the site boundary and dwarf evening primrose potentially occurs, based on a review of habitat suitability within the site boundary. Because there is no suitable habitat and/or the Facility would be located outside of the historical and/or current range of the other three plant species, they are not addressed further in this Exhibit.

Q.3.2.2

Laurent's Milk-vetch

Natural History and Occurrence in the Analysis Area

Laurent's milk-vetch is Oregon state listed as threatened. This species has no federal or Washington State status.

In 2009, during a rare plant survey for LJIIB, NWC discovered a population of Laurent's milk-vetch near Alkali Canyon (NWC, 2009a). This population is located within the site boundary of the Montague Facility. ORNHIC also provided a historical record (1950) of the species located within the 5-mile area, but outside of the site boundary (ORNHIC, 2009). Laurent's milk-vetch is a perennial, so if additional populations occur, this present should be present throughout the year. Additional botanical surveys are planned during

the appropriate bloom period in 2010 to identify if other populations are present within the site boundary.

Potential Impacts

Primary threats to this species include roadside herbicide application and livestock grazing. The Applicant will implement the measures described under Section Q.4, including micrositing facilities away from populations and avoiding confirmed populations within 200 feet of proposed construction areas. Weed control measures will also be implemented as described in the Revegetation Plan and Weed Control Plan required as part of the Site Certificate. Therefore, no impacts are expected to occur to populations of Laurent's milk-vetch.

Sessile Mousetail

Natural History and Occurrence in the Analysis Area

Sessile mousetail is a state candidate for listing as threatened or endangered and a federal species of concern. It has no status in Washington State.

Sessile mousetail occurs in alkali flats and vernal pools. ORNHIC reported two populations of sessile mousetail within the 5-mile analysis area, but outside of the site boundary. The nearest of these is approximately 0.31 mile north of the western portion of the site boundary on the opposite side of a railway corridor. The other documented population of sessile mousetail is located within the LJII site boundary](NWC, 2009a). Five additional populations were documented within the analysis area for the nearby Pebble Springs wind-energy facility, including two populations within the Montague site boundary. In addition, the Applicant identified potentially suitable alkaline seasonal wetland/vernal pool habitat for this species in several areas within the Facility site boundary (Figure Q-3). Sessile mousetail is a perennial, so if additional occurrences were present on the site they would be present year-round, though this species would be difficult to distinguish during the dry and non-growing periods. Botanical surveys are planned during the appropriate bloom period in 2010 to identify any additional populations present within the site boundary.

Potential Impacts

As with the Laurent's milk-vetch, primary threats to this species include roadside herbicide application and livestock grazing. The Applicant will implement the measures described under Section Q.4, including micrositing facilities away from populations and installing exclusion fencing around confirmed populations within 200 feet of proposed construction areas. Weed control measures will also implemented as described in the Revegetation Plan and Weed Control Plan required as part of the Site Certificate. Therefore, no impacts are expected to occur.

Dwarf Evening Primrose

Natural History and Occurrence in the Analysis Area

Dwarf evening primrose is an Oregon State candidate for listing as threatened or endangered and a federal species of concern. It is also classified as a sensitive species in Washington State.

This species occurs on unstable soil or gravel in steep talus, dry washes, banks and roadcuts. ORNHIC had no record of dwarf evening primrose within the 5-mile analysis area and no populations of this species were reported from adjacent and nearby facilities including LJI, LJII, Pebble Springs, Shepherds Flat (NWC and WEST, 2005; PPM, 2006; CSF, 2007). However, potentially suitable habitat for this species occurs within the site boundary (see Exhibit P, Attachment P-9). Dwarf evening primrose is an annual, so if it occurred on the site it would not be present year-round. Botanical surveys are planned during the appropriate bloom period in 2010 to identify any additional populations present within the site boundary.

Potential Impacts

Dwarf evening primrose has not been documented in the analysis area. Primary threats to this species include resource extraction (gravel), roadside herbicide application and drift, and exotic plant invasion. The Applicant will implement the measures described under Section Q.4. In the unlikely event that this species is identified during preconstruction surveys, the Applicant will microsite facilities away from populations and install exclusion fencing around confirmed populations within 200 feet of proposed construction areas. Therefore, no impacts to dwarf evening primrose are expected to occur.

Q.3.2.3 Wildlife

According to the information reviewed from USFWS and ORNHIC, state and federally listed and candidate wildlife species that occur or possibly occur in Gilliam, Morrow, and Klickitat counties, are the gray wolf, fisher, WGS, bald eagle, northern spotted owl, yellow-billed cuckoo, Oregon spotted frog, Middle Columbia steelhead Evolutionarily Significant Unit (ESU), Snake River basin steelhead ESU, Snake River Chinook ESU, Middle Columbia steelhead ESU, bull trout, and Mardon skipper. The county lists include the extent of each county, which takes in higher elevation and forested habitats where additional listed or candidate species may occur. Of these, only the WGS and bald eagle are likely to occur based on a review of habitat suitability within the site boundary. Because there is no suitable habitat for the remaining species and because, for many of these species, the Facility would be located outside of their historical and/or current range, they are not addressed further in this Exhibit.

Washington Ground Squirrel

Natural History and Occurrence in the Analysis Area

WGS Studies for the Facility. The WGS is a state endangered species and a federal candidate for listing as threatened or endangered.

Historically, this species was abundant in the sagebrush (*Artemesia tridentata*) and bluebunch wheatgrass (*Pseudoroegneria spicatum*) habitats throughout the Columbia plateau east and south of the Columbia River in Washington and Oregon (Bailey, 1936; Howell, 1938). The extent of its current range is not known with certainty, but it is greatly reduced from the historic range (Betts, 1999). Agricultural and grazing activities have fragmented and disturbed the native vegetation. Today, much of the remaining native habitat is dominated by rabbitbrush (*Chyrysothamnus visciduiflorus* and *C. tectorum*) and cheatgrass (*Bromus tectorum*) or is grazed intensively, reducing forage and cover for the ground squirrels. In this degraded habitat, the WGS is found most often in areas that have good cover (annual grasses and forbs) and deep, loose soils with low clay content, enabling burrow excavation.

Detections (holes, pellets, individuals, or vocalizations) were discovered within the Facility site boundary in 12 locations in March 2008 and in one location in 2006/2007 (Table Q-2, Figure Q-2 and Figure 5 in Attachment P-7). Table Q-2 describes each location's characteristics and other pertinent information. WGS were seen in three locations, vocalizations confirming presence were heard in one location, and fresh pellets were found in several locations. Most locations were very small in size ranging from one to three holes, but at four sites, there were multiple individuals (number undetermined) as confirmed by numerous WGS holes (7 to more than 10). Most active sites were noted in rabbitbrush/snakeweed shrub-steppe habitat, but three were in sagebrush shrub-steppe habitat. The 2006/2007 WGS area (Kronner, 2009) was in sagebrush shrub-steppe and native perennial grassland habitats (Table Q-2).

Locations where WGS sign of use (holes, pellets, vocalizations) were recorded in 2008 and 2009 within 2010 survey corridors will be re-visited once in 2010 to confirm activity status. Unsurveyed Facility corridors will also be surveyed; two surveys will be conducted. Results of the 2008, 2009 and planned 2010 wildlife surveys will be reported following the 2010 surveys.

WGS Studies for Other Facilities. WGS were detected at two additional locations within the Facility site boundary during surveys conducted for other wind projects (Figure 5 in Attachment P-7). One location with approximately 10 holes and pellets in rabbitbrush/snakeweed shrub-steppe habitat was found during surveys for LJIIB (NWC, 2009b, see Attachment P-7). This cluster of burrows is located within the Facility site boundary to the east of the proposed G turbine string. The second location was a confirmed WGS hole at Pebble Springs in 2006. The WGS hole was found in perennial grassland habitat (PPM, 2006) located within what is now the northern part of the Facility site boundary near the proposed transmission line, but this location was not found to be active in 2009 (Gritski et al., 2009b). Surveys are planned for the area in 2010.

Table Q-2. Washington Ground Squirrel Detections within the Montague Site Boundary

WGS Site #	Soils	Mapped Habitat Type (2009)	Estimated Size	General Notes	General Location
1	4C	SSA	Very small	Holes plus droppings	Western portion of Facility
2	4C	SSA	Very small	3 holes, fresh pellet	Western portion of Facility
3	4C	SSA	Small	7-8 holes	Western portion of Facility
4	23B	SSB	Small	Approx. 10 holes	Western portion of Facility
5	23C	SSB	Very small	1 fresh hole, 1 fresh pellet	Western portion of Facility
6	56B	GA	Small	10+ holes, vocalization	Western portion of Facility
7	23B	SSB	Very small	3 holes, 1 dropping	Northeastern portion of Facility
8	55B	SSB	Very small	1 dropping, 1 hole	Northeastern portion of Facility
9	55D	SSB	Small	Numerous holes, dropping	Northeastern portion of Facility
10	40D	SSB	Very small	WGS seen + lots of holes	Northeastern portion of Facility
11	40D	SSB	Very small	WGS seen, old dropping	Northeastern portion of Facility
12	55C,55E	SSA, GB	Unknown	WGS seen from Tree Lane in 2006 and 2007	Central portion of Facility
13	55B	SSB	Very small	1 hole with WGS dropping found incidentally while onsite	Northeastern portion of Facility

Source: Kronner, 2009 (Attachment P-7)

Estimated Size (based on one survey in March (Sites 1-11) and incidental observations obtained from other sources (Sites 12 and 13).

Very Small = < 10 individuals, usually single to several holes, may be one or a few individuals. Small = 10 to 30 individuals.

Medium = 30 to 40 individuals. Large = 40 to 100+ individuals.

Soils

4C – Blalock loam
23B, 23C – Olex silt loam
40D – Sagehill fine sandy loam
55B, 55C, 55D, 55E – Warden silt loam
56B – Willis silt loam

Mapped Habitat Types

SSA – Shrub-steppe, Sagebrush
SSB – Shrub-steppe, Rabbitbrush/Snakeweed
GA – Grassland, Exotic Annual Grass
GB – Grassland, Native Perennial

Potential Impacts

As discussed extensively in Exhibit P, no temporary or permanent facilities are proposed within Category 1 WGS habitat. During micrositing, all staging areas, turbines, roads, and collector lines and other temporary and permanent disturbance will be located outside of Category 1 WGS habitat. In addition, the Applicant will implement mitigation measures to avoid impacts to WGS such as flagging off Category 1 WGS habitat, monitoring construction in this area and implementing speed limits, and mitigating for impacts to Category 2 habitat as described in Section Q.4.

As a result of avoidance and minimization measures, no displacement or abandonment of WGS colonies are expected to occur, as demonstrated by extensive informal monitoring of WGS colonies during and after construction of Stateline turbine strings WS-A and B (FPLE, 2002a, 2002b, 2002c; Erickson et al., 2004), and the Leaning Juniper I (LJI) operational monitoring and Incidental Take Permit (ITP) reporting (NWC, 2007; Kronner, 2005, 2006). Accordingly, no significant impacts are expected to occur that could cause a significant reduction in the likelihood of the survival or recovery of the species.

Bald Eagle

Natural History and Occurrence in the Analysis Area

The bald eagle is a state threatened species. This species was removed from the federal list of endangered species in 2007; however, it is still federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

The bald eagle is closely associated with freshwater, estuarine, and marine ecosystems that provide abundant prey and suitable habitat for nesting and communal roosting. Breeding territories are typically located within 1 mile of permanent water in predominantly coniferous, uneven-aged stands with old-growth structural components. Bald eagles winter along ice-free lakes, streams, and rivers where food and perch sites are abundant and the level of human disturbance is low. Communal night roosts are used by bald eagles primarily during the winter months. In the Pacific Northwest, communal roosts generally occur in multi-layered mature or old-growth conifer stands that provide protection from weather and human disturbance.

Home-range size varies greatly, according to food abundance and the availability of suitable nest and perch trees. Favored nest trees are usually the largest trees or snags in a stand that provides an unobstructed view of the surrounding area and a clear flight to and from the nest (Isaacs and Anthony, 2001; Isaacs, 2004). Nests are usually built on limbs just below the crown, with the canopy above providing cover. Nesting behaviors typically begin in January, followed by egg laying and incubation in February and March. Young are reared throughout April, May, and June. Fledging occurs in July and August. Bald eagles are primarily predators, but they are also opportunistic scavengers that feed on a variety of prey, including salmon, other fish, small mammals, waterfowl, seabirds, and carrion (Snow, 1981). Bald eagles usually forage in large open areas with a wide visual field and suitable perch trees near the food source.

Bald eagles winter along the Columbia River several miles north of the Facility site boundary. One bald eagle was recorded during each of the avian use studies at the nearby Rattlesnake Road and Willow Creek Wind Power projects (Kronner et al., 2007a and 2007b) and a single individual was also observed during the avian use study for the nearby Shepherds Flat Wind Power Project (CSF, 2007). No bald eagles were observed during avian use studies conducted for LJI, LJII, and Pebble Springs projects (NWC, 2009a; PPM 2006). Bald eagles were not observed during wildlife surveys of the Facility either.

Potential Impacts

Bald eagles winter along the Columbia River several miles north of the Facility site boundary and might pass through the site boundary infrequently during spring and fall migration or during the winter. However, as mentioned earlier, no bald eagles were observed in the vicinity of the Facility during wildlife surveys, and the nearest known nest is more than 22 miles away from the Facility site boundary (Flick, 2009). Also, as noted above, individual bald eagles were observed during fixed-point surveys conducted for the nearby Rattlesnake Road and Willow Creek projects (Kronner et al., 2007a and 2007b) and a single individual was also observed during the avian use study for the nearby Shepherds Flat Wind Power Project (CSF, 2007). These observations were outside of the Facility 2-mile survey area for raptor nesting, but within approximately 5 miles of the Facility site boundary.

Potential direct impacts to this species may occur as strikes from operating turbines resulting in injuries or fatalities. However, unlike golden eagles, bald eagles do not appear susceptible to colliding with wind turbines, probably because of their differences in foraging habits (golden eagles are predators and move through the landscape in search of upland prey, whereas bald eagles tend to feed on fish or scavenge on carcasses and are attracted to cattle feedlots where calving occurs). In addition, there have been no reported instances of bald eagle fatalities at any U.S. wind facility (Erickson et al., 2001) or in interviews with regional wind facility managers (NWC, 2005 and 2006). The likelihood of these impacts is extremely small as a result of this species' limited use of the Facility vicinity. No construction effects are expected as bald eagles appear to use the area only incidentally during migration. Therefore, it is unlikely the Facility will have measurable effects on bald eagles or cause a significant reduction in the survival or recovery of the species.

Q.4 MEASURES PROPOSED TO AVOID OR REDUCE ADVERSE IMPACTS

OAR 345-021-0010(1)(q)(C) *For each species identified under (A), a description of measures proposed by the applicant, if any, to avoid or reduce adverse impact;*

Response: The Applicant has implemented or will implement several measures to avoid or reduce adverse impacts on threatened and endangered species. Additional measures for non-listed special status wildlife and habitat are provided in Exhibit P, Section P.9. The Applicant is not proposing measures to avoid or reduce adverse impacts to other species identified under OAR 345-021-0010(1)(q)(A) above, because, as discussed under OAR 345-021-0010(1)(q)(B), adverse impacts are not anticipated. Nonetheless, the measures proposed below will also be protective of other species in addition to the WGS.

Q.4.1 Prior to Construction

Q.4.1.1 Avoidance in Facility Design

The Applicant sited the proposed turbines and other permanent and temporary facilities that were closest to WGS outside of the Category 1 WGS habitat, as shown in Figure Q-2. Following review of the 2008 WGS data, the Applicant moved six turbine strings and

associated facility components away from historic WGS locations. In particular, turbine strings A, D, F, G, T and U were reconfigured and associated access roads and collector lines were lengthened to route them around WGS burrows and the 785 foot buffer zone so as not to encroach on Category 1 WGS habitat. Several turbines were also removed from turbine strings D and G to avoid the Category 1 WGS habitat. Following the planned 2010 wildlife surveys, the Applicant will microsite the Facility to avoid any additional Category 1 WGS habitat identified during these surveys.

Q.4.1.2 Avoidance During Micrositing

After the final layout has been better defined, additional plant and wildlife surveys will be conducted to identify state and federally listed species. These surveys will be conducted prior to construction, and the Applicant has committed to designing and micrositing the Facility to avoid any threatened or endangered species locations such as Category 1 WGS habitat found during these clearance surveys.

Before beginning construction, the Applicant will provide to the Department a map showing the final design locations and areas that would be disturbed during construction. The Applicant will hire qualified personnel to conduct a field investigation of the final layout, and provide a written report of the field investigation to the Department to detail any identified state and federally listed wildlife species.

Where any Category 1 WGS habitat or other state or federal listed or candidate wildlife species are found during the initial or pre-construction field surveys, the Applicant will ensure that construction and operation of the facility will have no impact on the resources. The Applicant will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources. Category 1 WGS habitat will flagged and avoided during construction, as further described in Section Q.4.2 below.

All Facility components will be microsited outside of the Category 1 WGS habitat. In addition, potential Facility-related disturbance in habitat adjacent to Category 1 WGS habitat will be minimized to the extent feasible and impacts to Category 2 habitat will be mitigated as described in the Habitat Mitigation Plan (HMP) that the Applicant will implement similar to the HMP implemented for the LJII facility. Because WGS colonies can change size and shape from year to year, surveying the colony edge prior to construction will ensure that the sensitive area is correctly marked with exclusion flagging and avoided during construction. In addition, high quality native habitat on the Facility site will be avoided where possible for temporary and permanent impacts to retain habitat cover in the general landscape (habitat is subject to landowner's use however).

Q.4.2 Avoidance and Minimization during Construction

The Applicant has committed to implementing protective measures for threatened and endangered species during construction, as summarized below.

Construction Monitoring

The Applicant uses an onsite manager and requires the construction contractors to designate a Field Contact Representative (FCR) to oversee their compliance during construction. The FCR is responsible for overseeing compliance with environmental protective measures and coordination in accordance with the county and other regulatory agencies.

Qualified biologist(s) will provide environmental training and monitoring during construction. A qualified biologist will visit the site periodically before site development and during construction in order to flag the Category 1 WGS habitat and other sensitive resource areas and oversee construction and permit compliance.

Exclusion Flagging

All Facility components will be microsited to avoid the Category 1 WGS habitat and threatened, endangered, or candidate species populations. The biological monitor will mark Category 1 WGS habitat, any sessile mousetail and Laurent's milk-vetch populations, and other threatened, endangered, or candidate species with brightly colored pin flags or wooden lathes and signing, and instruct the contractor to work outside these boundaries.

Dust Control

The Applicant proposes to mitigate impacts from dust deposition through water applications to disturbed ground during construction, by graveling of permanent roadways, by erosion control, by revegetation, and by imposition of construction and operation speed limits of 20 miles per hour (mph). 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 on vegetation or wildlife species. Upon completion of construction, many of the unimproved roads on the Facility site previously used for access to the area will have been graveled. Existence of these roads should significantly reduce traffic on the many unimproved roads and 4-wheel drive tracks now within the site boundary. It is likely that overall post-construction dust production from vehicular traffic on the site will be reduced from current conditions.

Erosion Control

To minimize impacts to the Facility habitat, the Applicant will prepare an Erosion and Sediment Control plan in accordance with a NPDES 1200-C permit and will require the contractor to install erosion and siltation controls near riparian areas and other appropriate locations as designated in this plan. The FCR or a designated person under the FCR will monitor the erosion and siltation controls onsite to ensure that they are in working condition.

Environmental Training

The Applicant will provide an environmental training course for the construction contractors that will provide information on the sensitive species present onsite, the exclusion flagging/signing, permit requirements, and other environmental issues.

The training will also cover proper protocol for responding to dead or injured wildlife, as will be described in the Wildlife Monitoring and Mitigation Plan (WMMP) for the Facility. The WMMP will be developed in consultation with ODFW and ODOE and will be similar to the WMMP implemented for nearby Facilities such as LJII and Shepherds Flat, as required by the Site Certificate. Construction and operations personnel will be required to report any injured or dead wildlife detected while on the site to the biological monitor during construction or appropriate onsite manager during operations. Construction site personnel will be required to attend the environmental training in conjunction with hazard and safety training prior to working onsite. The Applicant's construction contractor will maintain a list of onsite construction personnel who have received the training.

Limited Work Areas

Construction work will be limited to the approved and surveyed areas shown on project constraints maps. No working or driving cross-country within the site boundaries as shortcuts or for any other purposes will be permitted without prior approval from appropriate authorities.

Speed Limits

Construction personnel will be instructed to observe caution when driving through the project area and to maintain reasonable driving speeds of 20 mph (particularly during the period from 1 hour before sunset to 1 hour after sunrise) so as not to harass or accidentally strike wildlife. Speed limits will be posted throughout the Facility construction area.

Fire Control

The Applicant will be prepared for a quick response to wildfires that could impact the natural (wildlife habitat) environment.

Q.4.3 Minimization and Mitigation after Construction

After construction is complete, the Applicant will work to restore the habitat to preconstruction standards.

Habitat Restoration

The Applicant will implement a Revegetation Plan for the Facility similar to the Revegetation Plan implemented for nearby Facilities such as LJII and Shepherds Flat, as required by the Site Certificate. In order to reestablish plant communities of most value to wildlife, native species will be used in nonagricultural areas to the maximum extent possible.

Habitat Conservation

For habitat impacts that cannot be avoided or minimized, mitigation will be developed by means of reliable methods and in compliance with OAR 345-022-0060, as described in Exhibit P. The Applicant will implement a HMP for the Facility similar to the HMP implemented for the LJII facility. The Plan will describe the preservation and enhancement of a conservation area to mitigate for the impacts of the facility on wildlife habitat. The property will be protected under a conservation easement for the life of the Facility. The proposed mitigation area for the Facility is located within the same 440-acre parcel identified for mitigation of habitat impacts from the LJII Facility, as shown on Figures P-13 and P-14. The parcel is located in a relatively remote setting 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, as described in the LJII Final Order and HMP. The mitigation measures would likely result in conservation of suitable habitat for listed species such as the WGS, ensuring availability of undisturbed native habitat for the life of the Facility.

Fire Control

The Applicant will be prepared for a quick response to wildfires that could impact the natural (wildlife habitat) environment.

Q.5 NO SIGNIFICANT REDUCTION IN THE LIKELIHOOD OF SURVIVAL OR RECOVERY OF PLANT SPECIES

Q.5.1 Identified Plant Species with an ODA Protection and Conservation Program

OAR 345-021-0010(1)(q)(D) *For each plant species identified under (A), a description of how the proposed facility, including any mitigation measures, complies with the protection and conservation program, if any, that the Oregon Department of Agriculture has adopted under ORS 564.105(3);*

Response: Protection and Conservation Programs are prepared by ODA for selected plant species listed as threatened or endangered under the Oregon Endangered Species Act (ESA) and selected locations within the state. There is no plant protection and conservation program applicable to the site. Therefore, no additional information is required under this provision and OAR 345-022-0070(1)(a) does not apply.

Q.5.2 Identified Plant Species without an ODA Protection and Conservation Program

OAR 345-021-0010(1)(q)(E) *For each plant species identified under (A), if the Oregon Department of Agriculture has not adopted a protection and conservation program under ORS 564.105(3), a description of significant potential impacts of the proposed facility on the continued existence of the species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species;*

Response: Protection and Conservation Programs are prepared by ODA for plant species listed as threatened or endangered under the Oregon Endangered Species Act.

There is no plant protection and conservation program applicable to the site. In compliance with these requirements, Section Q.3 describes the potential impacts of the proposed Facility on the continued existence of state and federally listed and candidate plant species and on the suitable habitat for these species. The mitigation measures described in Section Q.4 are designed to avoid or minimize adverse impacts on listed and candidate plant species. The construction, operation, and maintenance of the Facility, as described, and taking into account the proposed mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the state threatened Laurent's milk-vetch, the state candidate sessile mousetail, or the state candidate dwarf evening primrose.

Q.6 NO SIGNIFICANT REDUCTION IN THE LIKELIHOOD OF SURVIVAL OR RECOVERY OF FISH AND WILDLIFE SPECIES

OAR 345-021-0010(1)(q)(F) *For each animal species identified under (A), a description of significant potential impacts of the proposed facility on the continued existence of such species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species;*

Response: In compliance with these requirements, Section Q.3 describes the potential impacts of the proposed Facility on the continued existence of state and federally listed and candidate wildlife species and on the suitable habitat for these species. The mitigation measures described in Section Q.4 are designed to avoid or minimize adverse impacts on the listed and candidate wildlife species. The construction, operation, and maintenance of the Facility, as described, and taking into account the proposed mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the state endangered WGS or the state threatened bald eagle.

Washington Ground Squirrel

The Facility will have no significant impact on the survival or recovery of this species. No Facility components will be placed within Category 1 WGS habitat. During micrositing, staging areas, turbines, roads, and collector lines and other temporary and permanent disturbance will be located outside Category 1 WGS habitat to protect this species.

The proposed development will not affect connectivity between WGS colonies or the survival or recovery of the species. No displacement or abandonment of WGS colonies is likely to occur, as demonstrated by extensive informal monitoring of WGS colonies during and after construction of Stateline turbine strings WS-A and B (FPLE, 2002a, 2002b, 2002c and Erickson et al., 2004), and the Leaning Juniper I (LJI) operational monitoring and Incidental Take Permit (ITP) reporting (NWC, 2007; Kronner, 2005, 2006). Accordingly, no significant impacts are expected to occur that could cause a significant reduction in the likelihood of the survival or recovery of this species.

Bald Eagle

The Facility will have no significant impact on the survival or recovery of this species. No bald eagles have been documented nesting within 5 miles of the site boundary. The nearest documented bald eagle nest is located more than 20 miles from the project (Flick, 2009). This species was not observed during wildlife surveys for the project, and their only use of the area around the Facility site boundary might be flying through, which is expected to be infrequent. For these reasons, the Facility is not likely to cause a significant reduction in the likelihood of survival or recovery of this species.

Q.7 MONITORING PROGRAM

OAR 345-021-0010(1)(q)(G) *The applicant's proposed monitoring program, if any, for impacts to threatened and endangered species;*

Response: The Applicant will implement a WMMP for the Facility similar to the WMMP implemented for nearby Facilities such as LJII and Shepherds Flat, as required by the Site Certificate. The WMMP will include avian and bat mortality monitoring, as well as monitoring of special status raptor nests within the Facility site boundary. Post-construction monitoring of WGS colonies will also be conducted, as described in WMMPs for nearby Facilities.

Q.8 PROPOSED SITE CERTIFICATE CONDITIONS

The Applicant proposes that site certificate conditions such as conditions 45, 84, 85, 87, and 89 from the LJII Site Certificate be included in the site certificate for the Montague Wind Power Facility. Specifically, the Applicant proposes the following conditions:

Condition 45

Before beginning construction, the certificate holder will provide to the Department a map showing the final design locations of all components of the facility and areas that would be disturbed during construction and also showing the areas that were surveyed for cultural resources as described in the site certificate application. If areas to be disturbed during construction lie outside of the surveyed areas, the certificate holder shall hire qualified personnel to conduct field investigation of those areas. The certificate holder shall provide a written report of the field investigation to the Department and to the State Historic Preservation Office (SHPO). If any historic, cultural, or archaeological resources are found during the field investigation, the certificate holder shall ensure that construction and operation of the facility will have no impact on the resources. The certificate holder shall instruct all construction personnel to avoid these areas and shall implement other appropriate measures to protect the resources.

Condition 84

The certificate holder may construct turbines and other facility components within the site boundary, subject to the following requirements addressing potential habitat impact:

(a) The certificate holder shall not construct any facility components within areas of Category 1 habitat and shall avoid temporary disturbance of Category 1 habitat.

(b) The certificate holder shall design and construct facility components that are the minimum size needed for safe operation of the energy facility.

(c) In the final design of the facility within micrositing areas, the certificate holder shall reduce the impact on essential or important habitat (Category 4 and above) to the extent practical.

(d) As a protective measure during construction, the certificate holder shall install exclusion fencing around confirmed populations of Laurent's milk-vetch and sessile mousetail. The certificate holder shall not install facility components or cause temporary disturbance within these areas. Before beginning construction, the certificate holder shall verify the protected status of sessile mousetail and notify the Department. If the species has been upgraded to threatened or endangered under State or federal law, the certificate holder shall take appropriate mitigation actions, subject to Department approval.

(e) If construction would affect locations within the micrositing areas that were not previously surveyed for the occurrence of State or federal threatened or endangered species, the certificate holder shall conduct additional pre-construction surveys of those locations, notify the Department of the findings and implement appropriate avoidance or mitigation measures for any threatened or endangered species detected, subject to Department approval.

Condition 85

The certificate holder shall implement measures to mitigate impacts to sensitive wildlife habitat during construction and operation including, but not limited to, the following:

(a) Preparing maps to show sensitive areas, such as nesting or denning areas for sensitive wildlife species, that are off limits to construction personnel.

(b) Before construction begins, the certificate holder shall have a qualified biologist place exclusion markers around sensitive wildlife habitat areas, including Category 1 Washington ground squirrel (WGS) areas and an appropriate buffer around these areas. The certificate holder shall maintain the exclusion markings until construction has been completed.

(c) Ensuring that a qualified person instructs construction and operations personnel to be aware of wildlife in the area and to take precautions to avoid injuring or destroying wildlife or sensitive wildlife habitat.

(d) Avoiding unnecessary road construction, temporary disturbance and vehicle use.

(e) Posting and maintaining speed limit signs (not to exceed 20 miles per hour) on access roads throughout the site. The certificate holder shall ensure that all construction and operations personnel are instructed to observe caution when driving in the facility area to avoid injury or disturbance to wildlife enforce and for personal safety.

Condition 87

The certificate holder shall conduct wildlife monitoring as described in the Wildlife Monitoring and Mitigation Plan that is incorporated in the Final Order on the Application and as amended from time to time.

Condition 89

The certificate holder shall acquire the legal right to create, enhance, maintain and protect a habitat mitigation area as long as the site certificate is in effect by means of an outright purchase, conservation easement or similar conveyance and shall provide a copy of the documentation to the Department. Within the habitat mitigation area, the certificate holder shall improve the habitat quality as described in the Habitat Mitigation Plan that is incorporated in the Final Order on the Application and as amended from time to time.

These four proposed conditions assure appropriate actions are undertaken to assure that Laurent's milk-vetch, sessile mousetail and WGS and other threatened, endangered or candidate species are adequately protected during the Facility's construction and operation.

Q.9 CONCLUSION

Three populations of two plant species that are state or federally listed or candidates for listing under ORS 564.105(2) were documented within the site boundary. In addition, potentially suitable habitat is present for another state candidate plant species. One state-listed endangered species, the WGS, is located within the site boundary, and one state-listed threatened species, the bald eagle, might travel through the area, but neither they nor their habitat will be significantly affected by the Facility. Avoidance and mitigation measures built into the Facility location and design will reduce the potential for impacts to insignificant levels. Therefore, based on the information provided in this Exhibit, there is sufficient evidence upon which the Council may find that the Facility, taking into account the proposed mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of threatened or endangered plant or wildlife species within the analysis area. Accordingly, the Applicant demonstrates that OAR 345-022-0070 is met.

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Figures

Figures Q-2 and Q-3 are confidential and not for public distribution.

ATTACHMENT Q-1

Preliminary Rare Plant Evaluation for the Montague Wind Power Facility

Figure Q-1

Threatened and Endangered Species Analysis Area

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

KLICKITAT COUNTY

GILLIAM COUNTY

SHERMAN COUNTY

MORROW COUNTY

84

Rattlesnake Rd

Heppner Hwy

Fourmile Rd

Cedar Springs Ln

Mcnabb Ln

Baseline Rd

Oregon Hwy 19 - John Day Hwy

Site Boundary
Micrositing Corridor
5-mile Threatened and Endangered Species Analysis Area
Proposed Turbine
State Boundary
County Boundary
Limited Access Highway
Highway
Major Road

N
W E
S

0 1 2 3 4 5
Miles

IBERDROLA RENEWABLES

File: Z:\Projects\OR\Montague\MapDocuments\Report Figures\EFSC\Figure Q-1 - Threatened & Endangered Species Analysis Area.mxd

Modify Date: 12/23/2009

Preliminary Rare Plant Habitat Evaluation Montague Wind Power Facility Gilliam County, Oregon

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DATE: January 20, 2010

Summary

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). No more than 269 turbines will be located within the Facility site boundary, depending on the final turbine size and vendor (as further described in Application for Site Certificate [ASC] Exhibit B, Section B.1.3). Please refer to ASC Exhibit C, Figures C-1, C-2, and C-4 through C-7, for maps of the site vicinity, Facility location, and Facility components, respectively.

The proposed Facility is located south of the city of Arlington, in Gilliam County, Oregon. The Facility site boundary encompasses all or portions of the townships, ranges, and sections listed in ASC Exhibit C.

CH2M HILL conducted a reconnaissance-level field investigation during fall 2009, to determine potential presence of suitable habitat for state or federally listed threatened or endangered species as well as other non-listed special-status species within the site boundary. The investigation was limited to areas accessible by secondary roadways throughout the site boundary and areas visited in conjunction with the stream and wetland survey (see ASC Exhibit J). Further surveys are planned in the spring of 2010 to identify special-status plant species near proposed Facility components; the Facility will be microsited to avoid impacting federal or state threatened or endangered species.

Methods

Data Search

Prior to the field investigation, CH2M HILL checked U.S. Fish and Wildlife Service county lists of *Federally Listed and Proposed Endangered and Threatened Species, Candidate Species and Species of Concern for* (USFWS, 2009) for Gilliam and Morrow counties, Oregon, and Klickitat

County, Washington, as well as the Oregon Natural Heritage Information Center (ORNHIC) database (ORNHIC, 2009), for special-status species that potentially occur within the Facility site boundary and a 5-mile analysis area.

The proposed Facility is located near several previously studied wind energy facilities, as shown in Figure P-1. In addition to reviewing the above sources, CH2M HILL reviewed the following documents that summarize the results of rare plant surveys for several of these projects:

- **Leaning Juniper IIA (LJIIA).** *Final Order for the Leaning Juniper II Wind Power Facility (*ODOE, 2007)
- **Leaning Juniper IIB (LJIIB)**. *Supplemental 2008–2009 Study to the 2005 Leaning Juniper Wildlife Baseline Study*. Appended to the *Request for Amendment No. 1 to the Site Certificate for the Leaning Juniper II Wind Power Facility* (NWC, 2009)
- **Shepherds Flat.** *Final Order for the Shepherds Flat Wind Farm* (ODOE, 2008)
- **Pebble Springs**. *Pebble Springs Wind Project: Application for Conditional Use Permit* (PPM Energy, 2006)

Information on special-status plants with potential to occur in the vicinity of the site boundary was compiled before the field visits. The information included habitat requirements, any known associated species, and elevation ranges (Table 1). Field biologists used this information to focus the level of survey intensity in areas where site conditions indicated species habitat requirements may occur. Plant identification was accomplished using current taxonomic guides, including, but not limited to the following sources:

- *Field Guide to Selected Rare Plants of Washington* (WNHP, 2008)
- *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1973)
- *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness, 1973)
- *Northwest Weeds* (Taylor, 1990)
- *Oregon Flora Project Rare Plant Guide* (OFP, 2009)
- *Oregon Threatened or Endangered Plant Field Guide* (ORNHIC, 2009)
- *Rare and Endangered Plants of Oregon* (Eastman, 1990)
- *Threatened and Endangered Vascular Plants of Oregon* (Meinke, 1982)
- *Wetland Plants of Oregon and Washington* (Guard, 1995)

Field Investigation

CH2M HILL conducted a reconnaissance-level field investigation on October 12 to 15, 20 to 22, 27, and 29; November 3 to 5 and 24; and December 2 to 4, 2009, to determine potential presence of suitable habitat for state or federally listed threatened or endangered species as well as other non-listed special-status species within the site boundary. The investigation was limited to areas accessible by secondary roadways throughout the site boundary and areas visited in conjunction with the stream and wetland survey (see ASC Exhibit J).

Results

Data Search

A search of the USFWS County lists and the ORNHIC database for the site boundary and a 5-mile buffer identified the following 22 special-status species as potentially occurring in the analysis area:

- Robinson's Onion (*Allium Robinsonii*)
- Laurent's Milk-vetch (*Astragalus collinus* var. *laurentii*)
- Dwarf Evening Primrose (*Camissonia pygmaea*)
- Disappearing Monkeyflower (*Mimulus evanescens*)
- Hepatic Monkeyflower (*Mimulus jungermainnoides*)
- Sessile Mousetail (*Myosurus sessilis)*
- Ute-Ladie's-tresses (*Spiranthes diluvialis*)
- Northern wormwood *(Artemisia campestris* ssp. *borealis* var. *wormskioldii)*
- Ames' milk-vetch (*Astragalus pulsiferae var. suksdorfii*)
- Long-bearded sego lily (*Calochortus longebarbatus var. longebarbatus*)
- Gray cryptantha (*Cryptantha leucophaea*)
- Clustered lady's-slipper (*Cypripedium fasciculatum*)
- Suksdorf's desert-parsley *(Lomatium suksdorfii)*
- Watson's desert-parsley *(L. watsonii)*
- White meconella (*Meconella oregano*)
- Liverwort monkey-flower (*Mimulus jungermannioides*)
- Barrett's beardtongue (*Penstemon barrettiae)*
- Whitebark pine (*Pinus albicaulis*)
- Obscure buttercup (*Ranunculus reconditus*)
- Persistent sepal yellowcress (*Rorippa columbiae*)
- Pale blue-eyed grass (*Sisyrinchium sarmentosum*)
- Woven spore lichen (*Texosporium sancti-jacobi*)

During surveys of LJIIA, four populations of the Oregon candidate species, sessile mousetail, were identified in areas that overlap with the Montague site boundary (ODOE, 2007; ODOE, 2008). In addition, during the information review of Shepherds Flat, this species was identified within the analysis area, but outside of the site boundary and outside of the Montague site boundary (Caithness Shepherds Flat, 2007).

In spring 2009, Northwest Wildlife Consultants (NWC) conducted surveys for state and federal listed and non-listed special-status plants in areas of the Montague site boundary that overlap with the site boundary for Pebble Springs (PPM, 2006). In spring 2009, NWC conducted similar surveys for LJIIB (NWC, 2009). One state-listed threatened plant species, Laurent's milk-vetch (*Astragalus collinus* var. *laurentii*), was documented at LJIIB and within the Montague site boundary during surveys conducted for LJIIB. In addition, one population of the Oregon candidate plant species, sessile mousetail, was identified within the Montague site boundary during surveys conducted for LJIIB (NWC, 2009) and two populations of this species were identified in the site boundary during surveys conducted for Pebble Springs (PPM Energy, 2006).

Two rare plant species with no status that are monitored by the ORNHIC, stalked-pod milk-vetch and Columbia milk-vetch, were identified within the Montague site boundary during surveys for LJIIB (NWC, 2009). Three additional rare species monitored by the ORNHIC, Columbia bladderpod (historical – 1938), gray cryptantha (historical – 1882), and Watson's desert parsley (historical – 1938), were identified in the vicinity, but outside of the Montague site boundary, during surveys for LJIIB (NWC, 2009). Columbia bladderpod was also identified within the analysis area, but outside of the Montague site boundary during surveys conducted for LJIIB (NWC, 2009).

Field Investigation

The field investigation identified the following habitat types present within the site boundary.

Developed

- **Old Field:** Previously cultivated, currently occupied by a variety of common non-native and native vegetation plants (rabbitbrush shrubs/annual grasses and weeds). Native vegetation is minor component.
- **Conservation Reserve Program (CRP) or Other Planted Grassland:** Planted grassland on previously farmed or other disturbed lands that may be enrolled in the CRP. Residual (not previously plowed) native vegetation patches in a few locations. Old grass stands contain rabbitbrush or other shrubs but are not dominant.
- **Dryland Wheat:** Agricultural fields currently in small grain production or fallow.
- **Irrigated Agriculture:** Agricultural crop or pasture fields that are irrigated for all or a portion of the growing season.
- **Other:** Developed or disturbed areas including farming or ranching home and shop sites, corrals, structures, feedlots, inactive and active gravel quarries, pastures, roads, rights-of-way and waste areas associated with ongoing human activities.

Grassland

Steppe dominated by native or nonnative grasses (less than 20 percent shrub cover):

- **Exotic Annual Grassland:** Dominated by exotic annual grass or weeds.
- **Native Perennial Grassland:** Dominated by native perennial bunchgrass. Shrubs, if present, are an inconspicuous component.

Shrub-Steppe

Steppe dominated by shrubs (greater than 20 percent shrub cover):

- **Sagebrush Shrub-steppe:** Big sage sagebrush/bunchgrass-annual grass.
- **Rabbitbrush-Snakeweed Shrub-steppe:** Rabbitbrush-snakeweed-buckwheat/ bunchgrass-annual grass. Most of these areas are formerly sagebrush-rabbitbrush snakeweed/bunchgrass-annual grass attempting to recover from recent fire or are older Developed/CRP and have significant shrub component.

TABLE 1
Rare Plant Species Information and Habitat Requirements

Scientific Name	Common Name	Family	Habitat	Elevation	Comments
Allium robinsonii	Robinson's onion	Liliaceae	Sand and gravel deposits along the Columbia River from near Vantage, Washington, to about the mouth of the John Day River, Oregon, apparently restricted to the bottom and lower benches of the river valley.	60 to 650 feet	Believed extirpated from Oregon
Artemesia borealis ssp. *wormskioldi*	Northern wormwood	Asteraceae	Arid sites generally supporting shrub-steppe vegetation. Grows on basalt, compacted cobble, and sand in generally flat terrain.		Believed extirpated from Oregon
Astragalus collinus var. *laurentii*	Laurent's milk-vetch	Fabaceae--	Occurs on dry slopes, in sandy or rocky substrates. Endemic to the Columbia Plateau, in Gilliam, Morrow, and Umatilla counties, Oregon, and possibly Sherman County as well.	1,800 to 3,300 feet	Documented within the site boundary during surveys conducted for Leaning Juniper IIB.
A. pulsiferaie var. *suksdorfii*	Ames' milk-vetch	Fabaceae	Found in generally flat or very gentle terrain in coarse textured substrates; occurs in relatively open ponderosa pine forests with bitterbrush.	1,800 to 1,900 feet	
A. scleroscarpus	Stalked-pod milk-vetch	Fabaceae--	Dunes and sandy barrens.	200 to 600 feet	Documented within the site boundary during surveys conducted for Leaning Juniper IIB.
A. succumbens	Columbia milk-vetch	Fabaceae--	Sandy places and rocky sagebrush desert, from the Columbia River to the lower foothills.	300 to 700 feet	Documented within the site boundary during surveys conducted for Leaning Juniper IIB.
Calochortus longebarbatus var. *longebarbatus*	Long-beared sego lily	Liliaceae	Clay loams in vernally moist sites in meadows, forest meadow edges, and within semi-open areas within coniferous woods dominated by grasses and forbs.	1,800 to 3,000 feet	
Camissonia pygmaea	Dwarf evening primrose	Onagraceae	Found on unstable soil or gravel in steep talus, dry washes, banks, and roadcuts. Occurs in habitats that are maintained in an open condition by erosion and the generally harsh environment.	500 to 1,800 feet	Flowering period is extended enough so that flowers and fruits have been observed on the same plant. The species is generally recognizable between June and August.
Cryptantha leucophaea	Gray cryptantha	Boraginaceae	Sandy substrate along the Columbia River within the Columbia Basin physiographic province; especially unstable sand dunes.	300 to 2,500 feet	Historical ORNHIC record located outside of site boundary.
Cypripedium fasciculatum	Clustered lady's-slipper	Orchidaceae	Mid- to late seral Douglas fir forest.	1,200 to 5,000 feet	
Lesquerella douglasii	Columbia bladderpod	Brassicaceae	Sandy and gravelly soils in sagebrush and into arid juniper or ponderosa pine woodlands.	200 to 800 feet	Documented outside of the site boundary during surveys conducted for Leaning Juniper IIB. Historical ORNHIC record located outside of site boundary.

TABLE 1
Rare Plant Species Information and Habitat Requirements

Scientific Name	Common Name	Family	Habitat	Elevation	Comments
Lomatium suksdorfii	Suksdorf's desert-parsley	Apiaceae	Semi-open to open dry, rocky hillsides on moderate to steep slopes.	350 to 3,500 feet	
L. watsonii	Watson's desert-parsley	Apiaceae	Arid, open, often rocky hillsides. Often found amongst sagebrush.		Historical ORNHIC record located outside of site boundary.
Meconella oregano	White meconella	Papaveraceae	Occurs in open grasslands and grassland/woodland mosaic on gentle to steeply sloping sites.	100 to 450 feet	
Mimulus evanescens	Disappearing monkeyflower	Scrophulariaceae	Occurs within sagebrush-juniper-dominated vegetation zones. Occurs in drying pools, along streambeds, adjacent to pond margins, in wet areas near boulders, etc. Occurs in moist gravelly, rocky areas, and low, wet fields, in sagebrush-juniper zones.	3,900 to 5,600 feet	Only two existing sites: Moll Reservoir in Lassen County, California, and Drews Reservoir in Lake County, Oregon.
Mimulus jungermannioides	Liverwort monkeyflower	Scrophulariaceae	Occurs in basalt crevices in seepage zones of vertical cliff faces and canyon walls.	500 to 3,300 feet	Documented in Wasco County, Oregon. Moist, shaded basaltic cliffs adjacent to the water. Plants are generally under an overhanging area of rock; bottom slope; filtered shade; moist; basalt cliffs. Associated species: *Mimulus guttatus*, *Huechera cylindrica*.
Myosurus sessilis	sessile mousetail	Ranunculaceae	Occurs in vernal pools and alkali flats.		Documented within the site boundary during surveys conducted for Pebble Springs and LJIIB projects. Additional areas of potentially suitable habitat identified within site boundary in 2009.
Penstemon barrerttiae	Barrett's beardtongue	Scrophulariaceae	Crevices along basalt cliff faces, on rock outcrop ledges, open talus, and occasionally on well-drained roadsides.	Below 3,200 feet	
Pinus albicaulis	Whitebark pine	Pinaceae	Grows in exposed subalpine zone near treeline	Subalpine zone	
Ranunculus reconditus (= triternatus)	Obscure buttercup	Ranunculaceae	Upper elevations of Columbia Hills; meadow-steppe habitat dominated by perennial xerophytic bunchgrass and broad-leaved herbs.	2,240 to 3,220 feet	
Rorippa columbiae	Persistent sepal yellowcress	Brassicaceae	Observed near all types of bodies of water. Known from a wide variety of soil types, including clay, sand, gravel, sandy silt, cobblestones and rocks. Individuals are usually found in open habitats that have low vegetative cover. A common feature of all of the known sites is inundation for at least part of the year.	3 to 7 feet	

TABLE 1
Rare Plant Species Information and Habitat Requirements

Scientific Name	Common Name	Family	Habitat	Elevation	Comments
Spiranthes diluvialis	Ute ladies'-tresses	Orchidaceae	Grows along riparian edges, gravel bars, old oxbows, high flow channels, and moist to wet meadows along perennial streams. It typically occurs in stable wetland and seepy areas associated with old landscape features within historical floodplains of major rivers, as well as in wetlands and seeps near freshwater lakes or springs.	720 to 1,830 feet	
Sysyrhinchium sarmentosum	Pale blue-eyed grass	Iridaceae	The species occurs in meadows and small openings.	1,600 to 4,200 feet	
Texosporium sancti-jacobi	Woven spore lichen	Caliciaceae	Grows in arid to semi-arid shrub-steppe, grassland or savannah communities.	Up to 3,300 feet	

Woodland

Wooded areas with greater than 10 percent tree cover:

- **Juniper Woodland:** Open canopy woodland consisting of western juniper. Often with significant big sage and grass understory component.
- **Riparian Woodland:** Found in one location along about a half-mile stretch of Eightmile Canyon, downstream from a permanently-flowing spring. Willow is the dominant deciduous tree of the overstory. Provides important roosting habitat for bats; thermal cover for mule deer; and nesting and migration habitat for passerines.

Riparian and Wetland

- **Palustrine Emergent Riverine Wetlands:** Found in one location along the same half-mile stretch of Eightmile Canyon as the riparian woodland community (see above), downstream from the permanently flowing spring. Dominant species are cattail, smartweed, saltgrass, duckweed, rush, and other grasses.
- **Irrigation-Fed/Palustrine Emergent Depressional Wetlands**: Located in a series within the channel of Eightmile Canyon, an ephemeral stream in this reach. The wetlands were artificially created by berms across the channel that collect run-off from the adjacent irrigated fields. Dominant species include prostrate smartweed.
- **Alkali/Isolated Palustrine Depressional Wetland:** Small depressional area with salt crust. This wetland is sparsely vegetated with saltgrass.
- **Vernal Pools/Isolated Palustrine Depressional Wetlands**: Several small depressional seasonal wetlands are present within the site boundary. These are areas that are inundated early in the growing season, drying out by early to mid-summer. Typical species include little mousetail, slender-branched popcorn flower, needleleaf navarretia, and marsh cudweed.

Escarpment

- **Escarpments:** Linear Columbia River Basalt outcroppings approximately 3 to 15 meters (10 to 50 feet) in height, found on steeper slopes that bound canyon edges and shoulders (i.e., Eightmile Canyon). When present, typical species include Sandberg's bluegrass, non-native grasses, and various native and non-native forbs. Soils are absent or very shallow due to rock outcroppings and steep slopes. Pockets of deeper soils are present in swales located in areas with less exposed basalt and fewer cliffs.

Habitat types within the site boundary were evaluated against the habitat requirements for potentially occurring species shown in Table 1. The purpose of the evaluation was to determine whether suitable habitat occurs onsite to support any of the identified species. Table 2 presents the results of this evaluation.

TABLE 2
Special-Status Plant Species Potentially Found in the Vicinity of the Montague Facility

Scientific Name	Common Name	Federal Status	ODA/ ORNHIC Status	Potential Habitat Present
Allium robinsonii	Robinson's onion	SoC	-- / 2-ex	No
Artemesia borealis ssp. *wormskioldi*	Northern wormwood	C	LE / 1-ex	No
Astragalus collinus var. laurentii	Laurent's milk-vetch	SoC	LT / 1	Yes
A. pulsiferaie var. suksdorfii	Ames' milk-vetch	SoC	-- / --	No
A. scleroscarpus	Stalked-pod milk-vetch	--	-- / 3	Yes
A. succumbens	Columbia milk-vetch	--	-- / 4	Yes
Calochortus longebarbatus var. *longebarbatus*	Long-beared sego lily	SoC	-- / 4	No
Camissonia pygmaea	Dwarf evening primrose	SoC	C / 1	Yes
Cryptantha leucophaea	Gray cryptantha	--	-- / 2-ex	No
Cypripedium fasciculatum	Clustered lady's-slipper	SoC	C / 2	No
Lesquerella douglasii	Columbia bladderpod	--	-- / 3	Yes
Lomatium suksdorfii	Suksdorf's desert-parsley	SoC	C / 1	No
L. watsonii	Watson's desert-parsley	--	-- / 2	Yes
Meconella oregano	White meconella	SoC	C / 1	No
Mimulus evanescens	Disappearing monkeyflower	SoC	C / 1	No
Mimulus jungermannioides	Hepatic monkeyflower	SoC	C / 4	No
Myosurus sessilis	Sessile mousetail	SoC	C / 1	Yes
Penstemon barrerttiae	Barrett's beardtongue	SoC	C / 1	No
Pinus albicaulis	Whitebark pine	SoC	-- /	No
Ranunculus reconditus (= triternatus)	Obscure buttercup	SoC	LE / 1	No
Rorippa columbiae	Persistent sepal yellowcress	SoC	C / 1	No
Spiranthes diluvialis	Ute ladies'-tresses	LT	-- / --	No
Sysyrhinchium sarmentosum	Pale blue-eyed grass	SoC	C / 1	No
Texosporium sancti-jacobi	Woven spore lichen	SoC	-- / 2	No

Status Definitions

LE Listed Endangered. Taxa listed by the USFWS or National Marine Fisheries Service (NMFS) as Endangered under the Endangered Species Act (ESA), or by the Departments of Agriculture (ODA) and Fish and Wildlife (ODFW) of the state of Oregon under the Oregon Endangered Species Act of 1987 (OESA). Endangered taxa are those which are in danger of becoming extinct within the foreseeable future throughout all or a significant portion of their range.

LT Listed Threatened. Taxa listed by the above agencies as Threatened; defined as those taxa likely to become endangered within the foreseeable future.

C Candidate. Candidate taxa for which NMFS or USFWS have sufficient information to support a proposal to list under the ESA, or which is a candidate for listing by the ODA under the OESA.

SoC Federal species of concern.

TABLE 2
Special-Status Plant Species Potentially Found in the Vicinity of the Montague Facility

Scientific Name	Common Name	Federal Status	ODA/ ORNHIC Status	Potential Habitat Present

ORNHIC List 1 – Threatened or endangered throughout range
ORNHIC List 2 – Threatened, endangered, or extirpated from Oregon; secure elsewhere
ORNHIC List 3 – Review
ORNHIC List 4 - Watch
Ex – Believed extirpated.

Conclusion

CH2M HILL's field investigation concludes that potential habitat is present within the proposed site boundary to support the state-listed threatened plant species, Laurent's milk-vetch and the state Candidate species, sessile mousetail. Both species were documented within the Facility site boundary during previous studies. CH2M HILL recommends conducting protocol-level surveys during the optimum bloom time for these species (May through June for Laurent's milk-vetch; May through July for sessile mousetail). If additional populations are identified, the Facility design will be modified to avoid impacts to these species.

Potential habitat also exists to support one species identified as a Candidate for listing under state regulations, dwarf evening primrose. Should the status of this species be elevated to state threatened or endangered in the course of the project, state Endangered Species Act (ESA) regulations would apply. CH2M HILL recommends conducting protocol-level surveys for this species during the optimum bloom period (June through August) to determine whether the species is present onsite. If populations are identified, the Applicant will avoid impacts to the maximum extent practicable.

Potential habitat also was identified for two rare plant species that were identified within the site boundary during a previous study, stalked-pod milk-vetch and Columbia milk-vetch. Suitable habitat may also be present for two other rare species, Columbia bladderpod and Watson's desert-parsley, which were identified in the vicinity, but outside of the site boundary, either during a previous study or by ORNHIC.

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EXHIBIT R

SCENIC RESOURCES
OAR 345-021-0010(1)(r)

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R.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). Up to 269 turbines will be located within the Facility site boundary, depending on the final turbine size and vendor (as further described in Exhibit B, Section B.1.3). Please refer to Exhibit C, Figures C-1, C-2, and C-3, and C-4 through C-7, for maps of the site vicinity, Facility location, and Facility components, respectively.

This Application for Site Certificate (ASC) analyzes impacts for two turbine types that represent a range of alternative turbine technologies (i.e., encompassing the scale and impacts of the turbines) that could potentially be used at the Facility. The minimum turbine layout is 134 3.0-MW turbines. The maximum turbine layout is 269 1.5-MW turbines. The final layout will have 134 to 269 turbines, with any combination of 3.0-MW turbines and 1.5-MW turbines. The total number of turbines will not exceed 269 and the total MW will not exceed 404. Figure R-1 shows a proposed layout for 269 1.5-MW turbines. Figure R-2 shows a proposed layout for 134 3.0-MW turbines.

Exhibit R addresses the potential impacts of the proposed Facility on scenic and aesthetic values in the analysis area, in compliance with OAR 345-021-0010(1)(r), which requires the submission of:

OAR 345-021-0010(1)(r) *An analysis of significant potential impacts of the proposed facility, if any, on scenic resources identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0080, including:*

R.2 ANALYSIS METHODOLOGY

Response: A systematic analysis was undertaken in response to OAR requirements. The first step was to create a map displaying the location of the Facility and the analysis area. The analysis area for Exhibit R is the area within the site boundary and the area within 10 miles of the site boundary. See OAR 345-001-0010(2) and (57)(b). Within the analysis area, scenic and aesthetic resources were identified based on provisions of applicable federal land management plans and local land use plans. There are no tribal lands within the analysis area and no tribal land management plans are known to mention any scenic resources within the analysis area, including any plans of the two closest tribes—the Confederated Tribes of the Warm Springs and Confederated Tribes of the Umatilla. Therefore, no lands identified in tribal land management plans are included in this Exhibit. Maps of the Facility, analysis area, and areas identified as significant or important by local land use plans and federal land management plans are included in Figures R-1 through R-4.

The Applicant's visual impact analysis considered all Facility components. However, because of the large distances from most of the identified scenic resources, the limited lines of sight from the closest identified scenic resources, and the dominance of wind turbines compared with other components of the Facility in terms of visual impact, the

visual appearance of the Facility from the identified scenic areas consists almost entirely of the wind turbines. For this reason, the analyses in this Exhibit focus on the turbines, as explained in greater detail directly below.

To narrow the area requiring more detailed analysis, a Zone of Visual Influence (ZVI) analysis was conducted, using Environmental Systems Research Institute (ESRI) ArcGIS software, to identify the areas from which the proposed Facility components might be visible. The ZVI data were overlaid on the map of areas for which local land use and federal land management plans have been prepared. Two maps (Figures R-1 and R-2) were developed for the maximum and minimum turbine layout scenarios. Two additional maps (Figures R-3 and R-4) were developed to indicate areas where the preferred and alternate 230-kV transmission line routes potentially will be visible. Review of these maps made it possible to determine whether the scenic resources identified in local land use and federal management plans will potentially be visible and to determine whether further analysis is required. On the basis of this review, areas from which the Facility will not be visible were identified and removed from further analysis.

ZVI analyses were conducted for both the maximum turbine layout using the dimensions of the 1.5-MW turbine and for the minimum turbine layout using the dimensions of the 3.0-MW turbine. For the ZVI analysis illustrated in Figure R-1, the towers were assumed to be 80 meters (262 feet), the rotors were assumed to be 77 meters (253 feet) in diameter, and the distance from the ground to the tip of the blade was assumed to be 119 meters (389 feet), representing the dimensions of the 1.5-MW turbine. For Figure R-2, the towers for the minimum turbine layout were assumed to be 100 meters (328 feet) tall, the rotors were assumed to be 100 meters (328 feet) in diameter, and the distance from the ground to the tip of the blade was assumed to be 150 meters (492 feet). Comparison of the two turbine ZVI analyses was conducted to illustrate and describe differences between the maximum and minimum layouts. The results of the ZVI analyses show that the two turbine types and layouts will be almost identical in terms of visibility from within the general analysis area, and from the scenic resources identified in Section R.4. Therefore, the ZVI presented in Figure R-1 for the maximum turbine layout was used to determine impacts to identified scenic resources as discussed in Section R.5.

To assess the potential visibility of the 230-kV transmission line, the tops of transmission line support structures were analyzed using the ZVI methodology described previously for turbines. The ZVI analysis assumed that the tops will be 30.5 meters (100 feet) high. The Applicant is evaluating a preferred transmission line route and two alternate routes, which differ from one another in the path taken from the central collector substation to the Slatt-Buckley transmission line at the Slatt Interconnection substation (Slatt substation), as shown on Figure C-4 in Exhibit C. Separate ZVI analyses are provided for two of the three transmission line routes: the preferred route and the Alternate 2 route, shown in Figures R-3 and R-4, respectively. Figure C-4 in Exhibit C shows that the Alternate 1 route is situated between the preferred and Alternate 2 routes. A ZVI analysis was conducted for the Alternate 1 route, but a separate figure is not included because the ZVI showed that views of this route are no different than the visibility of the

preferred and Alternate 2 routes due to its location directly between these other two routes.

The ZVI analysis for the two transmission line routes included in Figures R-3 and R-4 was conducted separately from the turbine analysis and only examined the potential visibility of the line. Because the transmission line support structures are notably smaller than either the 1.5-MW or 3.0-MW turbines evaluated in the ZVIs presented in Figures R-1 and R-2, the ZVI developed for the maximum turbine layout (Figure R-1) can be considered a worst-case scenario for the visual impacts of the entire Facility. Hence, the maximum turbine layout ZVI (Figure R-1) was used to determine impacts to the scenic resources discussed in Section R.5.

It is important to note that the visibility pattern the ZVI analysis presents is highly conservative. First, in some areas where the model indicates Facility visibility, the only visible parts of the Facility might be the tips of the turbine blades or tops of the transmission line structures, which will be hardly noticeable at some locations. In addition, the analysis does not take into account the screening role of vegetation, trees, and other structures, so in some areas where Facility visibility is indicated, views of the turbines or the transmission line will be screened by trees, vegetation, or other structures in the foreground. In addition, the ZVI model is a line-of-sight model that does not account for attenuating factors such as distance, haze, humidity, background landscape, or weather, which will make the Facility invisible or barely visible from certain locations under many atmospheric or weather conditions.[1] Finally, the analyses for the transmission line routes assumed support structures that are 30.5 meters (100 feet) high, when they will actually be approximately 24 meters (80 feet) above grade. Therefore, the ZVI for the transmission line is conservative in that the actual visibility of the tops of the support structures will be slightly less than indicated in Figures R-3 and R-4.

The Facility will also include night lighting on some of the turbines to minimize aviation risks, as required by the Federal Aviation Administration (FAA). To comply with the FAA's aircraft safety lighting requirements, the Facility will be marked according to FAA requirements. The number of turbines with lights and the lighting pattern of the turbines will be determined in consultation with the FAA. The Applicant's analysis of impacts from the turbines to identified scenic resource includes an assessment of turbine lighting.

Upon completing the ZVI analyses, the Applicant's visual resource specialists conducted a day of fieldwork on November 24, 2009, in the Facility's analysis area. The focus of the fieldwork was to assess potential views of the Facility from areas with local land use and federal management plans, and specifically to assess views from identified scenic resources. The results of this fieldwork are referenced in this Exhibit.

In analyzing the potential significant impacts under OAR 345-021-0010(1)(r), the Applicant followed the standard professional methods based on the procedures for evaluation of aesthetic impacts developed by federal agencies such as the U.S. Bureau of

[1] The ZVI analysis is based on visibility that will occur at 2 meters (6.6 feet) above ground level, which is somewhat higher than the average eye level for an upright adult.

Land Management (BLM), the U.S. Forest Service (USFS), and the Federal Highway Administration (FHA).[2] The analysis presents sufficient information for the Council to make findings under OAR 345-022-0080. Specifically, OAR 345-022-0080(1) states the following:

"the Council must find the design, construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impact to scenic resources and values identified as significant or important in local land use plans, tribal land management plans and federal land management plans for any lands located within the analysis area described in the project order."

The Applicant provides the following information in accordance with OAR 345-021-0010(1)(r) as evidence to support findings by the Council as required by OAR 345-022-0080.

R.3 APPLICABLE LOCAL, TRIBAL, AND FEDERAL PLANS

OAR 345-021-0010(1)(r)(A) *A list of the local, tribal and federal plans that address lands within the analysis area.*

Response: Table R-1 lists applicable local and federal plans that pertain to areas within 10 miles of the Facility site. There are no applicable tribal plans within the analysis area. Those areas within 10 miles of the site boundary from which Facility turbines will potentially be visible are identified in Figures R-1 and R-2 and those areas from which the Facility transmission line (in either the preferred or alternate routes) will potentially be visible are depicted in Figures R-3 and R-4.

Table R-1. Identification of Applicable Local Land Use Plans and Federal Management Plans that Pertain to Lands Within 10 Miles of the Site Boundary

Plan Category/Area/Applicable Plans	Facility Not Visible in the Plan Area	Facility Potentially Visible in the Plan Area and Further Analysis Required
Local Land Use Plans[a]		
Gilliam County, Oregon		
Gilliam County Comprehensive Land Use Plan and Zoning Ordinances, October 25, 2000		**X**
Morrow County, Oregon		
Morrow County Comprehensive Land Use Plan, January 1986		**X**
Sherman County, Oregon		
Sherman County Comprehensive Land Use Plan, October 25, 2000 (revised June 2007)		**X**
Klickitat County, Washington		
Klickitat County Comprehensive Plan, August 1977		**X**
Roosevelt Community Subarea Plan, 1995		**X**

[2] These methods are documented in Smardon et al., 1986.

Table R-1. Identification of Applicable Local Land Use Plans and Federal Management Plans that Pertain to Lands Within 10 Miles of the Site Boundary

Plan Category/Area/Applicable Plans	Facility Not Visible in the Plan Area	Facility Potentially Visible in the Plan Area and Further Analysis Required
Klickitat County Energy Overlay Zone Ordinance: Natural Resources/Energy Comprehensive Plan Amendment, March 2005		X
City of Arlington, Gilliam County, Oregon		
City of Arlington Comprehensive Plan, June 2003		X
City of Ione, Morrow County, Oregon		
City of Ione Comprehensive Plan, June 1987		X
Applicable Federal Land Management Plans		
John Day River		
Two Rivers Resource Management Plan Record of Decision, 1986		X
Record of Decision John Day River Management Plan, Two Rivers, John Day, and Baker Resource Management Plan Amendments, February 2001		X
Oregon National Historic Trail		
Oregon Trail Comprehensive and Management Use Plan, Oregon National Historic Trail, August 1999		X
Oregon Trail Management Plan, BLM Prineville District, 1993		X
Lewis and Clark Trail		
Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use, January 1982		X

[a] Some identified scenic resources are located in Washington. Although the Applicant has undertaken studies of potential impacts to all scenic resources within the analysis area identified under OAR 345-021-0010(1)(r)(B), the Applicant reserves the right to argue that applicable Oregon law does not require analysis of scenic resources outside of Oregon.

R.4 IDENTIFICATION AND DESCRIPTION OF SCENIC RESOURCES IDENTIFIED AS SIGNIFICANT OR IMPORTANT

OAR 345-021-0010(1)(r)(B) *Identification and description of the scenic resources identified as significant or important in the plans listed in (A).*

Response: The following sections describe the significant or important scenic and aesthetic values that were identified in the plans listed in Table R-1. Table R-2, later in this Exhibit, identifies the scenic resources that were identified in the plans listed in Table R-1.

R.4.1 Local Land Use Plans

This section includes an analysis of the local land use plans that exist within the Facility's analysis area, as listed in Table R-1.

R.4.1.1 Gilliam County Comprehensive Land Use Plan and Zoning Ordinances, Gilliam County, Oregon

The Facility is located entirely within Gilliam County. Land use planning in Gilliam County is guided by the *Gilliam County Comprehensive Land Use Plan* (Gilliam County, 2000). Part Five of the County's Comprehensive Plan focuses on conservation of open space and natural and scenic resources, intending to comply with statewide planning Goal 5 (Open Spaces, Scenic and Historic Areas, and Natural Resources) and Goal 8 (Recreation Needs) (Gilliam County, 2000).

In Finding 2 of Part 5, the County identifies "rock outcroppings marking the rim and walls of steep canyon slopes as an important characteristic of the County's landscape" (Gilliam County, 2000). However, for the purposes of this Exhibit, this is a general statement that does not identify any specific scenic resources within the analysis area.

In Finding 7 of Part 5, the County identifies the John Day River corridor as an important scenic resource. The County defers to the Oregon State Scenic Waterways Act (ORS 390.805-390.925) to govern this resource and deems additional regulation unnecessary. The John Day River is further analyzed as a scenic resource under Section R.4.2 below.

Policy 2 of Part 5 states that "it is the policy of Gilliam County to publicize provisions of state law relative to Scenic Waterways, to render all possible assistance in enforcement of the laws, rules, and regulations pertaining to State designated Scenic Waterways and to otherwise aid in the implementation of the declared policy of the State of Oregon with respect to such waterways. Conflicts between agricultural and recreational uses in this area should be resolved in favor of agriculture" (Gilliam County, 2000). The John Day River is further analyzed as a scenic resource under Section R.4.2 below.

R.4.1.2 Morrow County Comprehensive Land Use Plan, Morrow County, Oregon

The analysis area encompasses the western edge of Morrow County. Land use planning in Morrow County is guided by the *Morrow County Comprehensive Land Use Plan* (Morrow County, 1986). The Scenic Views and Sites subsection of Goal 5 in the *Morrow County Comprehensive Land Use Plan* states: "Morrow County contains a variety of landscapes, many of which may be considered to be scenic. The County has not, however, designated any sites or areas as being particularly high in scenic-resource value." Thus, no specific scenic resources are identified and no goals or policies are included to protect specific scenic resources.

R.4.1.3 Sherman County Comprehensive Land Use Plan, Sherman County, Oregon

The analysis area encompasses a small section of northeastern Sherman County. Land use planning in Sherman County is guided by the *Sherman County Comprehensive Land Use Plan* (Sherman County, 2007). Physical Characteristics—Section XI, Finding XI of the County's Comprehensive Plan identifies important landscape features within the County. These include rock outcroppings, trees, and the John Day and Deschutes River canyons (Sherman County, 2007).

Finding XIII of Section XI states that "citizens of the State passed a ballot measure, which was later, enacted into law (ORS 390.805 through 390.925), which designated the lands within one-quarter mile of the Deschutes and John Day Rivers bordering Sherman County to be within the Oregon State Scenic Waterway System" (Sherman County, 2007). Additionally, this finding addresses the addition of the Deschutes and/or John Day Rivers to the National Wild and Scenic River System. Finding XII clarifies that "Numerous citizen and/or stock ranchers of the County have expressed opposition to the inclusion of the Deschutes and/or John Day Rivers to the National Wild and Scenic River System. Some of the stock ranchers believe such designation might limit their stock operations in the future" (Sherman County, 2007). The John Day River is further analyzed as a scenic resource under the Section R.4.2 below. However, the Deschutes River is located outside the analysis area and thus no further analysis is provided.

The County's Goal VI is to "encourage preservation of the rural nature [of] the Sherman County landscape." Policy VII of Goal VI states "trees should be considered an important feature of the landscape and therefore the County Court shall encourage the retention of this resource when practical" (Sherman County, 2007). However, for the purposes of this Exhibit, this is a general statement that does not identify any specific scenic resources within the analysis area.

Section XV addresses energy production and use within the County. Under Goal I to conserve energy resources, the County defines a policy to "cooperate with public agencies and private individuals in the use and development of renewable resources" (Sherman County, 2007). The Facility complies with this goal.

Both Section XVII, under the Land Use Designation "Oregon State Scenic Waterway," and Section XI Finding XIII discussed above clarify "the lands within one-quarter mile of the Deschutes and John Day Rivers bordering Sherman County to be within the Oregon State Scenic Waterway System" (Sherman County, 2007). Section XVII provides an exception for "land that, in the Department of Transportation's judgment, does not affect the view from the waters within the scenic waterways" (Sherman County, 2007). The John Day River is further analyzed as a scenic resource under Section R.4.2 below. However, the Deschutes River is located outside the analysis area and thus no further analysis is provided.

R.4.1.4 Klickitat County Comprehensive Plan, Klickitat County, Washington

The analysis area encompasses a small section of southern Klickitat County. Land use planning in Klickitat County is guided by the *Klickitat County Comprehensive Plan* (Klickitat County, 1977). References to aesthetic values in the *Klickitat County Comprehensive Plan* are limited to areas located outside the 10-mile analysis area and thus no further analysis is needed.

R.4.1.5 Roosevelt Community Subarea Plan, Klickitat County, Washington

The *Roosevelt Community Subarea Plan* is part of the *Klickitat County Comprehensive Plan* and provides additional guidance for land use planning within the unincorporated

community of Roosevelt, located on the Washington side of the Columbia River across from the City of Arlington (Klickitat County, 1995). The subarea plan contains two statements about visual resources, both of which describe features of the immediate setting of the developed community. As the plan does not identify any specific scenic resources or views outside of Roosevelt, the proposed Facility will not impact any scenic resources identified by the subarea plan.

R.4.1.6 Klickitat County Energy Overlay Ordinance, Klickitat County, Washington

The *Klickitat County Energy Overlay Ordinance* also applies to the portion of the analysis area on the Washington side of the Columbia River (Klickitat County, 2005). Through this ordinance, Klickitat County adopted a Natural Resources/Energy Comprehensive Plan Amendment in 2005. The Findings section of this Amendment acknowledges that wind turbines can have aesthetic impacts but goes on to state that "perceptions of aesthetic impacts vary with individuals' values, and because of Klickitat County's rural nature, if sensitively sited, aesthetic impacts can be reduced to less than significant levels." The portion of the county that falls within the Facility's analysis area is indeed rural with large areas of open space. Hence the number of potential viewers in this area is limited. However, for the purposes of this Exhibit, the Facility is not sited within Klickitat County or in the State of Washington, and the amendment does not identify any specific scenic resources or views.

R.4.1.7 City of Arlington Comprehensive Plan, City of Arlington, Oregon

The City of Arlington is located directly north from the Facility and is completely encompassed by the analysis area. Land use planning in the City of Arlington is guided by the *City of Arlington Comprehensive Plan, 2002-2003* (City of Arlington, 2003). Goal 5 of the *City of Arlington Comprehensive Plan* addresses Open Space, Scenic and Historic Areas, and Natural Resources. This goal includes subtopic A, an inventory of land needed or desirable for open space, which describes the Horse Heaven Hills as rising "majestically over the Columbia on the Washington side of the river" (City of Arlington, 2003). Subtopic A also clarifies that there are "vast areas of open space within sight of almost every house in the Town "(City of Arlington, 2003). However, views of the Horse Heaven Hills are to the north away from the Facility. In addition, views from existing houses are toward the Columbia River, to the north and away from the Facility.

Subtopic F, Outstanding Scenic Views and Sites, identifies the views outside the City to the east, west, and north as scenic views and adds that "the topography of the City tends to protect those views as development occurs" (City of Arlington, 2003). Again, these views are all directed away from the Facility, which is proposed to the south of the City.

R.4.1.8 City of Ione Comprehensive Plan, City of Ione, Oregon

The City of Ione is located along the southeast edge of the analysis area approximately 9-miles from the Facility. Land use planning in the City of Ione is guided by the *City of Ione Comprehensive Plan (Ordinance #156) (*City of Ione, 1987). Under Section D, Open Spaces, Scenic and Historical Areas, and Natural Resources, the listed goal is "to conserve open space and protect natural, scenic, historic and cultural resources." Policy 1 in this section

specifies that the city shall identify scenic and historical areas which should be preserved from urban development. However, no scenic resources are identified in this plan.

Additionally, under Section L, Energy Conservation, the stated goal is to "conserve energy and develop and use renewable resources" (City of Ione, 1987). The Facility complies with this goal.

R.4.2 Federal Land Management Plans

This section includes an analysis of the federal land management plans that exist within the Facility's analysis area, as listed in Table R-1.

R.4.2.1 Two Rivers Resource Management Plan Record of Decision, BLM-Prineville District, Oregon

The *Two Rivers Resource Management Plan* (RMP), Record of Decision documents decisions reached by the BLM for resource management of public lands within the BLM's Prineville District, which encompasses Gilliam, Hood River, Sherman, and Wasco counties as well as parts of Crook and Jefferson counties. The RMP specifically identifies the John Day River as a scenic resource, which is located within the Facility's analysis area.

The basic policy direction for management of public lands along the lower John Day River was set by the RMP. As indicated on Figure R-1, the Facility will not be visible from segments of the river that have been designated as part of the National Wild and Scenic River system, except for a few scattered and isolated locations along the northern reach. The RMP identifies areas in the canyons occupied by the John Day River as locations with high visual quality, and it designates them as Special Management Areas. The BLM has placed the public lands along this segment of the John Day River in Visual Resources Management (VRM) Class II, a BLM management classification that permits management activities resulting in changes to the existing character of the landscape, provided that they do not attract the attention of the casual observer.

Additionally, the RMP identifies the Oregon National Historic Trail (ONHT) Historic Sites at Fourmile Canyon and McDonald Crossing as Special Management Areas. For these trail sites, "the unusual qualities of these sites will be maintained and protected" (BLM, 1986). However, these trail sites are not specifically identified as scenic resources, nor are any specific views from these sites identified. A more thorough review of these two trail sites is included below in Sections R.4.2.3 and R.4.2.4.

It is important to note that BLM's management plans and policies do not apply directly to lands, such as the Facility site, located outside the jurisdictional boundaries of BLM's plans. The Facility will not result in development or improvement of any BLM lands. The BLM plans are helpful, however, in identifying and assessing scenic resources.

R.4.2.2 Record of Decision John Day River Management Plan, Two Rivers, John Day, and Baker Resource Management Plan Amendments, BLM

The analysis area encompasses a segment of the John Day River designated as a National Wild and Scenic River by the Omnibus Oregon Wild and Scenic Rivers Act of 1988. This act directs the BLM to develop a river management plan for wild and scenic rivers. Thus, the *Record of Decision John Day River Management Plan, Two Rivers, John Day, and Baker Resource Management Plan Amendments* (ROD) presents BLM's plan to "protect and enhance river values such as recreation, fish, wildlife, vegetation, scenery, and water quality…through careful management of the lands within the John Day Basin" (BLM, 1994).

The segment of the John Day River included in the federal Wild Scenic River (WSR) system and covered by the *John Day River Management Plan* begins at Tumwater Falls, near river mile 10, and extends upstream through the Facility's analysis area (to approximately RM 40 at the Cottonwood Bridge where State Highway 206 crosses the John Day River). The WSR designation applies to the river itself and to federal lands managed by the BLM that are within ¼ mile of each bank. The segments' outstanding remarkable values include "scenic, recreation, fish, wildlife, geological, paleontological, and archaeological." The *John Day River Management Plan* indicates that along the part of the river in the analysis area, there will be no change in the VRM class, which would mean that BLM lands in the WSR along this segment of the river would be managed in accordance with VRM Class II standards, permitting changes to the existing character of the landscape that do not attract the attention of the casual observer. As indicated on Figure R-1, the Facility will not be visible from segments of the river that have been designated as part of the National Wild and Scenic River system including the areas within a ¼ mile of each bank, except for a few scattered and isolated locations along the northern reach.

This same segment of the John Day River, located upstream and south of Tumwater Falls, is also designated as a State Scenic Waterway pursuant to the Oregon State Scenic Waterways Act, ORS 390.805-390.020. The Scenic Waterway designation encompasses the river itself and the lands that lie within ¼ mile of its high water line. Under the State Scenic Waterways Act, the river segments in the Facility analysis area have been classified as a Scenic River Area, i.e., river segments that are:

> *…accessible by roads in places but contain related adjacent lands and shorelines still largely primitive and undeveloped except for agriculture and grazing. Scenic River Areas are administered to preserve their undeveloped character, maintain or enhance their high scenic quality, recreation, fish, and wildlife values while allowing continued agricultural use.*

The State's rules for the management of lands in Scenic River Areas (OAR 736-040-0065) include provisions that all new development (e.g., farm-related dwellings) must conform to County land use regulations and that all new development must be screened to the extent feasible. The guideline for new utility facilities in Scenic River Areas (OAR 736-040-0065) is that they share existing utility corridors, minimize ground and

vegetation disturbance, and make use of nonvisible alternatives when reasonably possible.

While the federal management plan and State Scenic Waterway designation are helpful in identifying and characterizing scenic resources along the John Day River, they are not directly applicable to the proposed Facility because it lies outside of the areas regulated by the federal plan and State designation.

R.4.2.3 Oregon Trail Comprehensive and Management Use Plan, National Park Service

The 10-mile analysis area includes a portion of the ONHT, which received federal designation as a "historic trail" under the National Trails System Act (NTSA) in 1978. The purpose of the historic trail designation on federal lands is to protect the historic route and any associated artifacts. Specifically, the purpose is described in the NTSA as follows:

> *National historic trails shall have as their purpose the identification and protection of the historic route and its historic remnants and artifacts for public use and enjoyment. Only those selected land and water based components of an historic trail which are on federally owned lands and which meet the national historic trail criteria established in this chapter are included as Federal protection components of a national historic trail….*

Thus, the NTSA and its related protections apply only to where the ONHT is on federal lands. In addition, the focus of the NTSA is on historic preservation, not management of scenic resources.

The NTSA indicates that specific locations along a historic trail can be identified as "high-potential" sites. High-potential sites are described as those locations that provide an opportunity to interpret the historic significance of the trail during its major use. The portion of the ONHT within the analysis area includes two high-potential sites, Fourmile Canyon and McDonald Crossing, as identified in the *Comprehensive Management and Use Plan – Oregon National Historic Trail* (CMP) (U.S. National Park Service, 1999). The locations of the high-potential sites in the analysis area are shown in Figure R-1.

The CMP was developed to comply with the requirements of the NHTA and to manage preservation of the ONHT. The CMP explains that the purposes of the ONHT are "to identify, preserve, and interpret sites, route, and history of the Oregon Trail" and "to commemorate the westward movement of emigrants to the Oregon country as an important chapter of our national heritage." Thus, the ONHT is managed for historical significance and not primarily as a scenic resource. The CMP's focus on the historic significance of the ONHT and not management of scenic resources is consistent with the Energy Facility Siting Council (EFSC) findings in Section IV.3(d) of the Final Order on the Shepherds Flat Wind Farm, dated July 25, 2008. The scenic value connected with the ONHT is focused on the view of visible trail remnants and ruts, along with the immediate surroundings. Therefore, the high-potential sites of the ONHT identified in the CMP and located in the analysis area are significant or important historic resources, but are not specifically identified as scenic resources.

Because these sites are not identified as significant or important scenic resources, they are not listed in Table R-2, which identifies such scenic resources in the analysis area. However, the Applicant provides an analysis below to demonstrate that the Facility will have limited impacts on the views from these locations.

McDonald Crossing (John Day River Crossing)

One of the two high-potential sites within the analysis area is McDonald Crossing. The CMP indicates that this high-potential site occurs where emigrants crossed the John Day River. This site is located within the river canyon on BLM and private land. The ZVI analysis shown on Figure R-1 indicates that the Facility will not be visible from McDonald Crossing.

Fourmile Canyon

The other high-potential site within the analysis area is Fourmile Canyon, which comprises the Fourmile Canyon BLM interpretive site where the ONHT crosses Fourmile Road and over a mile of deep ruts in the vicinity of the interpretive site (see Figure R-1). During the visual assessment conducted on November 24, 2009, the Applicant found that the ONHT splits into two segments due west of the BLM interpretive site and east of the site boundary, as shown in Figure R-1. The two segments are marked with white BLM trail markers where the trail is located on public land and the northernmost segment is located on both sides of Fourmile Road. The interpretive site referenced in the CMP is on BLM land and includes a covered and fenced in area with pedestal signs, located on the west side of Fourmile Road. The interpretive site directs viewers toward the southernmost trail segment that extends up an adjacent foothill located to the west.

The Fourmile Canyon high-potential site is located east of the Facility and approximately 1.5 miles from the closest portion of the site boundary with turbines, as shown in the maximum layout on Figure R-1. Although not identified as a scenic resource in the CMP, the ZVI analysis shows that turbines may be visible from the interpretive site. To the extent to which turbines may be seen from the interpretive site, they will appear as objects in the background of the view. The Facility will not likely be visible from other portions of the high-potential site. For example, the northernmost segment of the ONHT crosses Fourmile Road approximately 0.25 mile north of the interpretive site. Views of this segment of the ONHT from Fourmile Road will not likely include turbines from the Facility, especially views of the ONHT on the east side of the road.

The NHTA and subsequently the CMP designations apply only to federal land and do not regulate development on private land. The CMP identifies a "mile of deep ruts" at the Fourmile Canyon site and immediate surroundings, which are located on BLM land. The Facility is proposed entirely on private land and not on BLM land. Therefore, the Facility will not directly impact any portions of the ONHT located on public land.

R.4.2.4 Oregon Trail Management Plan, BLM-Prineville District, Oregon

The 1993 *Oregon Trail Management Plan* was prepared by the BLM Prineville District to meet the objectives of the Two Rivers RMP which directs the District to provide proper management for and interpretation of the ONHT segments occurring at Fourmile Canyon and McDonald Crossing. To meet the specified goal of land use compatibility, the plan proposes a "protective corridor extending ¼-mile either side of the main trail ruts" to protect the visual qualities of the Fourmile Canyon site, but notes that "the extent to which the ¼ mile protective corridor could be applied will be dependent on the amount of public land surrounding the individual trail segments."

The Facility will not be visible from McDonald Crossing as previously described (see Figure R-1). While Facility turbines may be visible in the background of the view from the Fourmile Canyon interpretive site, the Facility will be located entirely on private land, outside the ¼ mile corridor specified in this plan.

R.4.2.5 Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use, National Park Service

The 10-mile analysis area includes a portion of the Lewis and Clark National Historic Trail (LCNHT), which received federal designation as a "historic trail" under the NTSA in 1978. Again, the purpose of the historic trail designation, as addressed under Section R.4.2.3 above, is to protect the historic route and any associated artifacts. Thus, the focus of the NTSA is on historic preservation, not management of scenic resources. Furthermore, although the NTSA is not a defined protected area under OAR 345-022-0040, the Applicant addresses it below to demonstrate that the Facility will not likely result in significant adverse impact to the NTSA.

Trail Segments Identified in Comprehensive Plan

In 1982, the National Park Service prepared the *Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use* (CPMU) as called for in Section 5(f) of the NTSA which, "guides development and use of the Trail and provides a basis for coordinated and consistent implementation…" (pg. 2). The locations of the LCNHT were determined from the CPMU mapping (sheets 39 and 40). The CPMU includes mapping to more specifically identify the location of the LCNHT in the Columbia River segment and also identifies some existing recreational and historical areas that have potential for inclusion as part of the LCNHT. The Facility's analysis area encompasses a short portion of the Columbia River segment of the LCNHT as identified in the CPMU. However, the CPMU does not identify any specific scenic resources or views related to the LCNHT within the Facility's analysis area.

The LCNHT segments within the Facility analysis area are shown in Figures R-1 through R-4. The first segment is labeled a "water trail" along the Columbia River, which is how the expedition moved from east to west in 1804. The nearest portion of the site boundary with turbines is approximately 5.5 miles from the water trail. The second route is labeled as a "motor route" along Washington State Route 14, which is in the general vicinity of the expedition's return trip from the Pacific Ocean along the north

shore of the Columbia River in 1806. The nearest turbine proposed within the Facility site boundary is approximately 6.6 miles from the motor route. Although neither of these segments is specifically identified by the CPMU as a scenic resource, the ZVI analyses in Figures R-1 through R-4 show that the Facility will not be visible from the majority of either LCNHT segment. The main exception is the area along both the Columbia River and SR-14 directly adjacent to the town of Roosevelt, Washington. The ZVI shows that the Facility may be visible to a limited extent from this general area, but views from this area are already altered by existing development in Roosevelt and across the Columbia River by development in Arlington, Oregon, and surrounding areas, including turbines from existing wind facilities.

Existing Areas Identified in Plan

The CPMU also identifies three existing areas within the Facility's analysis area, which the plan indicates have the potential for inclusion as part of the LCNHT. The areas include three parks, one in Oregon and two in Washington. The Arlington Park and Marina is listed as the area in Oregon. This park and its views are focused on the Columbia River to the north and away from the proposed Facility. In addition, the ZVI analyses show that the Facility will not be visible from the Arlington Park and Marina. See Exhibit T, Section T.2, for additional discussion of the Arlington Park and Marina.

The first area listed on the Washington side of the Columbia River and within the Facility's analysis area is Roosevelt Park, located southwest of Roosevelt and on the river. The ZVI indicates that the Facility may be visible from this area, but as previously noted, views from this area are already altered by existing development in Roosevelt and across the Columbia River in Arlington. In addition, other existing infrastructure including I-84 and turbines from existing wind facilities are already visible from Roosevelt Park to the south.

The second area listed on the Washington side of the Columbia River and within the Facility's analysis area is Sundale Park, located west of Roosevelt and on the river. The ZVI shows that the Facility will likely not be visible from this area. Again, views from Sundale Park are already altered by other existing infrastructure including I-84 and turbines from existing wind facilities.

The CPMU also indicates that I-84 is not proposed for development as a route of the LCNHT; however, it does provide opportunity for interpretation of the Lewis and Clark expedition. Views from I-84 are focused on the river to the north, away from the Facility location. In addition, the ZVI analyses show that the Facility will not be visible from I-84 except for one small area along the eastern edge of the Facility analysis area. Again, views from this area of I-84 and specifically of the approximate LCNHT are to the north, away from the Facility.

Summary

In summary: (1) the focus of the NTSA is on historic preservation, not management of scenic resources; (2) no specific scenic resources related to the LCNHT are identified by the CPMU in the Facility's analysis area; and (3) the ZVI analyses show that the Facility

will not be visible from the majority of the LCNHT. Therefore, the LCNHT or any related resources are not listed in Table R-2, which contains the identified scenic resources in the analysis area, and no further analysis is required.

R.5 SIGNIFICANT POTENTIAL ADVERSE IMPACTS TO SCENIC RESOURCES

Table R-2 lists the scenic resource within the analysis area as specifically identified in local land use and federal land management plans. The table also indicates whether each scenic resource may potentially have views of the Facility and the subsequent degree of visual impact.

Table R-2. Scenic Resources Identified in Applicable Local Land Use Plans and Federal Management Plans that Pertain to Lands Within 10 Miles of the Site Boundary

Scenic Resource	County	Applicable Plan Scenic Resource Identified In	Approximate Distance and Direction to Nearest Proposed Turbine (miles and direction)	Is Facility Potentially Visible?	Degree of Impact (i.e. "Substantial" or "Not Substantial")
John Day River Canyon – WSR Segment 1/ State Scenic Waterway	Gilliam and Sherman counties	Two Rivers Resource Management Plan Record of Decision, 1986 Final John Day River Plan Record of Decision, February 2001	4.6 – Northeast	Minimally, only from isolated areas	Not Substantial

The Facility will not result in development or improvement of any federal land—more specifically, the John Day WSR identified in Table R-2. It is important to note that the applicable federal land management plans and their policies do not apply directly to lands, such as the Facility site, located outside the jurisdictional boundaries of the plans. These plans are designed to regulate development and improvement of the federal lands that they cover. Although the federal plans do not apply to the Facility site, the potential for adverse visual impacts to the scenic resource listed in Table R-2 is discussed below in response to OAR 345-021-0010(1)(r)(C).

OAR 345-021-0010(1)(r)(C) *A description of significant potential adverse impacts to the scenic resources identified in (B), including, but not limited to, impacts such as*:

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

Response: Although Facility construction and operation will result in the conversion of relatively small areas for access roads, turbine pads, and the underground collection system, this will not create any potential adverse impacts to identified scenic resources. The Facility has been sited specifically to avoid, minimize, and mitigate for potential adverse visual impacts resulting from the loss of existing vegetation and any necessary alteration of landscape.

Loss of Vegetation

The Facility is proposed for an area adjacent to the active Arlington Landfill. Approximately 43 percent of the land within the Facility site boundary is agricultural and conservation reserve program (CRP), devoted primarily to dryland winter wheat production where little natural vegetation occurs. The remainder of the land consists of grassland and shrub-steppe and is used for cattle grazing. Although the Facility will result in the conversion of relatively small areas of agricultural land and native grassland or shrub-steppe to access roads and turbine pads, the Applicant has minimized impacts to native habitat to the extent practicable. In addition, potentially significant impacts to native vegetation will be mitigated through a conservation easement, as further discussed in Exhibit P. The construction, operation, and retirement of the Facility are not anticipated to result in removal of aesthetically important natural vegetation.

Alteration of Landscape

Construction of the Facility will not alter the existing landscape in any way that will lead to potential adverse visual impacts from the identified scenic resource listed in Table R-2. The access roads, turbine pads, and underground collection system will require some ground preparation and limited grading. However, as described above, the ZVI data show that there will be limited, if any, views of the Facility project from the John Day WSR, so minor ground preparation and grading will not result in adverse visual impacts. In addition, John Day WSR is approximately 4.6 miles from the nearest portion of the Facility site boundary. Therefore, this distance further minimizes any potential for adverse visual impacts resulting from alteration of landscape.

Finally, the Facility layout has been designed to minimize the siting of components in the vicinity of prominent features in the landscape, such as rock outcroppings. Therefore, the Facility will have no adverse effect on rock outcrops identified as important landscape features in Finding 2 of Part 5 of the *Gilliam County Comprehensive Land Use Plan* or Finding XI of the *Sherman County Comprehensive Plan*.

(ii) Visual impacts of facility structures or plumes.

Response:

R.5.1 Overview

The Facility will consist of 134 to 269 turbines, depending on final turbine selection. The total number of turbines will not exceed 269 and the total MW will not exceed 404.The turbines will be mounted on a concrete pad and spaced up to 1,000 feet apart.

Under the maximum turbine layout (269 turbines) being considered, smaller turbines will be used in greater quantity. Turbines will be mounted on towers up to 80 meters (262 feet) in height, and will have rotors with a diameter of up to 77 meters (253 feet). Under the minimum turbine layout (134 turbines) being considered, towers will be up to

100 meters (328 feet) in height, and the rotors will be up to 100 meters (328 feet) in diameter.

The Facility will require the creation of gravel aprons at the base of each turbine, and a system of new and improved roads to provide access to each of the turbine locations. Energy from the proposed Facility will be collected by the underground cable system and connected to two new Facility Collector Substations (western and central). A 230-kV aboveground transmission line will connect the western collector substation to the central collector substation. A 230-kV aboveground transmission line will then connect the central collector substation to the existing 500-kV BPA Slatt substation. The Facility also will include an operations and maintenance (O&M) building(s), meteorological towers, and related facilities.

Photographs providing views of the Facility site from the perimeter roads are provided in Attachment R-1.

R.5.2 Visual Impact Analysis

The Applicant's visual impact analysis considered all Facility components. However, because of the large distances from the identified scenic resource, the limited lines of sight from the closest identified scenic resource, and the dominance of wind turbines compared to other components of the Facility in terms of visual impact, the visual appearance of the Facility from the scenic resources consists almost entirely of the wind turbines. For this reason, the following discussion focuses on the turbines.

In addition, because the maximum and minimum turbine layout scenarios do not create a materially different visual impression from the identified scenic resource within the 10-mile analysis zone, the maximum turbine layout ZVI scenario was used for the visual impact analysis.

A visual impact sometimes associated with wind facilities occurs at night when some of the turbines are lighted, as required by the FAA, to minimize aviation risks. Therefore, the Applicant analyzed the potential impact from lighting on the scenic resource described below. The number of turbines with lights and the lighting pattern of the turbines will be determined in consultation with the FAA. In general, these lights are designed to concentrate the beam in the horizontal plane, thus minimizing light diffusion down toward the ground and up toward the sky. Section R.6 contains additional information on how the Applicant will mitigate for potential visual impacts from turbine lighting.

R.5.2.1 John Day River

The ZVI analysis depicted in Figure R-1 indicates that the Facility may be visible to a very limited degree from small areas of BLM lands in the canyon but will generally not be visible from the Wild and Scenic River/Oregon Scenic Waterway designated segment of the river and the lands extending ¼ mile on either side of the river.

BLM's management plans and policies do not apply to privately owned lands, such as the Facility site, located outside the jurisdictional boundaries of BLM's plans. However, because BLM's plans are helpful in identifying and assessing scenic resources, an assessment of the Facility's potential effects on views from BLM lands in the John Day River canyon along the portion of the river that is included in the Wild and Scenic River system as well as the portion that is a State Scenic Waterway was undertaken to evaluate the impacts on the scenic qualities of this area. This analysis focuses on the impacts of the Facility on views from the river and from the lands along it in the canyon bottom. This approach was taken because it is reasonable to assume that the BLM lands on the sides of the John Day River canyon were given a VRM Class II designation to protect the existing character and quality of views within the canyon, which has some visual interest and some level of recreational use, as opposed to protecting the views from these river viewshed lands on the canyon's slopes toward areas that lie outside of the canyon. This approach is consistent with that taken in the Leaning Juniper II Application for Site Certificate (and supported in the Final Order), in which it was stated that BLM Prineville District planning staff had indicated that because access to the rim and canyon walls is very limited, potential impacts to these areas would not be significant and are not the primary concern of BLM (Leaning Juniper Wind Power II, LLC, 2006).

In the few limited areas along the John Day River corridor from which Facility turbines might be visible, few turbines will be visible from any one point, and only the blades are likely to be visible from many locations, rather than the turbines themselves or the support towers. In the places where they may be visible, the turbines will appear as elements on the ridgelines in the landscape's background, and will have no direct effect on the appearance of the walls of the canyon or the canyon floor. Although the turbines might be noticeable in some of the views, because of their small numbers, their location in the background, and the viewing distance (which will vary but be a minimum of 4.6 miles from nearest turbine to nearest point on the John Day Wild and Scenic River/John Day State Scenic Waterway), they will not be dominant elements in the scene. To the extent to which they will be visible, the turbines will be subordinate elements of the view, and because views from the canyon already include views of transmission lines of various voltages and are thus not entirely pristine, the presence of the turbines will not substantially alter the existing character and quality of views from the river corridor.

R.5.2.2 Conclusion

There are few locations in the canyon where the Facility's turbines will be visible at all, and to the limited extent to which they will be seen, they will appear as small objects in the background of the view. The most likely visual impact of the Facilities turbine strings will occur at night when some of the turbines will be lighted as required by the Federal Aviation Administration (FAA) to minimize aviation risks. To respond to FAA's aircraft safety lighting requirements, the Facility will be marked according to guidelines established by the FAA. The FAA guidelines for lighting of wind turbines call for lights that flash red (at 2,000 candela) at night. These lights are designed to concentrate the beam in the horizontal plane, thus minimizing light diffusion down toward the ground and up toward the sky. The exact number of turbines that will require lighting will be specified by the FAA after it has reviewed final Facility plans. Because the flashing lights

are most noticeable within approximately 1 mile of them, the visual impacts of the turbine lights will be low. Lights associated with the turbines will not have significant adverse impacts on the scenic resources discussed previously. Consequently, the Facility's impacts on this reach of the river will not be significant. The Facility will thus be consistent with federal management plans and the Sherman and Gilliam County comprehensive plans, which identify the John Day River canyon as an important visual resource.

R.6 OPPORTUNITY FOR MITIGATION

OAR 345-021-0010(1)(r)(D) *The measures the applicant proposes to avoid, reduce or otherwise mitigate any significant adverse impacts*.

Response**:** Although no significant adverse impacts to scenic and aesthetic resources have been identified, the Applicant will incorporate best management practices to minimize the proposed Facility's visual effects. Measures that will be incorporated into the design of the Facility to assure an attractive appearance and good integration into its landscape setting include the following:

- Implementation of active dust suppression measures during the construction period to minimize the creation of dust clouds
- Use of wind turbine towers, nacelles, and rotors that are locally uniform and that conform to high standards of industrial design to present a trim, uncluttered, aesthetic appearance
- Use of low-reflectivity, neutral gray, white, off-white, or earth tone finishes for the towers, nacelles, and rotors to minimize contrast with the sky backdrop and to minimize the reflections that can call attention to structures in the landscape
- Use of neutral gray, white, off-white, or earth tone finishes for the small cabinets containing pad-mounted equipment that might be located at the base of each turbine, to help the cabinets blend into the surrounding ground plane
- Restriction of exterior lighting on the turbines to the aviation warning lights required by the FAA, which will be kept to the minimum required number and intensity to meet FAA standards
- Placement of much of the Facility's electrical collection system underground, minimizing the system's visual impacts
- Use of a low-reflectivity finish for the exterior of the O&M facility building to maximize its visual integration into the surrounding landscape
- Restriction of outdoor night lighting at the O&M facility and the substation to the minimum required for safety and security; sensors and switches will be used to keep lighting turned off when not required, and all lights will be hooded and directed to minimize backscatter and offsite light trespass

- Use of a low-reflectivity finish for substation equipment to minimize its visual salience
- Use of dull gray porcelain insulators to reduce insulator visibility
- Use of fencing with a dull finish around the substation to reduce the fence's contrast with the surroundings

R.7 MAP

OAR 345-021-0010(1)(r)(E) *A map or maps showing the location of the scenic resources described under (B).*

Response: Figures R-1, R-2, R-3, and R-4 depict the scenic and aesthetic sites that are located within the analysis area. Attachment R-1 contains photographs of the Facility site.

R.8 MONITORING

OAR 345-021-0010(1)(r)(F) *The applicant's proposed monitoring program, if any, for impacts to scenic resources.*

Response: Because the proposed Facility will not result in significant adverse impacts to scenic and aesthetic values within the analysis area, the Applicant does not propose an active monitoring program specific to impacts on scenic and aesthetic values. With respect to the Applicant's efforts to incorporate design measures intended to better integrate the facilities into their landscape setting, no ongoing monitoring is proposed.

R.9 CONCLUSION

The Facility will comply with all applicable regulatory guidelines concerning scenic and aesthetic resources as discussed in the foregoing responses to the criteria contained in OAR 345-021-0010(l)(r)(A) through (F). Based on the foregoing information, the Applicant has satisfied the requirements in OAR 345-021-0010(1)(r) and demonstrated that the design, construction, and operation of the Facility will not result in significant adverse impacts to scenic resources and values within the analysis area. The Applicant proposes best management practices to further minimize the Facility's visual impacts. Accordingly, the Council may find that the standards contained in OAR 345-022-0080 have been satisfied.

R.10 REFERENCES

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Figures

ATTACHMENT R-1

Site Photographs

Figure R-1

Scenic & Aesthetic Areas

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

Benton County
Klickitat County
Morrow County
Sherman County
Gilliam County
Boardman
Roosevelt
Arlington
Roosevelt Park
Sundale Park
Port of Arlington Park and Marina
Fourmile Canyon
McDonald Crossing
Ione
Lexington
84
14
74
19
207
206

Legend

- Site Boundary/Micrositing Corridor
- 10-mile Analysis Area
- Proposed Turbine
- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis & Clark Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site
- John Day Wild and Scenic River/John Day State Scenic Waterway
- BLM Land
- State Boundary
- Limited Access Highway
- Highway
- Major Road
- Major Railroad Line
- River
- Water
- City Limit
- County Boundary

# of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 30
- 31 - 50
- > 50

Note:
ZVI analysis assumes 269 1.5-MW turbines.

Source: Lewis and Clark Trail information from National Park Service (Ms. Denise Nelson) and the National Park Service, 1982, Lewis and Clark National Historic Trail, Comprehensive Management and Use Plan

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Miles

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Figure R-2

Scenic & Aesthetic Areas

3.0-MW Turbine Layout
(Minimum Turbine Layout)

Montague Wind Power Facility

Benton County
Klickitat County
Morrow County
Sherman County
Gilliam County
Boardman
Roosevelt
Arlington
Roosevelt Park
Sundale Park
Port of Arlington Park and Marina
Fourmile Canyon
McDonald Crossing
Ione
Lexington
84
14
74
19
206
207

Legend

- Site Boundary/Micrositing Corridor
- 10-mile Analysis Area
- Proposed Turbine
- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis & Clark Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site
- John Day Wild and Scenic River/John Day State Scenic Waterway
- BLM Land
- State Boundary
- Limited Access Highway
- Highway
- Major Road
- Major Railroad Line
- River
- Water
- City Limit
- County Boundary

# of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 30
- 31 - 50
- > 50

Note:
ZVI analysis assumes 134 3.0-MW turbines.

Source: Lewis and Clark Trail information from National Park Service (Ms. Denise Nelson) and the National Park Service, 1982, Lewis and Clark National Historic Trail, Comprehensive Management and Use Plan

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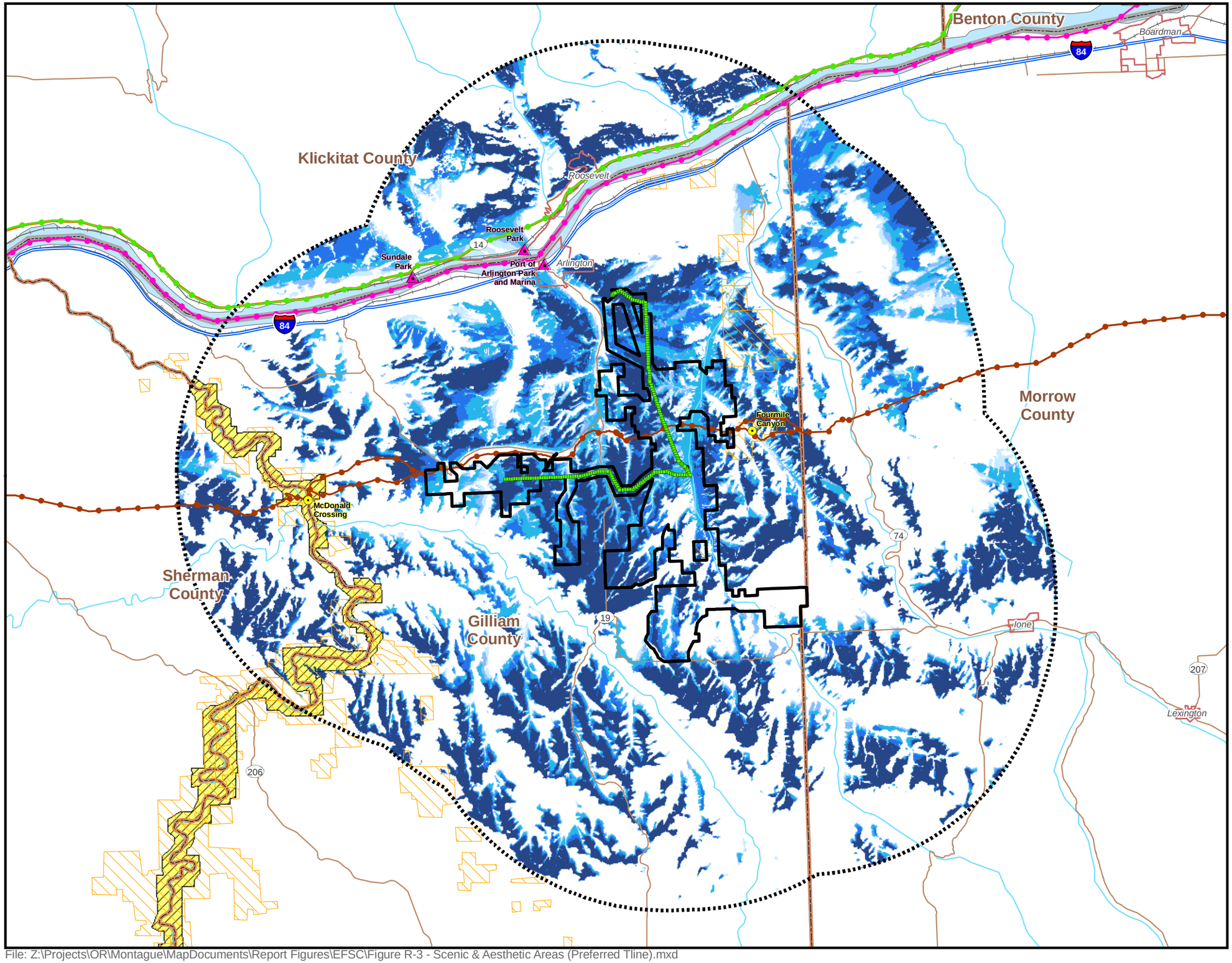

Figure R-3

Scenic & Aesthetic Areas

Preferred Transmission Line - Without Turbines

Montague Wind Power Facility

Legend

- Site Boundary/Micrositing Corridor
- 10-mile Analysis Area
- Proposed Transmission Line Structure
- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis & Clark Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site
- John Day Wild and Scenic River/John Day State Scenic Waterway
- BLM Land
- State Boundary
- Limited Access Highway
- Highway
- Major Road
- Major Railroad Line
- River
- Water
- City Limit
- County Boundary

# of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 30
- 31 - 50
- > 50

Note:
ZVI analysis assumes 100-ft tall structures.

Source: Lewis and Clark Trail information from National Park Service (Ms. Denise Nelson) and the National Park Service, 1982, Lewis and Clark National Historic Trail, Comprehensive Management and Use Plan

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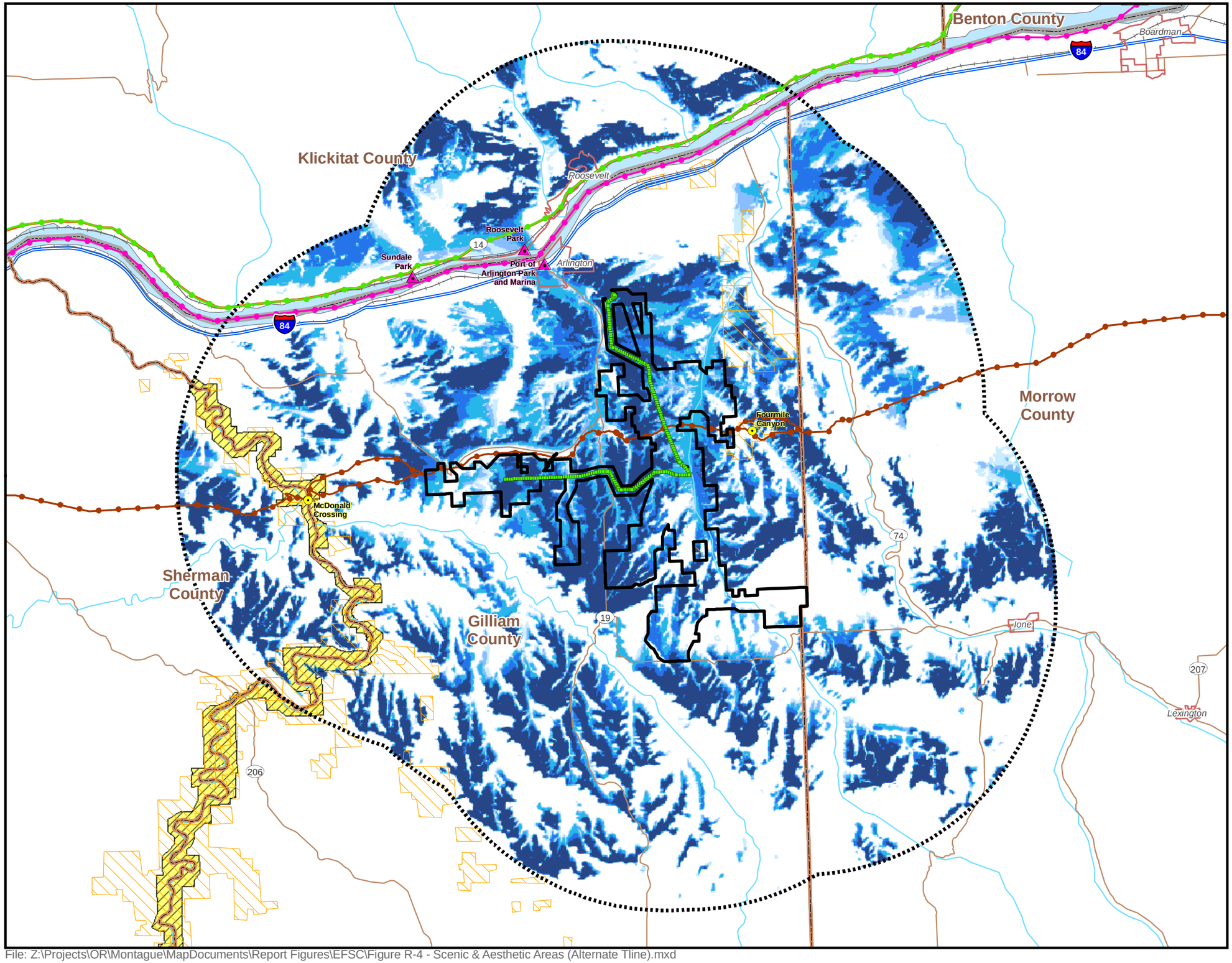

Figure R-4

Scenic & Aesthetic Areas

Alternate 2 Transmission Line - Without Turbines

Montague Wind Power Facility

Legend

- Site Boundary/Micrositing Corridor
- 10-mile Analysis Area
- Proposed Transmission Line Structure
- Oregon Trail (Approximate Route)
- Oregon Trail High-Potential Site

Lewis & Clark Trail

- Water Trail (Approximate 1804 Route)
- Motor Route (Approximate 1806 Route)
- Lewis and Clark Trail Potential Site
- John Day Wild and Scenic River/John Day State Scenic Waterway
- BLM Land
- State Boundary
- Limited Access Highway
- Highway
- Major Road
- Major Railroad Line
- River
- Water
- City Limit
- County Boundary

# of Visible Turbines

- 1 - 5
- 6 - 10
- 11 - 30
- 31 - 50
- > 50

Note:
ZVI analysis assumes 100-ft tall structures.

Source: Lewis and Clark Trail information from National Park Service (Ms. Denise Nelson) and the National Park Service, 1982, Lewis and Clark National Historic Trail, Comprehensive Management and Use Plan

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ATTACHMENT R-1

Site Photographs



Looking south/southwest from the central city of Arlington parking lot.



Looking northwest from the center of the city of Ione.



Looking west/northwest from the Bureau of Land Management's Oregon National Historic Trail, Four Mile interpretive site.



Looking east/northeast from the Oregon National Historic Trail, McDonald Crossing.

EXHIBIT S

HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES
OAR 345-021-0010(1)(s)

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S-1 Historical, Cultural, and Archaeological Surveys

Attachment

S-1 Cultural Resources Survey for the Montague Wind Power Facility [*Confidential and Not for Public Distribution*]

S.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). Up to 269 turbines will be located within the Facility site boundary, depending on the final turbine size and vendor (as further described in Exhibit B, Section B.1.3). Please refer to Exhibit C, Figures C-1, C-2, and C-3, and C-4 through C-7, for maps of the site vicinity, Facility location, and Facility components, respectively.

Exhibit S addresses potential impacts the proposed Facility will have on historic, cultural, and archaeological resources in the cultural resources analysis area, which is defined in the Project Order, Section VI, as the area within the site boundary where any and all ground-disturbing activities associated with construction and operation are likely to occur. For purposes of studying the analysis area, the Applicant identified a survey corridor and areas surveyed for previous Applicant projects (see Section S.4.1.3 for further description). Figure S-1 shows the analysis area.

This Exhibit responds to the requirements of OAR 345-021-0010(1)(s), as follows:

OAR 345-021-0010(1)(s) *The applicant shall include information in Exhibit S or in confidential submissions providing evidence to support a finding by the Council as required by OAR 345-022-0090.*

Response**:** OAR 345-021-0010(1)(s) requires that the site certificate application for the proposed energy facility address historic, cultural, and archaeological resources as defined in OAR 345-022-0090. OAR 345-022-0090 requires the following:

"*[T]he Council must find that the construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impacts to:*

(a) Historic, cultural or archaeological resources that have been listed on, or would likely be listed on the National Register of Historic Places;

(b) For a facility on private land, archaeological objects, as defined in ORS 358.905(1)(a), or archaeological sites, as defined in ORS 358.905(1)(c); and

(c) For a facility on public land, archaeological sites, as defined in ORS 358.905(1)(c)."

OAR 345-022-0090, however, is not a directly applicable approval criterion for wind energy facilities. See OAR 345-022-0090(2). At the same time, the Council may apply the requirements of OAR 345-022-0090(1) as conditions on the Facility's site certificate. Therefore, this Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(s) and provides evidence to support a finding by the Council as required by OAR 345-022-0090.

OAR 345-021-0010(1)(s) *Information about historic, cultural and archaeological resources. Information concerning the location of archaeological sites or objects may be exempt from public disclosure under ORS 192.502(4) or ORS 192.501(11). The applicant shall submit such*

information separately, clearly marked as "confidential," and shall request that the Department and the Council keep the information confidential to the extent permitted by law. The applicant shall include information in Exhibit S or in confidential submissions providing evidence to support a finding by the Council as required by OAR 345-022-0090, including:

S.2 RESOURCES LISTED, OR ELIGIBLE FOR LISTING, ON THE NATIONAL REGISTER OF HISTORIC PLACES

(A) Historic and cultural resources within the analysis area that have been listed, or would likely be eligible for listing, on the National Register of Historic Places;

Response: The Applicant recorded a total of 23 archaeological sites within the analysis area, including 19 archaeological sites, three farmsteads, and two discontiguous, visually intact remnants of the Oregon National Historic Trail (ONHT) comprising a single site. There are no sites that are currently listed on the National Register of Historic Places (NRHP). Formal testing to determine eligibility has not been conducted. However, six of the 23 recorded sites appear likely to be eligible for listing on the basis of surface indicators. The six sites comprise five archaeological sites and the two discontiguous intact remnants mentioned above. The three historic farmstead sites are unlikely to be eligible for listing. Section S.3.2 provides additional description of recorded sites and their likely NRHP eligibility.

S.3 ARCHAEOLOGICAL OBJECTS ON PRIVATE LANDS WITHIN THE ANALYSIS AREA

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

Response:

S.3.1 ORS Definition of Archaeological Objects and Sites

The Applicant has evaluated the archaeological objects and archaeological sites within the analysis area. As stated in ORS 358.905(1)(a), an "archaeological object" is an object that "(A) [i]s at least 75 years old; (B) [i]s part of the physical record of an indigenous or other culture found in the state or waters of the state; and (C) [i]s material remains of past human life or activity that are of archeological significance including, but not limited to, monuments, symbols, tools, facilities, technological by-products and dietary by-products." Comparatively, as stated in ORS 358.905(1)(c)(A), an "archaeological site" is defined as a "geographic locality in Oregon…that contains archaeological objects and the contextual association of the archaeological objects with: (i) [e]ach other; or (ii) [b]iotic or geologic remains or deposits." Examples of archaeological sites from ORS 358.905(1)(c)(B) include "shipwrecks, lithic quarries, house pit villages, camps, burials, lithic scatters, homesteads and townsites." Based on these definitions, the Applicant recorded a total of 23 sites, including 19 archaeological sites, three farmsteads, and two visually intact remnants of the ONHT comprising a single site. In addition, the Applicant recorded 22 archaeological isolates.

S.3.2 Sites Found Within the Analysis Area

A total of 23 archaeological sites, including 19 archaeological sites, three historic farmsteads, and two visually intact remnants of the ONHT comprising a single site, were discovered within the cultural resources analysis area and recorded with the Oregon State Historic Preservation Office (Oregon SHPO). Attachment S-1, the Cultural Resources Survey Report (confidential and not for public distribution), shows the mapped locations of the recorded sites, and provides details of the investigation methodology and findings from the 2009 surveys. The sites listed below will be avoided by Facility construction and operation.

Formal testing to determine eligibility for listing on the NRHP was not conducted. However, six of the 23 recorded archaeological sites appear likely to be eligible for listing on the basis of surface indicators, as indicated by underlined text in the descriptions that follow.

S.3.2.1 Site CH-09-03

This site consists of a lithic scatter, a dense concentration of tertiary flakes in a dune blow-out. Several formed tools are present on the site including a mid-stage biface, and edge-ground cobble, and a quartzite anvil stone. Over 250 pieces of lithic material are present on the site. The site location and soil depth suggest that subsurface deposits are likely, and the site appears to be eligible for listing on the NRHP.

S.3.2.2 Site CH-09-04

This site consists of a lithic scatter located in a dune blow-out. It contains a wide array of lithic material types and over 350 pieces of cultural material. The site location suggests that subsurface deposits are likely. The size and density of observed materials, as well as its likely subsurface component, are such that the site appears to be eligible for listing on the NRHP.

S.3.2.3 Site CH-09-05

This site consists of a sparse lithic scatter located on a south-facing slope. Most lithic material is large primary or secondary decortication or shatter flakes. Approximately 50 pieces of lithic material were observed on the site surface. The slope and available soil depth suggest that a subsurface deposit is possible and the site appears to be eligible for listing on the NRHP.

S.3.2.4 Site CH-09-07

This site consists of a lithic scatter containing over 50 pieces of lithic material, including a small chert projectile point. Most of the flakes are tertiary decortication flakes. Basalt, obsidian, and chert are all represented in the cultural material. The flakes are visible in a dune blow out so subsurface deposits are likely. The likelihood of a subsurface deposit, and the presence of formed tools, suggest the site is eligible for listing on the NRHP.

S.3.2.5 Site CH-09-RM-2

This site contains a small number of flakes, flake fragments, and shatter observed on a gentle west facing slope overlooking Alkalai Canyon. One fist-sized core was observed. The main cluster of flakes forms a small 20-meter-diameter ovoid. The site appears to contain significant soil depth. Flakes are generally small, and represent a secondary stage of decortication. The site appears to be eligible for listing on the NRHP.

S.3.2.6 Site AF-01

This site consists of an historic can concentration and scattered historic debris in the bottom of Eightmile Canyon. About 100 cans are present, most of which are solder dot sanitary cans. Also on the site are a white enamelware basin, a glass pickle jar, a stove pipe, a small kerosene can, a steel Rainier Ale can, a Prince Albert Tobacco container, a Log Cabin Maple Syrup container, a paint can, a small medicine container with cotton inside, a Lumberjack Imitation Maple Syrup container, scrap metal pieces, battery parts, a large gas canister, and milky green glass fragments. On the basis of the artifacts, the site dates to ca. 1930 to 1960. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.7 Site AF-03

This site is located on an east-facing side-slope on the west side of Eightmile Canyon. It contains five earthwork features and a refuse scatter. Historic-era artifacts on the site surface include fragments of household debris, among them a variety of glass fragments, stove parts, and nails. On the basis of these artifacts, the site likely predates 1915. The artifacts and earthwork features at the site suggest a dwelling, likely related to early homesteading. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.8 Site CH-09-01

The site is located on the north rim of a small drainage. The site consists of an historic debris scatter with four excavated features. Debris on the site includes a light historic debris scatter of metal fragments and crushed cans. Other artifacts include a variety of household and agricultural items. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.9 Site CH-09-02

This site consists of a small scatter of household cans and metal fragments in the bottom of Eightmile Canyon. Artifacts include one gallon-sized metal pail, eight crushed hole-in-top solder dot cans embossed with "PUNCH HERE," one larger can, one coffee can with a key-wind opening and a painted "Hills Bros" logo, and one crushed sanitary can. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.10 Site CH-09-06

Located in Eightmile Canyon, this site consists of a relatively recent trash dump which may still be in use. Trash on the site includes steel drums, rolls of fencing, barbed wire, stove parts (modern and historic), concrete, pipes, automobile filters, cans, plastic five-gallon buckets, signage, and glass bottles. Some of the deposits on the site are modern. A very deep, square pit is present. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.11 Site CH-09-08

Site CH-09-08 consists of a large, rectangular basalt rock enclosure in the vicinity of Eightmile Canyon. The rock wall is about two courses tall and measures 28 to 30 inches wide in most places. It is located at the base of a hill, in an open valley bottom. No artifacts are present on the site, and the immediate area appears to be used as active rangeland. Because of its large size, the enclosure is not likely a foundation for a covered building; rather, it may have been used as a livestock corral or some other livestock-related pen enclosure. Because no artifacts are present on the site, a definitive determination of the site's age is unclear. Surface indicators do not indicate this site is eligible for listing on the NRHP.

S.3.2.12 Site CH-09-09

This site consists of abandoned historic agricultural equipment and several refuse concentrations spread over a large area near Eightmile Canyon. It includes mid-20th century farm implements, horse drawn implements, a 1920s vintage passenger vehicle, and three trash dumps containing household discards and agricultural equipment debris. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.13 Site CH-09-10

Nine pieces of abandoned historic agricultural equipment and a quarry make up this site, located near Eightmile Canyon. Historic refuse includes 1950s vintage automobiles (a Desoto), domestic debris, appliances, and architectural elements (window frames) and farm implements.

The equipment and debris represent multiple dumping episodes and date to between 1930 and 1960. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.14 Site CH-09-11

This small historic trash dump near Eightmile Canyon contains over 100 cans, farm implements, automobile parts, and household discards. The site appears to represent one or more dumping episodes from the early to mid-20th century. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.15 Site CH-09-12

The site consists of abandoned historic farm machinery and a 1930s era passenger vehicle chassis. The equipment appears to date from the 1930s to the 1960s. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.16 Site CH-09-21-OR.Tr

The approximate route of the ONHT intersects the Facility site boundary as shown in Figure S-1. The ONHT (approximate route) intersects the Facility site boundary on Fourmile Road approximately 0.25 mile north of the public Fourmile Canyon interpretive site, and exits the Facility site boundary near Blalock Canyon Road. The ONHT is the emigrant route used from 1841 to about 1869 from Independence Missouri to the Oregon Territory. Beginning in the 1840s emigrants passed through what would become Gilliam County on their way to The Dalles on the ONHT. Giles French (1958) has described the different branches of ONHT route that passed through the northern part of the county and the routes have been mapped by Gregory Franzwa (1990). Most visible remnants of the ONHT in Gilliam County and in the Facility vicinity have been destroyed by agriculture or overlain with modern transportation facilities. Two discontiguous, visually intact remnants of the ONHT were recorded in two separate remnants comprising one recorded site within the site boundary, as shown in Figure 3 of the cultural resources survey report (Attachment S-1; confidential and not for public distribution). Wagon ruts, often faint, can be intermittently seen in the two remnants. The two remnants are not visible from public roads or viewing areas and no public access to them is available within the analysis area. The Applicant will avoid construction of Facility components on visually intact remnants of the ONHT. The ONHT appears to be eligible for listing on the NRHP.

S.3.2.17 Site CH-09-RM-1

This site consists of an historic debris dump containing at least five vending machine covers and internal machinery, large amounts of baling wire, over 200 tin cans, and miscellaneous modern debris including plastic brooms, jugs, sheet metal, tires, fence posts, and aerosol spray cans. The site is located in a drainage gulley washing down an east-facing hillslope in the vicinity of Alkali Canyon. Cans on the site range from modern pull tab aluminum types to solder dot historic cans. A fragment of a 1949 license plate is present on the site. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.18 Site CH-09-RM-3

This site consists of a sparse scatter of historic debris in an active agricultural field overlooking Rock Creek. Artifacts on the site are of domestic type, typically found on historic homesteads. Because of the active plowing and cultivation on the site, all artifacts are highly fragmented and very small. They include fragments of various color varieties of bottle glass, stoneware fragments, miscellaneous and unidentified metal fragments, and a small number of tin can fragments. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.19 Utse Farmstead (DS-1)

This small farmstead complex is located adjacent to the approximate route of the ONHT and contains a framed house currently undergoing remodeling, sheep sheds, a hay barn and feeder. The complex currently is in operation. The eligibility of this site is still to be determined pending the results of architectural review.

S.3.2.20 Site JRC-6

The site contains nine features dug into the ground with very few artifacts associated with them. Eight of the features are dug into a slope of a hill, while a large circular feature is on a level floodplain. The features appear to be hand-excavated. Based on the scarcity of artifacts, it appears that this area was used on a temporary basis. Although the use of this site is unknown, historically this area has been used by the livestock and agricultural industries, so it is assumed that this site is somehow related to activities associated with these industries. Surface artifacts do not indicate this site is eligible for listing on the NRHP.

S.3.2.21 Site JRC-7

The Eightmile Cemetery is located adjacent to the east side of Eightmile Road. It is bordered by a wire fence with an entrance on the west side. Grave markers indicate the cemetery was initially used in 1899 and last used in 2003. Although cemeteries, with few exceptions, are not generally eligible for listing on the NRHP, other state laws regulate and protect such burial places. The Eight Mile Cemetery meets the definition of an historic cemetery as defined in ORS 97.772. Additionally, this cemetery is classified as an archaeological site under ORS 358.920 and receives regulatory protection under that statute.

S.3.2.22 Eightmile Canyon Ranch (JRC-8)

This expansive farm and ranch complex includes an abandoned residence in near ruin, hay barns, a granary, livestock chutes, metal grain bins and a wellhouse. The complex contains scattered milled lumber debris attesting to the former presence of at least one additional building, now destroyed. The complex is still in operation as a storage facility. The eligibility of this site is still to be determined pending the results of architectural review.

S.3.2.23 Weatherford Ranch (JRC-10)

This expansive ranch is an operational livestock and farming complex that includes a framed residence, multiple barns and sheds, livestock enclosures, and modern metal grain bins. A monument facing the road commemorates the establishment of the ranch in 1942. The eligibility of this site is still to be determined pending the results of architectural review.

S.4 ARCHAEOLOGICAL SITES ON PUBLIC LANDS WITHIN THE ANALYSIS AREA

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

Response: The proposed Facility is located entirely on private lands.

S.5 SIGNIFICANT POTENTIAL IMPACTS OF FACILITY CONSTRUCTION AND OPERATION ON HISTORIC, CULTURAL, AND ARCHAEOLOGICAL RESOURCES

(D) The significant potential impacts, if any, of the construction, operation and retirement of the proposed facility on the resources described in paragraphs (A), (B) and (C) and a plan for protection of those resources that includes at least the following:

S.5.1 Methodology

(i) A description of any discovery measures, such as surveys, inventories, and limited subsurface testing work, recommended by the State Historic Preservation Officer or the National Park Service of the U.S. Department of Interior for the purpose of locating, identifying and assessing the significance of resources listed in paragraphs (A), (B), and (C).

Response:

S.5.1.1 Desktop Survey

The desktop survey included a file and literature search conducted at Oregon SHPO to identify potential historic, cultural, or archaeological resources within the proposed Facility site boundary. In addition, General Land Office maps were examined for evidence of early historic activity that might not be identified in other sources.

S.5.1.2 Traditional Use Survey

The Facility is located on the ceded lands and traditional use area of the Confederated Tribes of the Warm Springs Indian Reservation (CTWSR) as identified in the Treaty of 1855. The ceded lands and traditional use are of the Confederated Tribes of the Umatilla Reservation (CTUIR) are located just east of the Facility site boundary in Morrow County. Both the CTWSR and the CTUIR have been directly contacted and provided with Facility maps and background information. Much of the analysis area currently is being cultivated, or has in the past been cultivated and is now in the Conservation Reserve Program (CRP). Private ownership has precluded access for well over 100 years to Native Americans seeking to practice traditional plant resource gathering or upland hunting of birds and mammals. It is unlikely that these privately owned lands were accessed in the past by any living Tribal members. Further, the extensive alteration of the native ground cover and transformation of the landscape into a Euro-American rural agrarian land-use pattern has most likely degraded or destroyed any former Traditional Cultural Properties (TCPs). The lack of access to these lands over at least three generations indicates that the lands have not likely been used within the living memory of Tribal members.

The conditions defined in National Register Bulletin 38 (Parker and King, 1998) for the identification and verification of traditional use do not appear likely to be satisfied within the analysis area. Therefore, as a result of this long period of cultivation under private ownership, and the lack of continued native use, ethnographic or TCP studies have not been undertaken.

Notwithstanding the Facility site's National Register non-eligibility as a TCP, discussions between the Applicant and the CTWSR have indicated that the CTWSR desires to know whether traditional plants may survive on the Facility site on the side slopes and areas that have not been subject to historic agricultural activities. The Applicant and the CTWSR are currently developing the scope of such a study, which would be conducted by the CTWSR. Given that the study is for the private use of the CTWSR, the study need not be constrained by the Facility's permitting schedule.

S.5.1.3 Field Investigation

Field investigations were conducted on October 12 through December 4, 2009, for the cultural resources survey corridor. An intensive cultural resources field inventory was conducted to check for the presence or absence of historic properties and for cultural resources that otherwise might not meet the threshold of significance necessary to qualify them as historic properties. Portions of the Facility site were previously surveyed for cultural resources in 2007-2008 for the Pebble Springs Wind Power Facility and in 2008-2009 for Leaning Juniper IIB (LJIIB).

Regulatory Compliance

The investigation methods employed in preparing Exhibit S followed applicable National Environmental Policy Act (NEPA) (Public Law 91-190) regulations and were consistent with U.S. Secretary of Interior standards for cultural resource survey and documentation under Section 106 of the National Historic Preservation Act (Public Law 89-665). Turbine strings, adjacent access roads, and collector lines were surveyed with 66- to 100-foot (20- to 30-meter) transect intervals. Surveys were conducted and sites were recorded using hand-held Trimble global positioning system (GPS) devices.

Survey Corridors

The cultural resources survey corridor was developed to encompass the preliminary alignments of the proposed wind turbines, collector lines, operations and maintenance (O&M) facility(s), Facility Collector Substations, staging areas, access roads, and preferred and one alternate transmission line (subsequently named Alternate 2). An additional survey corridor was added for an alternate transmission line route as the field investigation was being completed (Alternate 1 230-kV Transmission Line, Figure S-1). A preliminary literature review identified no cultural sites in this corridor. Prior to construction, this corridor will be field surveyed and cultural resources, if identified, recorded. Results will be provided to the Oregon Department of Energy (ODOE) and Oregon SHPO prior to construction and any sites recorded will be avoided by construction of the transmission line.

Figure S-1 shows the Facility site boundary, micrositing corridor, and cultural resources survey corridor. Survey methods and findings are further described in the Cultural Resources Survey Report (confidential and not for public distribution) included as Attachment S-1.

Survey corridors were established around proposed temporary and permanent facilities and construction areas identified in a preliminary layout available at the time the survey began. Figure S-1 shows the survey corridor layered on top of the site boundary to indicate the area surveyed during the field investigation. The Applicant proposes a site certificate condition in the event that the Facility is changed or expanded beyond the corridors surveyed for cultural resources, or to address any layout changes that may occur through micrositing of facilities (see Section S.6 for proposed site certificate condition). If micrositing indicates that any facilities would optimally be located outside of the surveyed areas or other Facility components are expanded beyond the areas recently surveyed for cultural resources, the Applicant proposes to conduct cultural resource surveys and submit that information to ODOE before construction begins. All new or additional components will be designed to avoid impacts on cultural resources.

Protection Measures

If any potential historic, cultural, or archaeological resources are found during the field investigation, the Applicant will ensure that construction and operation of the Facility will have no impact on the resources. The Applicant will instruct all construction personnel to avoid these areas and will implement other appropriate measures to protect the resources. The Applicant has committed to avoiding all historic, cultural, or archaeological resources through the micrositing of the transmission line poles and construction disturbance areas, as further described in Sections S.5.3.

S.5.2 Survey and Inventory Results

(ii) The results of the discovery measures described in subparagraph (i), together with an explanation by the applicant of any variations from the survey, inventory, or testing recommended.

Response: The results of the October through December 2009 cultural resource survey are documented in the Cultural Resources Survey Report (Attachment S-1; confidential and not for public distribution). No historic properties or archaeological sites will be affected by construction or operation of the proposed Facility.

As mentioned earlier, in the event that the Facility is changed or expanded beyond the corridors surveyed for cultural resources, or if micrositing indicates that facilities would optimally be located outside of the surveyed areas, the Applicant proposes to conduct cultural resource surveys and submit that information to ODOE before construction begins.

S.5.3 Measures Designed to Prevent Destruction of Historic, Cultural, and Archaeological Resources

(iii) A list of measures to prevent destruction of the resources identified during surveys, inventories and subsurface testing referred to in subparagraph (i) or discovered during construction.

Response: Cultural resources surveys identified 23 cultural sites in the cultural resources analysis area. None of the sites recorded during the cultural resource surveys will be affected by the proposed Facility as now designed. Although cultural sites that are likely eligible for listing on the NRHP have been recorded within the analysis area, micrositing will be designed to avoid any impacts to all of these sites. The Applicant has committed to avoiding all historic, cultural, and archaeological resources through the micrositing of the Facility components.

The following protective measures will be implemented during construction of the Facility to avoid impacts:

Environmental Awareness Training

- The Applicant will develop an environmental awareness training course for the construction contractors. The course will provide information on the sensitive historic, cultural, or archaeological resources present onsite, exclusion flagging, permit requirements, and other environmental issues.

- Construction site personnel will be required to attend the environmental awareness training in conjunction with hazard and safety training prior to working onsite.

Construction Drawings

Cultural resources will be identified on construction drawings as "sensitive resource areas-no entry" and brought to the attention of construction personal working in the field.

Exclusion Flagging

Resources identified near planned construction will be marked as described below:

- Historic, cultural, or archaeological resources will be marked with orange exclusion fencing or other marking. The contractor will be instructed to work outside these boundaries at all times.

- The contractor will ensure that exclusion flagging is in place prior to construction in that area.

The Applicant will ensure that construction and operation of the Facility will have no impact on the resources. The Applicant will instruct construction personnel to avoid these areas and will implement other appropriate measures to protect the resources.

S.5.4 Permit Application

(iv) A completed copy of any permit applications submitted pursuant to ORS 358.920.

Response: No permit applications have been submitted to Oregon SHPO pursuant to ORS 358.920 because no subsurface testing on public or private land was conducted (recorded sites and general site location and history do not warrant subsurface testing). In the event that previously undiscovered archaeological sites are inadvertently disturbed during construction, construction work will cease and the Applicant will direct the site archaeologist to apply for necessary archaeological excavation permits from Oregon SHPO.

S.6 PROPOSED MONITORING PROGRAM

(E) The applicant's proposed monitoring program, if any, for impacts to historic, cultural and archaeological resources during construction and operation of the proposed facility.

Response: In addition to the field flagging and marking of all recorded sites, archaeological monitors will be present during construction in areas within 200 feet of the six cultural sites that have been identified as likely to be eligible for listing on the NRHP (CH-09-03, CH-09-04, CH-09-05, CH-09-07, CH-09-RM-2, and CH-09-21-Or. Tr) to ensure protection of these resources.

S.7 PROPOSED SITE CERTIFICATE CONDITIONS

The Applicant proposes that four site certificate conditions be included in the Facility site certificate. The proposed conditions are consistent with site certificate conditions 45, 46, 47, and 48 from the *Leaning Juniper II Wind Power Facility First Amended Site Certificate* (approved by ODOE on November 20, 2009). The Applicant proposes the following conditions:

Condition 45

Before beginning construction, the certificate holder shall provide to the Department a map showing the final design locations of all components of the facility, the areas that would be disturbed during construction and the areas that were surveyed as described in the Application for Site Certificate. The certificate holder shall hire qualified personnel to conduct field investigation of all areas to be disturbed during construction that lie outside the previously-surveyed areas. The certificate holder shall provide a written report of the field investigation to the Department and to the Oregon State Historic Preservation Office (SHPO). If any potentially significant historic, cultural, or archaeological resource sites are found during the field investigation, the certificate holder shall instruct all construction personnel to avoid the identified sites and shall implement appropriate measures to protect the sites, including the measures described in Condition 48.

Condition 46

The certificate holder shall ensure that a qualified person instructs construction personnel in the identification of cultural materials and avoidance of accidental damage to identified resource sites.

Condition 47

The certificate holder shall ensure that construction personnel cease all ground-disturbing activities in the immediate area if any archaeological or cultural resources are found during construction of the facility until a qualified archeologist can evaluate the significance of the find. The certificate holder shall notify the Department and SHPO of the find. If SHPO determines that the resource is significant, the certificate holder shall make recommendations to the Council for mitigation, including avoidance or data recovery, in consultation with the Department, SHPO, and other appropriate parties. The certificate holder shall not restart work in the affected area until the certificate holder has demonstrated to the Department and SHPO that it has complied with archaeological permit requirements administered by SHPO.

Condition 48

Before beginning construction, the certificate holder shall label all identified historic, cultural, or archaeological resource sites on construction maps and drawings as "no entry" areas, and if construction activities will occur within 200 feet of an identified site, the certificate holder shall flag a 50-foot buffer around the site.

These four proposed conditions assure appropriate actions are undertaken to confirm that historic, cultural, or archaeological resources are adequately protected during the Facility's construction and operation.

S.8 CONCLUSION

The foregoing evidence demonstrates that no historic, cultural, or archaeological properties in the Facility site boundary have been listed on the NRHP, and consequently, the Facility will have no significant adverse impacts to historic, cultural or archaeological resources under OAR 345-022-0090(1)(a). Further, although no sites have been listed on the NRHP, all sites recorded as a result of the cultural resource investigation conducted for the Facility will be avoided by during construction and operation. The Applicant will avoid these sites by marking them on construction and operations drawings as "no entry" areas and thus the Facility will not result in significant adverse impacts to archaeological sites under OAR 345-022-0090(1)(b). The Facility will not result in significant adverse impacts to archaeological sites under OAR 345 022 0090 (1)(2) because there are no public lands within the site boundary.

S.9 REFERENCES

Franzwa, Gregory M. 1990. *Maps of the Oregon Trail*. The Patrice Press, St. Louis, Missouri.

French, Giles. 1958. *The Golden Land, A History of Sherman County, Oregon*. Oregon Historical Society. Portland, Oregon.

Parker, Patricia L., and Thomas F. King. 1998, U.S. Department of the Interior, National Park Service. "National Register Bulletin 38: Guidelines for Evaluating and Documenting Traditional Cultural Properties."

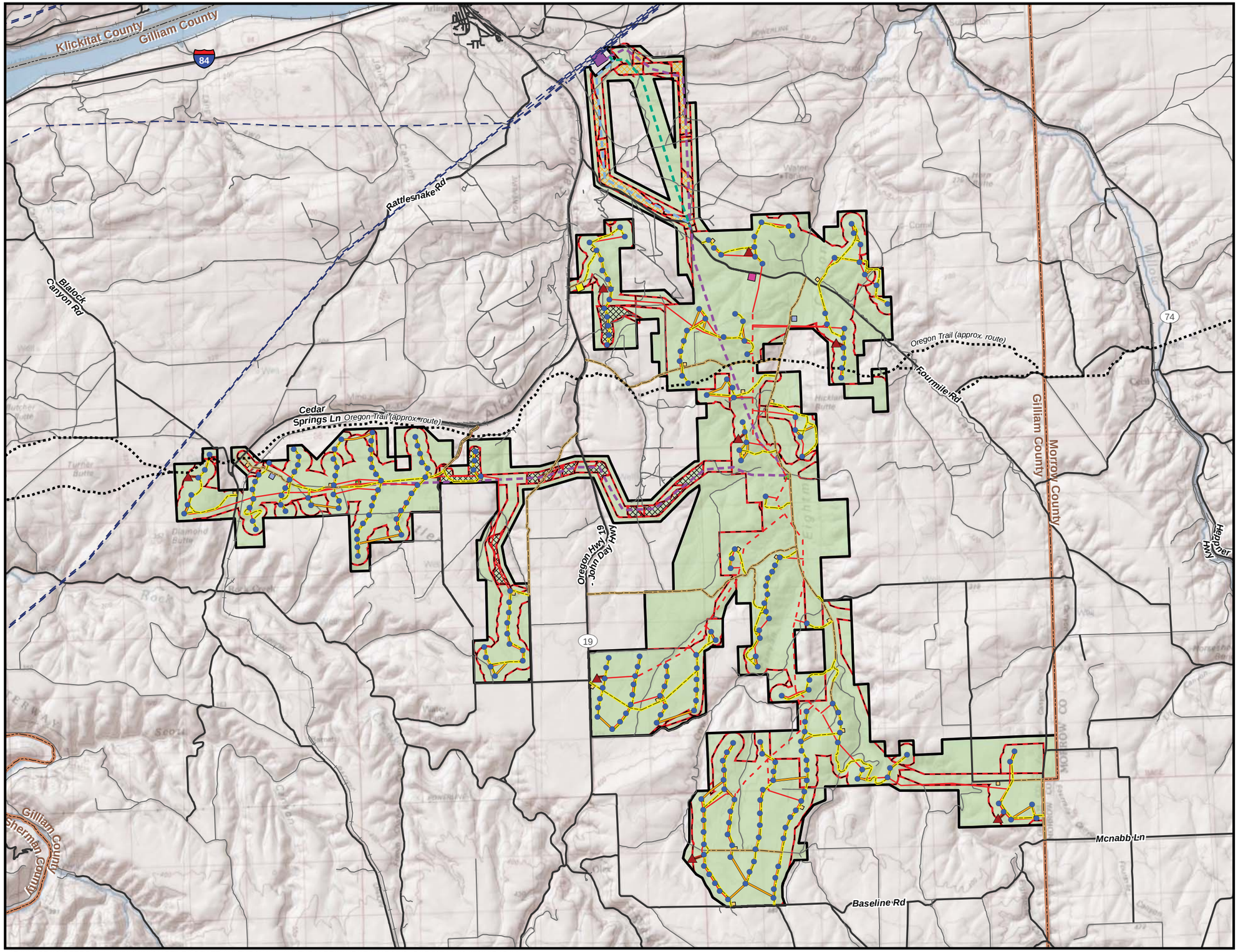
Figure

Figure S-1

Historic, Cultural, and Achaeological Resources

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility



- Site Boundary
- Micrositing Corridor
- Montague Survey Corridor
- Pebble Springs - Completed Survey
- Leaning Juniper IIB - Completed Survey

Proposed Permanent Facilities

- Proposed Turbine
- Proposed Met Tower
- Proposed New Turbine Road
- Proposed New Met Tower Road
- Proposed Improved Road
- Proposed Underground 34.5-kV Line
- Proposed Overhead 34.5-kV Line
- Proposed 230-kV Transmission Line
- Alternate 1 230-kV Transmission Line
- Alternate 2 230-kV Transmission Line
- Proposed 5-Acre Facility Collector Substation
- Proposed 10-Acre O&M Facility and Staging Area
- Alternate 10-Acre O&M Facility and Staging Area

Proposed Temporary Facilities

- Proposed Crane Path
- Proposed 2.5-Acre Staging Area
- Proposed 5-Acre Staging Area

Existing Facilities

- Oregon Trail (approximate route)
- Existing Transmission Line
- Public Road
- Private Road
- Major Railroad Line
- BPA Slatt Interconnection Substation
- County Boundary

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ATTACHMENT S-1

Cultural Resources Survey Report

Confidential and Not for Public Distribution

EXHIBIT T

RECREATIONAL FACILITIES AND OPPORTUNITIES

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

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T-1 Recreational Facilities and Opportunities

T.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW).

Exhibit T addresses impacts the proposed Facility will have on important recreational opportunities in the analysis area. This Exhibit responds to the requirements of OAR 345-021-0010(1)(t), as follows:

OAR 345-021-0010(1)(t) *Information about the impacts the proposed facility would have on important recreational opportunities in the analysis area, providing evidence to support a finding by the Council as required by OAR 345-022-0100, including:*

Response: OAR 345-021-0010(1)(t) requires that the site certificate application for the proposed energy facility address important recreational opportunities. OAR 345-022-0100(1) provides that "the Council must find that the design, construction and operation of a facility, taking into account mitigation, are not likely to result in significant adverse impact to important recreational opportunities in the analysis area as described in the project order." This Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(t) and provides evidence to support a finding by the Council as required by OAR 345-022-0100.

T.2 IMPORTANT RECREATIONAL OPPORTUNITIES AND FACILITIES IN THE ANALYSIS AREA

OAR 345-021-0010(1)(t)(A) *A description of important recreational opportunities in the analysis area considering the criteria in OAR 345-022-0100 including information on the factors listed in OAR 345-022-0100(1).*

Response**:** The analysis area for potential impacts on recreational opportunities includes the area within the site boundary and the area within 5 miles of the site boundary (OAR 345-001-0010(2), (57)(d)). Accordingly, the following discussion considers potential recreational opportunities within the site boundary itself and also within the broader analysis area. Figure T-1 shows the analysis area.

There are no county, state, or federally designated recreation lands or any designated recreational facilities within the site boundary. In general, recreational activities in the analysis area include camping, hiking, upland bird and big game hunting, boating, fishing, sightseeing, nature and wildlife photography, wind surfing, and bicycling. Many other locations exist outside the analysis area for these opportunities. Thus, these recreational opportunities within the analysis area will likely be considered common and replaceable.

The limited recreational opportunities within the 5-mile analysis area include three city of Arlington parks, one Port of Arlington recreation site, China Creek Golf Course, Roosevelt Park in Washington, the Oregon National Historic Trail (ONHT), and the

Lewis and Clark National Historic Trail (LCNHT), as discussed in the following sections.

T.2.1 Parks, Recreation Site, and Golf Course

The three city of Arlington parks are outside of the Facility site boundary but within the analysis area. The parks are Earl Snell City Park, Alkali Park, and City Park. In addition, the Port of Arlington Park and Marina, China Creek Golf Course, and Roosevelt Park in Washington are outside of the Facility site boundary but within the analysis area.

Earl Snell City Park along the Columbia River is a day use park with a playground and access to the beach along the Columbia River. Alkali Park is an open grassy area in town. City Park is a small grassy area with limited playground equipment.

The Port of Arlington Park and Marina has one recreation site on the Columbia River. It includes a public marina and boat launch, a day use area, and a recreational vehicle (RV) park. The beach access is used for boating, swimming, and wind surfing.

China Creek Golf Course is a nine-hole golf course located south of Arlington. It has no special designation or any outstanding, unusual, or rare qualities.

Roosevelt Park is owned and operated by the U.S. Army Corps of Engineers (USACE). The park is located on the Columbia River in the area designated as Lake Umatilla, in Roosevelt, Washington. According to the USACE, the park provides a modern boat launch. Many recreational opportunities are available along the shores accessible at Roosevelt Park, such as boating, fishing, swimming, and sailboarding (USACE, 2010).

While each of these facilities provides recreational opportunities such as beach access, day use, and playgrounds, the recreational opportunities are common and replaceable. As determined by the Council for the previously-approved Leaning Juniper II Wind Power Facility and Shepherds Flat project, these recreational opportunities do not meet the criteria set forth in OAR 345-022-0100 as "important."

T.2.2 Oregon National Historic Trail

The 5-mile analysis area includes a portion of the ONHT, which received federal designation as a "historic trail" under the National Trails System Act (NTSA) in 1978. The approximate route of the ONHT intersects the Facility site boundary in the northeastern portion of the analysis area on Fourmile Road approximately 0.25 mile north of the public Fourmile Canyon interpretive site, and exits the Facility site boundary near Blalock Canyon Road, as shown in Figure T-1. Agriculture, modern roadways, and other modern developments have obliterated physical traces of the ONHT along most of its approximate alignment or route. Exhibits R and S also discuss the ONHT in detail.

T.2.2.1 Within Site Boundary

As discussed in Exhibit S, two discontiguous, visually intact remnants of the ONHT are located within the Facility site boundary. These remnants are not visible from county roads or public viewing areas. Because the intact remnants are on private land, they are not accessible by the public for recreation.

T.2.2.2 Outside Site Boundary and Within Analysis Area

Potential recreational opportunities associated with the ONHT are located in three places within the analysis area but outside the Facility site boundary: (1) An intact remnant is visible from the Fourmile Canyon interpretive site along Fourmile Road, a public County road; (2) trail markers are visible from McDonald Crossing; and (3) a monument marking the approximate alignment of the ONHT is located within the public right-of-way on Oregon Highway 19 (OR 19). These locations are shown in Figure T-1.

As discussed in Exhibit R, the NTSA indicates that specific locations along a historic trail can be identified as "high-potential" sites. High-potential sites are described as those locations that provide an opportunity to interpret the historic significance of the trail during its major use. The portion of the ONHT within the analysis area includes two high-potential sites, Fourmile Canyon and McDonald Crossing, as identified in the *Comprehensive Management and Use Plan – Oregon National Historic Trail* (CMP) (U.S. National Park Service, 1999).

McDonald Crossing

One of the two high-potential sites within the analysis area is McDonald Crossing. The McDonald Crossing site also is located within the analysis area. However, no intact portions of the ONHT occur near the site, only trail markers commemorating the trail's approximate alignment occur near the site. As stated in Exhibit R, turbines will not be visible from this site. The recreational opportunity associated with the ONHT at McDonald Crossing is limited to viewing the ONHT approximate alignment.

Fourmile Canyon

The other high-potential site within the analysis area is Fourmile Canyon, which comprises the Fourmile Canyon BLM interpretive site where the ONHT crosses Fourmile Road and over a mile of deep ruts in the vicinity of the interpretive site. The Fourmile Canyon interpretive site is located on Bureau of Land Management (BLM) land. During the visual assessment conducted on November 24, 2009, the Applicant found that the ONHT splits into two segments due west of the BLM interpretive site and east of the site boundary, as shown on Figure T-1. These two segments are marked with white BLM trail markers where the trail is located on public land and the northeasternmost intact remnant is located on both sides of Fourmile Road. The interpretive site referenced in the CMP is on BLM land and includes a covered and fenced in area with pedestal signs, located on the west side of Fourmile Road. The interpretive site directs viewers toward the southernmost trail segment that extends up an adjacent foothill located to the west.

As discussed in Exhibit R, to the extent to which turbines may be seen from the Fourmile Canyon interpretive site, they will appear as objects in the background of the view. The Facility will likely not be visible from other portions of the high-potential site. Potential recreational opportunities at the Fourmile Canyon interpretive site include reading signs, viewing intact remnants of the ONHT, and potentially hiking to a limited extent on intact portions of the ONHT on adjacent public lands.

Oregon Highway 19 Monument

A monument marking the approximate alignment of the ONHT is located within the public right-of-way on OR 19. The recreational opportunity at this location is limited to viewing the monument.

T.2.2.3 Summary of Facility Effects on Oregon National Historic Trail

During construction and operation, the Facility will have no adverse effect on the recreational opportunities listed above. The Facility will not affect the visually intact remnants of the ONHT within the site boundary, nor will the Facility affect any publicly accessible locations where the ONHT may be viewed. Accordingly, the Facility can be designed, constructed, and operated to have no significant adverse impact to the ONHT in accordance with OAR 345-022-0100(1).

T.2.3 Lewis and Clark National Historic Trail

The 5-mile analysis area includes a portion of the Lewis and Clark National Historic Trail (LCNHT), which received federal designation as a "historic trail" under the NTSA in 1978. The purpose of the historic trail designation is to protect the historic route and any associated artifacts. Thus, the focus of the NTSA is on historic preservation, not management of recreation resources.

Although the NTSA is not identified as an important recreational opportunity in the analysis area pursuant to OAR 345-022-0100, the Applicant addresses it below to demonstrate that the Facility will not likely result in a significant adverse impact to the NTSA.

As detailed in Exhibit R, the National Park Service prepared the *Lewis and Clark National Historic Trail, Comprehensive Plan for Management and Use* (CPMU) as called for in Section 5(f) of the NTSA which, "guides development and use of the Trail and provides a basis for coordinated and consistent implementation…" (pg. 2). The locations of the LCNHT were determined from the CPMU mapping (sheets 39 and 40), including an approximate water trail along the Columbia River, which is how the expedition moved from east to west in 1804, and a motor route along Washington State Route 14, which is in the general vicinity of the expedition's return trip from the Pacific Ocean along the north shore of the Columbia River in 1806. As described in Exhibit R, the Facility will not be visible from the majority of either LCNHT segment.

The CPMU also identifies two parks within the Facility's analysis area, which the plan indicates have the potential for inclusion as part of the LCNHT. These are Port of Arlington Park and Marina in Oregon and Roosevelt Park in Washington. Both parks

are described in Section T.2.1 above. As described in Exhibit R, the Facility will not be visible from the Port of Arlington Park and Marina. The Facility may be visible from Roosevelt Park, but views from this area already are altered by existing development in Roosevelt and across the Columbia River in Arlington. In addition, other existing infrastructure, including I-84 and turbines from previous wind facilities, already are visible from Roosevelt Park to the south.

The CPMU indicates that after appropriate protection measures have been established, sites and segments should be accessible and available for historic interpretation and public use and enjoyment. For those portions of the LCNHT within the analysis area, recreational opportunities to support public use and historic interpretation may include driving the approximate route along Washington State Route 14 or Interstate 84, boating the approximate route in the Columbia River, or visiting the parks identified along the approximate route.

During construction and operation, the Facility will have no adverse effect on the recreational opportunities associated with the LCNHT. The Facility will not physically affect any approximate remnants of the LCNHT. The Facility may be visible from a limited portion of the approximate remnants of the LCNHT, but views from these areas already are altered by existing development and other existing infrastructure, including I-84 and turbines from existing wind facilities. Accordingly, the Facility can be designed, constructed, and operated to have no significant adverse impact to the LCNHT in accordance with OAR 345-022-0100(1).

T.3 SIGNIFICANT POTENTIAL ADVERSE IMPACTS TO THE OPPORTUNITIES IDENTIFIED

OAR 345-021-0010(1)(t)(B) *A description of significant potential adverse impacts to the opportunities identified in (A) including, but not limited to, potential impacts such as*:

(i) Direct or indirect loss of an opportunity as a result of construction or operation.

Response: During construction and operation, the Facility will have no adverse effect on the recreational opportunities listed above. The Facility will not affect visually intact remnants of the ONHT within the site boundary, nor will the Facility affect any publicly accessible locations where the ONHT may be viewed. Accordingly, the Facility can be designed, constructed, and operated to have no significant adverse impact to the ONHT in accordance with OAR 345-022-0100(1).

(ii) Noise resulting from facility construction or operation.

Response: Given projected noise levels, the distance between turbine locations and recreational opportunities, and the role of topography in attenuating noise effects, the noise resulting from Facility construction and operation will not affect recreational opportunities in the 5-mile analysis area. Please refer to Exhibit X for additional detail.

(iii) Increased traffic resulting from facility construction or operation.

Response: It is assumed that the primary transporter route will carry the majority of construction-related heavy-duty and light-duty delivery vehicles, as well as some workforce traffic. The primary route is assumed to begin in the Portland, Oregon, area on eastbound I-84 to Gilliam County, Oregon, as further discussed in Exhibit U.

State, county, or local roadways could be temporarily affected by traffic increases resulting from construction vehicles accessing the site. Potential construction and operational impacts to traffic safety or maintenance on state highways from this Facility are anticipated to be inconsequential, as the state highway system (I-84 and OR 19) is constructed to design, safety, and load-bearing standards. These roadways are able to accommodate vehicles at the legal load limit, thereby reducing the potential for significant traffic safety and maintenance impacts. Traffic will not affect the public's ability to view ONHT interpretive signs, monuments, or intact portions of the trail discussed above. Given that existing county and local roadways can safely accommodate Facility construction traffic, with minor improvements as needed, increased traffic resulting from Facility construction or operation will not detrimentally impact important recreational opportunities.

(iv) Visual impacts of facility structures or plumes.

Response: Exhibit R presents a discussion of potential impacts to visual resources as a result of the proposed Facility, and concludes that the Facility will have no significant visual impacts on scenic or aesthetic areas.

T.4 MITIGATION MEASURES

OAR 345-021-0010(1)(t)(C) *A description of any measures the applicant proposes to avoid, reduce or otherwise mitigate the significant adverse impacts identified in (B).*

Response: Because no significant adverse impacts to important recreational opportunities will result from Facility design, construction, and operation, no further measures are proposed to avoid, reduce, or otherwise mitigate Facility impacts. Potential impacts to other (unimportant) recreational opportunities will be reduced through mitigation measures proposed for other purposes, including use of existing roads where possible and the visual design of the turbine towers.

T.5 MAP OF ANALYSIS AREA

OAR 345-021-0010(1)(t)(D) *A map of the analysis area showing the locations of important recreational opportunities identified in (A).*

Response: Figure T-1 shows the analysis area for recreational opportunities and facilities and the potentially important recreational facility identified pursuant to OAR 345-021-0010(1)(t)(A).

T.6 MONITORING PROGRAM

OAR 345-021-0010(1)(t)(E) *The applicant's proposed monitoring program, if any, for impacts to important recreational opportunities.*

Response: Because there will be no significant impacts on important recreational opportunities, no monitoring program is proposed.

T.7 CONCLUSION

The Facility will have no significant adverse impacts on any important recreational opportunity within the analysis area. Intact remnants of the ONHT will not be affected, nor will the Facility affect any publicly accessible locations where the ONHT may be viewed. Accordingly, the Facility can be designed, constructed, and operated to have no significant adverse impact on important recreational opportunities in the analysis area, in accordance with OAR 345-022-0100(1). In addition, no site certificate conditions are required to protect recreational opportunities within the analysis area.

T.8 REFERENCES

DeLorme Co. 2001. Oregon Atlas and Gazetteer. www.delorme.com.

DeLorme Co. 2001. Washington Atlas and Gazetteer. www.delorme.com.

U.S. Army Corps of Engineers (USACE). 2010. Corps Lakes Gateway: Oregon - John Day Lock and Dam, Lake Umatilla. http://corpslakes.usace.army.mil/visitors/project-print.cfm?Id=G208480. Accessed on January 4, 2010.

U.S. National Park Service. 1999. *Comprehensive Management and Use Plan – Oregon National Historic Trail* (CMP).

Figure

Figure T-1

Recreational Facilities and Opportunities

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

KLICKITAT COUNTY
GILLIAM COUNTY
SHERMAN COUNTY
MORROW COUNTY
Roosevelt
Arlington
Lone
Roosevelt Park
Earl Snell Park
City Park
Port of Arlington Park and Marina
Alkali Park
China Creek Golf Course
Oregon Highway 19 Monument
Fourmile Canyon
McDonald Crossing
84
Rattlesnake Rd
Blalock Canyon Rd
Cedar Springs Ln
Heppner Hwy
Fourmile Rd
Baseline Rd
Mcnabb Ln
Oregon Hwy 19 - John Day Hwy
DALREED BUTTE
SADDLE BUTTE

- Site Boundary
- Micrositing Corridor
- 5-mile Recreational Opportunity Analysis Area
- Recreational Facilities and Opportunities
- Oregon Trail High-Potential Site
- Oregon Trail (Approximate Route)
- Lewis & Clark Trail (Approximate Route)
- Proposed Turbine
- City Limit
- River
- Water
- Limited Access Highway
- Highway
- Major Road
- State Boundary
- County Boundary

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Modify Date: 1/8/2010

EXHIBIT U

PUBLIC SERVICES/SOCIOECONOMIC IMPACTS

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

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U.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW), as further described in Exhibit B, Section B.1.3. Please refer to Exhibit C, Figures C-1, C-2, and C-3, and C-4 through C-7, for maps of the site vicinity, Facility location, and Facility components, respectively.

OAR 345-021-0010(1)(u) *Information about significant potential adverse impacts of construction and operation of the proposed facility on the ability of public and private providers in the analysis area to provide the services listed in OAR 345-022-0110, providing evidence to support a finding by the Council as required by OAR 345-022-0110. The applicant shall include:*

Response: This Exhibit describes potential adverse impacts of Facility construction and operation on employment, population, housing, and transportation, and on the ability of affected communities in the analysis area to provide public services. The analysis area extends 10 miles from the Facility site boundary in Oregon and Washington[1] (see OAR 345-001-0010(2)(57)(b)). Figure U-1 shows the analysis area.

OAR 345-022-0110 requires that the site certificate application for the proposed energy facility address important public services, and that "the Council must find that the construction and operation of the facility, taking into account mitigation, are not likely to result in significant adverse impact to the ability of public and private providers within the analysis area described in the project order to provide: sewers and sewage treatment, water, storm water drainage, solid waste management, housing, traffic safety, police and fire protection, health care and schools." OAR 345-022-0110, however, is not a directly applicable approval criterion for wind energy facilities and special criteria facilities like the Facility. See OAR 345-022-0110(2) and (3), 345-015-0310. At the same time, the Council may apply the requirements of OAR 345-022-0110(1) as conditions on the Facility's site certificate. Therefore, this Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(u) and provides evidence to support a finding by the Council as required by OAR 345-022-0110.

U.1 IMPORTANT ASSUMPTIONS USED TO EVALUATE POTENTIAL IMPACTS

OAR 345-021-0010(1)(u)(A) *The important assumptions the applicant used to evaluate potential impacts*;

Response: Potential impacts were evaluated on the basis of the assumptions described in the following subsections.

[1] Although the Applicant has included within this analysis the potential adverse impacts of Facility construction and operation on public services in Washington, the Applicant reserves the right to argue that the Council lacks jurisdiction to condition a site certificate due to potential impacts that reach beyond Oregon.

U.1.1 Employment

U.1.1.1 Construction

Facility construction is anticipated to begin in late 2010 after issuance of the site certificate. The completion of commissioning and start of commercial operation is targeted for the end of 2011. However, given that construction could conceivably be delayed by weather or other unforeseen circumstances such as market changes, the Applicant would like the flexibility to build the Facility in one or more phases, and requests a deadline for construction completion of 3 years later than the deadline for beginning construction, or 6 years from issuance of the site certificate.

During construction, an estimated average workforce of 200 people will be employed, with a maximum of 475 people during the peak months of construction. Most construction workers will be employees of construction and equipment manufacturing companies under contract to the Applicant.

Construction workers will include a mix of locally hired workers within 30 miles of the Facility (e.g., from Gilliam, Morrow, Sherman, and Wasco counties in Oregon and Klickitat, Benton, and Yakima counties in Washington) for road and turbine pad construction, and specialized workers for specialized construction (e.g., substation and electrical transmission construction, turbine erection, turbine testing). For purposes of this analysis, the conservative assumption was made that 30 percent of construction workers will be hired locally and the remainder from outside the four-county area. Local hiring may be greater and will depend upon the availability of workers with appropriate skills. The Applicant's policy will be to hire locally to the extent practicable.

U.1.1.2 Operations

An estimated 10 to 30 staff will be employed at the Facility for operations and maintenance. Some of the operations and maintenance staff will be hired locally, and some will be hired from outside the area for those positions that require previous experience at other wind generation facilities. Some specialized outside contractors may also be required on occasion. The assumption is that operations will begin in late 2010 and continue for at least 30 years and probably much longer. (See Exhibit W for a discussion of Facility life.)

U.1.1.3 Facility Retirement

If the Facility is retired (decommissioned), operational jobs will be eliminated. Retirement of the Facility will require removal of most Facility components and restoration of disturbed areas. These activities will result in temporary construction employment similar to Facility construction employment.

U.1.2 Population

U.1.2.1 Construction

The analysis area extends 10 miles from the Facility site boundary in the states of Oregon and Washington. Population will change very little as a result of Facility construction. Assuming conservatively that only 30 percent of the construction workers will be local residents (from Gilliam, Morrow, Sherman , and Wasco counties in Oregon and Klickitat, Benton, and Yakima counties in Washington), an average of about 140 and a maximum of about 330 new workers will be temporary residents (in-migrants) at the Facility. Assuming an average household size of 2.0 persons (the assumption being that many workers will not be accompanied by families or others), an estimated maximum of about 660 temporary new residents may be associated with Facility construction during the peak construction period in summer. The actual number of temporary residents likely will be less due to a combination of more local hiring and fewer workers bringing families or others with them. These in-migrants will likely settle in vacant hotels, campgrounds, recreational vehicle (RV) parks, houses, and temporary housing located within a commutable distance to the Facility.

U.1.2.2 Operations

The number of new permanent residents resulting from Facility operations will be small. An estimated 10 to 30 employees will be hired as part of the Facility and some will already be local residents. Assuming conservatively that 50 percent (five to fifteen) of these employees are in-migrants with an average household size of 3.0 (higher than for temporary employees), as many as 45 new permanent residents could be added to the local population. It is assumed that these workers will live locally, with the exception of specialized personnel who may commute from outside the area. That number is insignificant in comparison to the populations of Gilliam, Morrow, Sherman, Wasco, Klickitat, Benton, and Yakima counties.

U.1.3 Transportation

Various transporter routes will provide access to the Facility during construction and operations. These routes will be used to bring in turbine components, other equipment and materials, water, and workers from outside of the analysis area to the Facility and will include state, county, and private roadways. Major transporter routes are depicted in Figure U-1.

U.1.3.1 Primary Transporter Route

Multiple transporter routes will be necessary for this Facility due to the various locations of proposed turbine strings. Transporter routes are assumed to carry the majority of construction-related vehicles, including turbine component delivery vehicles, water trucks, and the majority of workforce traffic. The routes will likely begin in the Portland, Oregon, area on eastbound Interstate 84 (I-84) and continue towards Gilliam County, Oregon.

From I-84, the primary transporter route will continue southbound on Oregon Highway 19 (OR 19; also known as John Day Highway) near Arlington, Oregon. From OR 19, various county roads provide further access to turbine access roads. Turbine string roads to the west of OR 19 can be accessed via Cedar Springs Lane, Berthold Road, and Weatherford Road. For turbine string roads to the east of OR 19, multiple roads can be used. Eightmile Road, Fourmile Road, Montague Lane, Tree Lane, and Baseline Road will likely be used to access turbines between OR 19 and Oregon Highway 74 (OR 74). Mason Road, Davidson Road, and Upper Fourmile Road could also be used to access these individual turbine string roads.

Two additional alternate transporter routes from I-84 also are proposed. The first alternate route would begin on eastbound I-84 and continue southbound on Blalock Canyon Road, approximately 8.5 miles west of Arlington, Oregon. From Blalock Canyon Road, the alternate transporter route would connect with Cedar Springs Lane to provide access to individual turbine string roads. Blalock Canyon Road is fairly narrow with a winding path. It is not suitable for oversize or overweight trucks because of limitations caused by the physical terrain. Although it is unsuitable for large vehicles, this route will provide more efficient access for smaller delivery vehicles destined for the turbines in the west portion of the Facility. The second alternate route would begin on eastbound I-84 and continue southbound on OR 74. From OR 74, the alternate route would then follow Fairview Road, and access the facility from the east.

U.1.3.2 Truck Traffic

During construction, a number of trucks will be accessing the site on these transporter routes. Heavy-duty trucks will be carrying gravel and other materials required to improve or construct new turbine access roads from existing roadways. These heavy-duty trucks will also provide concrete for the turbine pads and footings. In addition to concrete and gravel, lighter-duty trucks delivering water to the site will be required. Water will be needed for dust control during road construction and for concrete batch plants. Light-duty trucks carrying electrical equipment and materials required for connection to existing power lines also will be necessary.

U.1.3.3 Point of Origin

Facility construction is anticipated to take approximately 9 to 12 months from the time of permit approval to commercial operation. During construction, an estimated average workforce of 200 people will be employed, with a maximum of 475 people during the peak months of construction. Local workers will most likely originate in Arlington or Condon, or other cities within 30 miles of the Facility site boundary. Workers could also originate from the west in the city of Goldendale, Washington (approximately 30 miles from the site), or from the city of The Dalles, Oregon (approximately 60 miles from the Facility), or from the city of Hermiston to the east (approximately 50 miles from the Facility). Some workers from outside the local area may temporarily relocate to communities closer to the Facility. Workers needed for specialized construction (e.g., substation and electrical transmission construction, turbine erection, turbine testing) may originate from areas outside Gilliam County.

An estimated 10 to 30 personnel will be hired for operation and maintenance of the Facility. It is assumed that these workers will live locally, with the exception of specialized personnel who may commute from outside the area.

U.2 PUBLIC AND PRIVATE PROVIDERS IN THE ANALYSIS AREA

OAR 345-021-0010(1)(u)(B) *Identification of the public and private providers in the analysis area that would likely be affected*;

Response:

U.2.1 Counties, Cities, and Communities

While the Facility itself is entirely within Gilliam County, the analysis area includes portions of Morrow, Sherman, and Klickitat counties and incorporated communities within a 10-mile radius of the Facility site boundary (Figure U-1). Table U-1 presents historical population estimates for each of the counties and communities within the Facility analysis area. In 2008, 17 percent of the entire State population resided in the communities located in Gilliam, Morrow, Sherman, Wasco, and Klickitat counties.

The Dalles, located to the west of the Facility analysis area in Wasco County, is the largest community within commutable distance to the Facility. The Dalles had a 2008 population of approximately 13,200 people, 22 percent of the five-county area's population total.

Between 1990 and 2008, communities in the analysis area added population at varying rates. With the exception of Grass Valley in Sherman County and Goldendale in Klickitat County, all of the communities experienced a less rapid average annual growth rate from 1990 to 2000 than from 2000 to 2008.

Table U-1. Historical Population of Counties and Communities within the Analysis Area

	Population			Average Annual Growth Rate	
	1990	2000	2008	1990-00	2000-08
Gilliam	**1,717**	**1,915**	**1,885**	**1.10%**	**-1.57%**
Arlington	425	524	610	2.10%	16.41%
Condon	635	750	780	1.70%	4.00%
Morrow	**7,625**	**10,995**	**12,485**	**3.70%**	**13.55%**
Boardman	1,387	2,855	3,330	7.50%	16.64%
Ione	255	321	350	2.30%	9.03%
Lexington	286	263	285	-0.80%	8.37%
Sherman	**1,918**	**1,934**	**1,845**	**0.10%**	**-4.60%**
Rufus	295	268	275	-1.00%	2.61%
Wasco	374	381	420	0.20%	10.24%
Moro	292	337	385	1.40%	14.24%
Grass Valley	160	171	170	0.70%	-0.58%
Klickitat	**16,616**	**19,161**	**20,100**	**1.40%**	**4.90%**
Goldendale	3,324	3,760	3,725	1.20%	-0.93%

Table U-1. Historical Population of Counties and Communities within the Analysis Area

	Population			Average Annual Growth Rate	
	1990	2000	2008	1990-00	2000-08

Source: Center for Population Research and Census, 2009.

Growth has occurred throughout the analysis area, but appears to have occurred most rapidly in Morrow County, which added over 4,800 people since 1990. Other communities have also added residents, as described above, but not to the degree experienced in Morrow County. Sherman and Gilliam counties were the only counties in the analysis area to lose population between 2000 and 2008.

U.2.2 Service Providers

U.2.2.1 Transportation

The providers of transportation services in Gilliam County include the Gilliam County Road Department and the Oregon Department of Transportation (ODOT).

State, county, or local roadways may be temporarily affected by traffic increases as a result of construction vehicles accessing the site. Potential construction and operational impacts to traffic safety or maintenance on state highways from this Facility are anticipated to be minimal because the state highway system (I-84 and OR 19 on the primary route and OR 74 on the alternate route) is constructed to design, safety, and load-bearing standards. These roadways are able to accommodate vehicles at the legal load limit, thereby reducing the potential for significant traffic safety and maintenance impacts. Daily traffic generated by this Facility is not expected to affect operations on I-84, since construction vehicles will constitute just a fraction of the daily traffic and impacts will be inconsequential. Construction traffic is expected to only slightly affect OR 19 since existing average daily traffic (ADT) volumes on this roadway are currently very low (generally less than 2,000 daily vehicles on average). There are currently no permanent restrictions on state highways proposed for transporter routes.

It is anticipated that county and local roadways will safely accommodate Facility construction traffic. In some cases, however, county and local roadways may require improvement before construction can begin as described in Section U.3.7.4. To ensure the integrity of local roads, the Applicant will coordinate with local transportation officials to make improvements where necessary to accommodate Facility construction traffic.

It is possible that some trucks carrying turbines and other equipment will exceed the legal load limit of 80,000 pounds gross vehicle weight (GVW). In the event that transportation vehicles exceed the legal load limit, the transportation contractor will seek appropriate authorization to travel on state and county roads from the Gilliam County Road Department and ODOT. If the alternate along Fairview Road is used, appropriate authorization will also be obtained from Morrow County. The transportation contractor will comply with the travel conditions and transportation equipment requirements stipulated by the respective agencies. The requirements

imposed by Gilliam County and ODOT will be designed to prevent significant impacts to traffic safety or maintenance needs along the transportation routes identified in this Exhibit.

The certificate holder will cooperate with the Gilliam County Road Department to ensure that any unusual damage or wear to the County's roads during Facility construction will be the responsibility of the certificate holder. If the alternate route along Fairview Road is used, the certificate holder will also cooperate with Morrow County. The certificate holder will assess the road conditions at the Facility prior to the start of construction and evaluate the roads after construction to determine any significant change in condition. Inspections will include monitoring of roadway conditions after the completion of construction activities. Monitoring could include use of photographs, videotape, and engineer field notes to document road conditions.

The Applicant also proposes two site certificate conditions to assure that transportation services are adequately addressed during the Facility's construction and operation, as described in Section U.5.

U.2.2.2 Sewers and Sewage Treatment

Most of the cities in the analysis area have sewer systems and treatment facilities. Rural residences in the area generally use onsite private septic systems for sewage disposal. No community in the analysis area currently provides sewers or sewage treatment to the Facility site.

U.2.2.3 Water

Most of the cities in the analysis area have public water systems that serve their respective incorporated areas, but those systems will not be used or affected by the Facility. During construction, water will most likely be obtained from the city of Arlington. The City will serve as a sufficient water source to meet the Facility requirements. During operations, water will be provided by a newly constructed well near the operations and maintenance (O&M) facility(s). See Exhibit O for a more detailed discussion.

U.2.2.4 Stormwater Drainage

No community in the analysis area currently provides stormwater drainage service to the Facility site, with the exception of minimal stormwater drainage facilities associated with public roads maintained by Gilliam County. During construction, numerous Best Management Practices (BMPs), outlined in the Facility erosion and sediment control plan (ESCP), will be implemented to minimize erosion and sedimentation that could alter the surrounding stormwater drainages.

U.2.2.5 Solid Waste Management

No community in the analysis area currently provides solid waste management services to the Facility site. Solid waste disposal for the Facility during construction and

operations will be provided by private contract with a local commercial hauler or haulers. The public landfill nearest to the Facility is the Arlington Landfill owned by Waste Management Services of Oregon, Inc.

U.2.2.6 Housing

Housing is provided to varying degrees in all of the incorporated and unincorporated communities within the analysis area, and within a commutable distance from the Facility outside of the analysis area. In general, housing is not provided as a government service per se except in the case of subsidized housing for low-income persons and through a variety of government loans and other incentives. Provision of housing in a given area depends on a number of factors, including the supply of appropriately zoned land, builders, and developers, and the demand for housing by potential residents. There is no government housing within the Facility site boundary.

Table U-2 presents housing supply and availability data for counties and communities within the analysis area. Housing vacancy rates for 2000 ranged from 5.3 percent in Lexington to 21.3 percent in Grass Valley. The four-county average vacancy rate of approximately 12.8 percent is higher than the state of Oregon's average of 8.2 percent.

Table U-2. Housing Supply in Counties and Communities within the Analysis Area

	Housing Units		Average Annual Growth Rate	Vacancy Rate
	1990	2000	1990-2000	2000
Gilliam	**932**	**1,043**	**1.1%**	**21.5%**
Arlington	192	278	3.8%	18.0%
Condon	356	422	1.7%	15.4%
Morrow	**3,412**	**4,276**	**2.3%**	**11.7%**
Boardman	562	948	5.4%	9.2%
Ione	142	139	-0.2%	10.1%
Lexington	114	114	0.0%	5.3%
Sherman	**900**	**935**	**0.4%**	**14.8%**
Rufus	144	162	1.2%	21.0%
Wasco	182	199	0.9%	14.1%
Moro	136	144	0.6%	8.3%
Grass Valley	81	94	1.5%	21.3%
Klickitat	**7,215**	**8,633**	1.8%	**13.4%**
Goldendale	1,418	1,690	1.8%	**NA**

Source: U.S. Census Bureau, 2000.

U.2.2.7 Traffic Safety and Transportation

The provider of transportation services in Gilliam County is the Gilliam County Road Department. The state transportation system in the Facility vicinity is provided and maintained by ODOT.

U.2.2.8 Police Protection

Local police service is provided by most of the incorporated cities in the Facility analysis area. The Applicant will seek assistance from the Gilliam County Sheriff's Office in Condon, Oregon, for police service (see Attachment U-1). Backup law enforcement service is available from the Oregon State Police Eastern Region, with offices in Arlington, Condon, Pendleton, and Milton-Freewater.

U.2.2.9 Fire Protection

North Gilliam County Rural Fire Protection District provides fire protection to the Facility area (see Attachment U-2). The Applicant will notify the Fire Protection District of construction plans and phasing, identify the location of and access to Facility structures, and provide mutual assistance in the case of fire within or around the Facility site boundary.

The site will be equipped with fire protection equipment in accordance with the Oregon Fire Code.

U.2.2.10 Health Care

Because population in the analysis area is relatively sparse, hospitals and health care services tend to be regional in nature. There are no hospitals within the analysis area. The hospitals nearest to the Facility are the Klickitat Valley Hospital in Goldendale, Washington (about 50 miles away by car) and the Pioneer Memorial Hospital in Heppner, Oregon (about 50 miles away by car). The Mid-Columbia Medical Center, located in The Dalles, and the Good Sheppard Hospital, located in Hermiston, are only slightly farther away at 56 and 54 miles by car, respectively. Gilliam County provides ambulance service in the analysis area through contracts with private service groups. Providers offer basic, intermediate, and advanced life support emergency medical care and transportation.

U.2.2.11 Schools

A total of 5 school districts and 11 individual schools provide educational services to the zip codes located in the analysis area. The schools closest to the Facility are operated by the Arlington and Condon school districts. Arlington and Condon both have an elementary school and high school.

U.3 ADVERSE IMPACTS TO PROVIDERS

OAR 345-021-0010(1)(u)(C) *A description of any likely adverse impact to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0110;*

Response:

U.3.1 Economic and Demographic Impacts

U.3.1.1 Population

Limited in-migration for construction-related employment and permanent operations and maintenance employment are expected to occur because of the proposed Facility. Temporary construction-related jobs filled from outside of the analysis area are anticipated to last no more than 12 months, but during that time workers likely will stay at area motels, eat at local restaurants, and purchase other amenities such as gas and groceries, all having a beneficial impact on the local economy. An estimated 10 to 30 staff will be employed at the Facility for operations and maintenance. Some of the operations and maintenance staff will be hired locally, and some will be hired from outside the area for those positions that require previous experience at other wind generation facilities. It is assumed that these workers will live locally, with the exception of specialized personnel who may commute from outside the area.

In-migrant operational staff and their families will not have a significant impact on local population. Assuming conservatively that 50 percent (five to fifteen) of the operations and maintenance positions are filled from outside the analysis area and the average household size is 3.0 (higher than for temporary employees), approximately 45 new residents could be added to the local population, if all relocate within Gilliam County and surrounding counties within the analysis area. That number is small in comparison to the populations of Gilliam and surrounding counties.

U.3.1.2 Economic Activity

Revenue generated for the local economy will benefit public services, including schools and others services Gilliam County provides for its citizens. While Morrow, Sherman, Wasco, and Klickitat counties will not gain revenue from the site operation through tax payments, residents from communities within those counties may be employed during construction and operation of the Facility. Income earned by those individuals because of the proposed Facility will contribute to the local economy indirectly through local purchases. In addition, the proposed Facility itself will purchase goods and services from local and regional businesses, from Facility maintenance services to office equipment to business services. Lease payments to local landowners will also benefit the local economy because it is likely that a portion of the lease payments will be spent in nearby communities. All of this activity will result in a net inflow of dollars into the local economy that will have a beneficial effect beyond that of the new employment.

U.3.1.3 Tax Revenues

Development of the Facility will result in an increase in annual property tax revenue to Gilliam County. In addition, Facility development will raise the value of other properties because of the increase in wages and overall economic activity in the analysis area. The additional tax revenue generated by the existence of the Facility will increase the

county's ability to provide roadways, police and fire protection, and other services to its citizens.

U.3.2 Sewers and Sewage Treatment

U.3.2.1 Construction

The only sewage services required by the Facility during construction will be related to the handling of sewage from contract portable toilets. Because the sewage demands of the Facility will be minimal and temporary, no adverse impacts are anticipated.

U.3.2.2 Operations

The Applicant will install kitchen and bathroom facilities in the O&M building(s). The domestic-strength waste will be treated by the building's onsite septic system. No other sewage treatment will be needed for Facility operations. As described in Section U.4.2, no adverse impacts are anticipated.

U.3.3 Water

U.3.3.1 Construction

It is estimated that approximately 36.9 million gallons of water will be required for the Facility during construction. Peak day demand for Facility construction could reach 120,000 gallons per day. Water for construction will either be purchased from the city of Arlington under an existing municipal water right or provided by an existing or newly constructed well under a limited license to be issued by the Oregon Water Resources Department (OWRD). As demonstrated in Exhibit O, the city of Arlington has adequate water to supply the Facility without impairing supply to existing users.

U.3.3.2 Operations

Kitchen and bathroom facilities will be installed in the O&M building(s). Nominal water amounts of water will be needed for domestic purposes (hand washing, drinking, toilets) and an onsite exempt well will provide less than 5,000 gallons per day for domestic use. Given that the operational needs of the Facility represent an insignificant fraction of the total municipal water use in the analysis area, existing water rights will not be detrimentally affected, and sufficient water is available for the intended uses.

If blade washing is recommended by the manufacturer, it will have a de minimis impact on the environment because it will involve a small amount of water per turbine (estimated to be approximately 50 gallons per blade) and will require washing of fewer than eight turbines per week (see Exhibits G and O for additional explanation).

Accordingly, as described in Section U.4.3, no adverse impacts to water use are anticipated.

U.3.4 Stormwater Drainage

U.3.4.1 Construction

Stormwater drainage impacts could occur during construction of Facility components, including new roads, staging areas, and turbine foundations. Application of the erosion control measures developed pursuant to the Facility's National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit No. 1200-C, as described in Section U.4.4, will prevent adverse impacts related to construction of these facilities. Facility components will be designed to maintain existing stormwater drainage patterns. Exhibit E discusses the 1200-C permit in more detail. A copy of the permit application is included as Attachment I-1 to Exhibit I.

U.3.4.2 Operations

Through proper site design and the other procedures described for construction activities in Section U.4.4, no adverse impacts on stormwater drainage are anticipated during operations.

U.3.5 Solid Waste Management

U.3.5.1 Construction and Operations

Potential impacts from the Facility on the ability of communities to provide solid waste management services could result if the solid waste management needs from the Facility (during either construction or operations) cannot be met through existing facilities or if meeting those needs interferes with the ability of service providers to meet other community waste management needs (e.g., if local landfill capacity is inadequate to handle the needs of the Facility). As described in Section U.4.5, no such impacts from construction or operations are anticipated.

U.3.6 Housing

U.3.6.1 Construction

Potential impacts on housing could result if there were an inadequate supply of housing in relation to the demand from the new temporary and permanent residents associated with the Facility. It is not known where the new temporary and permanent residents associated with the Facility will settle and what type of housing they will select. As described in Section U.4.6, no significant adverse impacts are anticipated.

U.3.6.2 Operations

Permanent housing for about three to five new households may be required starting at the beginning of operations. As described in Section U.4.6, no significant adverse impacts are anticipated.

The Facility layout was designed to minimize impacts to residences located in close proximity to the wind turbines. The turbines will be located a minimum of 1,320 feet

away from residences, measured from the centerline of the turbine tower to the center of the nearest residence existing at the time of tower construction.

U.3.7 Transportation

U.3.7.1 Traffic Volumes and Roadways

Primary Transporter Route

To evaluate the possible impacts resulting from construction traffic associated with the Facility, traffic volumes for state highways that are part of the expected transporter routes were obtained. ODOT was consulted for traffic volumes. These volumes were published in the 2004 through 2008 Traffic Volume Tables for the state system in Oregon (ODOT, 2008a). Volumes were available for all state routes included as proposed transporter routes for the Facility.

Because of the rural nature of the analysis area, recent traffic counts on county roads proposed for use in transporter routes are not available. The counties do not monitor traffic volumes on a yearly basis.

The most recent version of the *Gilliam County Transportation System Plan* (Gilliam County, 1999) indicates that the County has not taken or maintained traffic counts since prior to 1999. The system plan indicates that traffic volumes on county roadways are low. Major collector roads in the county could be expected to carry approximately 200 vehicles per day, while minor collector roadways could carry approximately 100 vehicles per day. County roadway volumes are minimal, and only during harvest times for various crops in the area do the roadways carry more than residential trips. Harvest season typically is between July and mid-September.

Table U-3 shows the ADT volumes for the most recent 5 years of data available at various milepost locations along the transporter routes. The table also includes estimated ADT on county roadways.

The roads in the primary transportation route include interstate, district, and county roadways. I-84, also known as the Columbia River Highway Number 2, serves as the primary east-west route through Gilliam County. I-84 is a four-lane divided highway, with two lanes traveling in each direction and 6-foot paved shoulders. The remaining roads are state highways and county roadways. OR 19 begins at the I-84 junction, extends through Arlington, and continues south to US 26 in central Oregon. The portion of OR 19 that passes through the Facility site boundary is primarily two lanes (one lane in each direction, undivided) with varying paved shoulder widths. ODOT classifies this road as a regional highway. The posted speed limit is 55 mph, except on various curves and grade changes where the speed limit is reduced to between 35 and 45 mph. There are no passing lanes on OR 19 within Gilliam County.

County roadways on the primary transporter route include Cedar Springs Lane, Berthold Road, Weatherford Road, Eightmile Road, Fourmile Road, Montague Lane, Tree Lane, and Baseline Road. Mason Road, Davidson Road, and Upper Fourmile Road could also be a part of the primary transporter route.

Alternate Transporter Route

An alternate transporter route includes I-84, OR 74, and county roadways not proposed in the primary transporter route. The alternate route includes Blalock Canyon Road between I-84 and Cedar Springs Lane. Blalock Canyon Road is not suitable for oversize or overweight trucks because of limitations caused by the physical terrain. Only smaller vehicles destined for the turbines in the west portion of the Facility will use Blalock Canyon Road. In addition, the alternate route also includes access to the Facility from the east, and will utilize OR 74 and Fairview Road.

Table U-3. Transporter Route Traffic Volumes and Number of Lanes

Highway	Location	Milepost	Number of Lanes	2004 ADT[1]	2005 ADT[1]	2006 ADT[1]	2007 ADT[1]	2008 ADT[1]
Primary Transporter Route								
I-84[2]	Sherman-Gilliam County Line	114.55	4-lanes/ divided	10800	11400	11100	11200	10600
	West of Arlington Interchange	137.02	4-lanes/ divided	10900	11300	11100	11100	10600
OR 19	South City Limits of Arlington	1.07	2-lanes/ undivided	2100	2200	1100	1000	1100
	North of Cedar Springs Lane	6.30	2-lanes/ undivided	790	820	800	780	800
	Montague Lane	7.59	2-lanes/ undivided	740	770	600	580	590
	Tree Lane	11.96	2-lanes/ undivided	370	360	280	270	240
	Baseline Road	15.52	2-lanes/ undivided	370	360	270	260	240
Cedar Springs Lane[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Berthold Road[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Weatherford Road[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Montague Lane[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Eightmile Road[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Fourmile Road[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Upper Fourmile Road[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Tree Lane[2]	N/A	N/A	2-lanes/ undivided	N/A	N/A	N/A	N/A	< 200
Secondary (Alternate) Transporter Route								
OR 74	South of I-84	0.30	2-lanes/ undivided	160	150	170	150	150

Table U-3. Transporter Route Traffic Volumes and Number of Lanes

Highway	Location	Milepost	Number of Lanes	2004 ADT[1]	2005 ADT[1]	2006 ADT[1]	2007 ADT[1]	2008 ADT[1]
OR 74	North of Fairview Road	13.88	2-lanes/ undivided	140	130	130	120	110
Fairview Road[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Blalock Canyon Road[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A: Not available.

[1] Oregon Department of Transportation, 2004-2008 Traffic Volume Tables.

[2] Estimated ADT from *Gilliam County Transportation System Plan* (Gilliam County, 1999).

Table U-3 shows that based on available data, traffic on the proposed transporter route roadway segments has remained relatively constant on I-84, but has generally decreased over the most recent 5 years on OR 19 and OR 74. During the past 5 years, the ADT volume on OR 19 at the south city limit of Arlington has decreased by almost 50 percent, while the more rural segment of OR 19 (south of Montague Lane) has decreased by approximately 20 to 30 percent.

U.3.7.2 Pavement Conditions

Pavement conditions may influence traffic safety issues. Poor pavement with potholes might cause vehicles to swerve, resulting in unsafe vehicle operation. ODOT's Pavement Condition Map was consulted for District 9 and 12 (ODOT, 2008b). Table U-4 shows the pavement conditions for state highways expected to be used as part of the primary transporter route.

Table U-4. Pavement Condition for State Highway Transporter Routes

Highway	Transportation Route	Location	Pavement Condition
I-84	A	West of Blalock	Very Good
I-84	A	West of Arlington	Good
OR 19	A	South of Arlington	Good
OR 19	A	Between Cedar Springs and Tree Lane	Fair
OR 19	A	South of Tree Lane	Good
OR 74	Alternate	South of I-84	Good

Source: Oregon Department of Transportation, 2008b.

A review of roadway conditions for the primary transportation route indicates that the majority of roadways proposed for the state highway transporter routes are in good condition. A portion of OR 19 between approximately Cedar Springs Lane and Tree Lane is in fair condition on the primary transporter route. Interstate 84 east of the Arlington interchange is in fair condition. Pavement conditions on local county roadways vary from paved to unimproved gravel surfaces.

Local county roadway surfaces vary from paved to unimproved gravel, as shown in Figure U-2. Cedar Springs Lane, Baseline Road, portions of Eightmile Road, and portions of Fourmile Road on the primary transporter route are paved.

Other county roads on the primary transporter route (Berthold Road, Weatherford Road, Montague Lane, Tree Lane, and portions of Eightmile Road and Fourmile Road) have gravel surfaces. Blalock Canyon Road on the alternate transporter route is paved between I-84 and approximately Heritage Lane. South of Heritage Lane, the road has a recycled asphalt base with chip seal. Fairview Road on the alternate transport route is also paved.

These county road segments will be evaluated before and after construction of the Facility to determine what, if any, degradation has occurred. The roadway will be repaired to existing conditions or better.

Regardless of existing pavement conditions, roadway segments will be reviewed prior to any added construction traffic, and a system for monitoring safety or degradation to pavement will be developed for the necessary roadways prior to construction.

U.3.7.3 Construction Traffic Volumes

Potential traffic safety impacts are not anticipated from construction of this Facility. Although high volumes of vehicle and truck traffic may be added to the roadways in Gilliam County, safety and traffic flow will be monitored to avoid adverse effects.

Truck Volumes

The size and weight of the vehicles are of concern largely in areas where roadways are designed for less than the legal load limit of 80,000 pounds. Oversize transporter trucks will be required to bring in the parts of each turbine. Additional oversize vehicles will be required for transport of large construction operating equipment (e.g., cranes, bulldozers).

To estimate the number of construction trips the Facility potentially will produce, the Applicant requested the number of truck trips used to construct similar wind projects in the region from a contractor experienced in wind farm construction. Based on experience with similar projects, it is estimated that approximately 120 truck trips will be needed for each 1.5-MW turbine and approximately 140 trips for each 3.0-MW turbine. These truck deliveries could include large turbine components, construction machinery, electrical equipment, water, and other materials. Using this estimate, the truck volumes anticipated for the Facility will be between 18,620 trucks (based on 134 turbines at 3.0 MW each) and 31,920 trucks (based on 269 turbines at 1.5 MW each). Assuming 12 months of construction, at 20 workdays per month of construction (possibly more workdays during the peak period of construction), this equates to between approximately 78 daily trucks (with 134 turbines) and 134 daily trucks (with 269 turbines). These numbers in turn equate to a maximum of 269 trips per day (134 trucks with one inbound trip and one outbound trip) and a minimum of 156 trips per day added to background traffic patterns.

Vehicle Volumes

As previously established, I-84 carried an ADT volume of approximately 10,600 vehicles in 2008 within the analysis area on the primary transportation route. Assuming similar volumes during the year of construction, the Facility will cause an increase in traffic of approximately 2.5 percent through I-84 under the maximum layout scenario. This increase is expected to be inconsequential on the primary route. ADT volumes on OR 19 just south of Arlington will increase by 25 percent with construction trips, and will likely double in the more rural areas near Tree Lane and Baseline Road. This is not expected to affect driving conditions or cause backups and delays because there would be ample capacity on the state roads. The County does not monitor daily traffic patterns on its roadways (for example, on Montague Lane, Cedar Springs Lane, Eightmile Canyon Road, or Tree Lane) likely due to low volumes. An additional 269 construction-related trips, spread over the typical workday, are not expected to affect driving conditions or cause backups and delays.

Summary of Traffic Volumes

In summary, the volumes of traffic generated by this Facility represent a minimal amount of traffic with respect to the state highway system ADT volumes. On the basis of traffic trips on transporter routes, construction of the Facility is not expected to cause any traffic congestion or delay impacts to the state and county roadway system.

Existing county roadway facilities included as part of the Facility's transporter routes will experience an increase in traffic volumes during construction, but because of the rural nature of the area, construction will not result in traffic volumes that exceed the capacity of the roadway facilities. The roadway facilities currently support very few trips and have ample capacity. Therefore, even with traffic increases, construction is not anticipated to cause adverse affects to traffic volumes.

U.3.7.4 Construction Traffic and Design Standards

To ensure the integrity of local roads, the certificate holder will coordinate with local transportation officials to make improvements where necessary with the objective of accommodating Facility construction traffic.

Traffic Standards

State highways are designed and constructed to accommodate legal loads of 80,000 pounds without a permit. During construction, it will be necessary for trucks exceeding the legal load limit to access the site via state highways. These trucks will be delivering turbines and other heavy construction equipment. Before construction, the transportation contractor will consult with ODOT to determine whether any segments of roadway or bridges are restricted for travel, and to obtain any heavy haul permits required to allow transport of these loads. There are no permanent restrictions on state highways proposed for transporter routes. Because the state highways are built to accommodate overweight vehicles with permits, impacts to safety or roadway pavement conditions are not anticipated. Currently, OR 19 between approximately Cedar Springs

Lane and Tree Lane is reported to have fair pavement conditions. While satisfactory, these roads will be monitored and reviewed prior to any construction activity.

OR 19 on the proposed primary transporter route does require permitting for loads wider than 14 feet and heavier than a gross weight of 98,000 pounds. No vehicle length restrictions apply to I-84 or OR 19 near the Facility.

Design Standards

The certificate holder will work with the Gilliam County Road Department to ensure that any unusual damage or wear to county roads that is caused by construction of the facility is repaired by the certificate holder. During construction of the Facility, the contractor will obtain authorization from Gilliam County before proceeding with overweight loads on county-maintained roadways. The certificate holder will strictly adhere to travel conditions and transportation equipment requirements set forth by either ODOT or Gilliam County. Upon completion of construction, the certificate holder will restore county roads to pre-construction condition or better, to the satisfaction of the County Road Department.

U.3.7.5 Operational Impacts

Operational traffic impacts associated with the Facility are not anticipated. While construction will introduce up to 269 trips per day to the transporter routes, operation of the Facility will result in far fewer traffic trips. Operational trips include employees traveling to work in their personal vehicles, as well as specialized personnel required for inspections of the turbine strings who may travel in light-duty trucks. The occasional delivery truck may also access the site during operations. As noted above, construction of the Facility is not anticipated to cause adverse impacts on transportation. Once completed, the Facility will require far fewer trips and personnel. Therefore, adverse impacts to the transportation network are not anticipated during operation of the Facility.

U.3.8 Police Protection

U.3.8.1 Construction and Operations

Potential adverse impacts on the ability of communities to provide police protection could occur if the Facility itself resulted in an increased need for police services (e.g., from vandalism or other crime during construction or operations) or if the additional temporary or permanent population from the Facility resulted in such increased need. As described in Section U.4.8, the Facility will not have an adverse impact on the ability of local communities to provide police protection or law enforcement services.

U.3.9 Fire Protection and Emergency Response

U.3.9.1 Construction and Operations

Potential adverse impacts on fire protection services could occur if Facility construction or operation or the increased population associated with either resulted in an increase in

fires or other needs for fire protection services beyond the ability of local fire departments to provide those services. During Facility construction, there could be some risk of accidental grass fires on the site. However, as described in Exhibit B and Section U.4.9 of this Exhibit, Facility fire protection measures will minimize the risk of such fires and the Facility will not have an adverse impact on the ability of local communities to provide fire protection and emergency response services.

U.3.10 Health Care

U.3.10.1 Construction and Operations

Potential impacts on health care could occur if Facility construction activities or increases in temporary residents (during construction) and permanent residents (during operations) resulted in an increase in the use of routine and emergency health care services that exceeded the capacity of local providers. As described in Section U.4.10, no significant impacts to health care services are anticipated.

U.3.11 Schools

U.3.11.1 Construction

Because construction work for the Facility will be short-term and temporary and because peak construction will occur during the summer months, no new students are anticipated in association with Facility construction. Therefore, no impacts on schools will result.

U.3.11.2 Operations

Assuming that about 15 new permanent households result from the Facility, an estimated maximum of 30 new schoolchildren (assuming two children per household) could move to the analysis area. As described in Section U.4.11, no significant adverse impacts on schools are anticipated.

U.4 EVIDENCE THAT ADVERSE IMPACTS TO PROVIDERS ARE NOT SIGNIFICANT

OAR 345-021-0010(1)(u)(D) *Evidence that adverse impacts described in (C) are not likely to be significant, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts; and*

Response:

U.4.1 Economic and Demographic Impacts

Together the number of new temporary construction jobs and new operations jobs created from Facility construction and operations will represent less than 1 percent of total employment in the four-county area (a total of 13,261 jobs in the four-county region [U.S. Bureau of Labor Statistics, 2008]). Similarly, new temporary and permanent populations will represent a small fraction of total county population. Because the Facility and the jobs will be located in an unincorporated part of the county, they will

not directly affect the employment base of a specific city or town. The jobs created by the Facility will result in short-term and long-term benefits to overall county employment.

U.4.2 Sewers and Sewage Treatment

U.4.2.1 Construction

During construction, contract portable toilets will be used. Sewage from portable toilets will be pumped regularly and disposed of at a local treatment facility.

U.4.2.2 Operations

The Applicant will install kitchen and bathrooms in the O&M building(s). The building(s) will be served by an onsite sewage disposal (septic) system. Because the Facility's sewage needs will be minimal during both construction and operations, the Facility will not have any significant adverse impact on the ability of any community in the area to provide sewers or sewage treatment.

U.4.3 Water

U.4.3.1 Construction

During Facility construction, approximately 36.9 million gallons will be required (see Exhibit O). The majority of the water (34.1 million gallons) will be used to control dust and maintain compaction on constructed access roads. Peak day demand for construction is expected to range up to 120,000 gallons per day. Water for construction will be purchased from the city of Arlington pursuant to an existing municipal water right held by the City. The Facility's water demand is not expected to injure the City's existing water right or exceed the amount of waver available to the City. See the City of Arlington Certificate of Water Right (Attachment O-2) addressing availability of municipal water. Alternatively, water will be provided from an existing or newly constructed well under a limited license to be issued by the Oregon Water Resources Department (OWRD).

U.4.3.2 Operations

The Applicant will install kitchen and bathroom facilities in the O&M building(s). A nominal amount of water will be used (for toilets, hand washing, drinking)—no more than 5,000 gallons per day, which will come from an onsite well and will not affect municipal water sources in the analysis area.

U.4.4 Stormwater

U.4.4.1 Construction

New and improved roads constructed as part of the Facility will be designed to maintain existing drainage patterns. Construction of the Facility will operate under an erosion and sediment control plan prepared pursuant to a NPDES 1200-C General Storm Water Permit issued by the Oregon Department of Environmental Quality (DEQ). BMPs will be

selected to minimize erosional effects from stormwater runoff and wind, and prevent sediment transport into water resources located within or near construction. The site-specific BMPs will focus on preventing and/or minimizing erosion rather than controlling sediment after erosion has already occurred. The BMPs discussed below represent the minimum BMPs that will be implemented during construction:

- **Stabilized Construction Entrance/ Exit:** A stabilized construction entrance/exit will be installed at locations where dirt (exposed, disturbed land) or newly constructed roads intersect existing paved roads. Stabilized entrances will also be installed at the construction staging areas. The stabilized construction entrance/exits will be inspected and maintained for the duration of Facility life.
- **Maintain Existing Vegetation:** To the extent practicable, existing vegetation will be preserved.
- **Silt Fencing:** Silt fencing will be installed at various locations throughout the Facility. It will be installed on contour downgradient of all excavations, including construction of the turbine footings. Silt fencing will also be installed downgradient of the O&M building(s). Silt fencing will be used as perimeter control, and it will be installed around the perimeter of material stockpiles and the perimeter of construction staging areas.
- **Straw Wattles:** Straw wattles may be installed to decrease the velocity of sheet flow stormwater. The wattles will be used along the downgradient edge of access roads adjacent to slopes or sensitive area.
- **Mulching:** Mulch will be provided to immediately stabilize soil exposed as a result of land-disturbing activities. Mulch will also be used during the reseeding of disturbed areas.
- **Stabilization Matting:** Jute matting, straw matting, or turf reinforcement matting may be used to stabilize slopes that could become exposed during installation of access roads, or to stabilize intermittent streams disturbed during construction of road crossings. The use of erosion control matting, along with revegetation techniques, will allow for stabilization.
- **Soil Binders and Tackifiers:** Soil binders and tackifiers may be used on exposed slopes to stabilize them until vegetation is established.
- **Concrete Washout Area:** Concrete chutes and trucks will be washed out in dedicated areas near the turbine foundation construction area. Soil from the concrete washout area will be backfilled with the stockpiled soil over the completed footing to ensure that the surface soils maintain infiltration capacity. Concrete washout will be handled in this method to prevent concrete washout water from leaving a localized area, and to ensure that the restored surface soil maintains positive infiltration.
- **Stockpile Management:** To facilitate installation of the turbine footings, large excavations will be created. The soil from these excavations will be temporarily stockpiled and used as backfill at the completion of the footing. While the material is

stockpiled, silt fencing will be used as perimeter control, and the stockpiled material will be covered with a thick layer of mulch or by plastic sheeting that is adequately anchored.

- **Revegetation:** At the completion of land-disturbing activities, the site will be revegetated with an approved seed mix. The seed will be applied with mulch to protect the seeds as the grass establishes.
- **Check Dams and Sediment Traps:** Check dams and sediment traps will be used during the construction of low-impact ford crossings or culvert installations. The check dams and sediment traps will minimize downstream disturbances during construction of the stream crossings.
- **Pollutant Management:** During construction, source control measures will be implemented to reduce the potential of chemical pollution to surface water or groundwater during construction. Chemical pollution could occur as a release of diesel fuel or lubricating oils, or from improper debris and waste handling. All fuels and oils will be stored in a dedicated area, and construction vehicles will be fueled and maintained only in dedicated areas. All handling, storage, and disposal of materials will be consistent with federal, state, and local ordinances, and in a manner that will not cause stormwater contamination.

Given the erosion and sediment control plan and the BMPs that will be used to prevent and control adverse impacts during construction of the Facility, construction will not have a significant adverse impact on the water quality of any receiving waters. In addition, the design of the Facility will not alter existing drainage patterns, and will not have an adverse impact on the ability of any community in the area to provide stormwater drainage.

U.4.4.2 Operations

Adherence to the site design and erosion control guidelines outlined above for construction will prevent stormwater drainage impacts during operations. The erosion and sediment control guidelines outlined above are not all applicable for operations because an industrial stormwater permit is not required for operations at this Facility and because construction activities requiring erosion control will be complete. However, several good housekeeping BMPs will be implemented during site operation to minimize erosion and mobilization of sediment. These practices include restoring the site in accordance with the Revegetation Plan required as part of the site certificate. No adverse impacts on the ability of any community to provide stormwater drainage are anticipated from Facility operations.

U.4.5 Solid Waste Management

U.4.5.1 Construction

Most waste will be removed from the site and reused, recycled, or disposed of at the adjacent Arlington Landfill if necessary. The Arlington Landfill has adequate capacity to accommodate construction-related debris and is not expected to reach its full capacity

for another 50 years. As described in Exhibit G, little construction waste will require offsite disposal.

U.4.5.2 Operations

As described in Exhibit G, only minimal amounts of solid waste will be generated by the Facility during operations. The Facility, therefore, will not have any significant adverse impact on the ability of any community in the area to provide solid waste management services.

U.4.6 Housing

U.4.6.1 Construction

Based on employment and population projections for the Facility, additional temporary housing could be required for up to 80 new households during the peak construction period and about 42 new households on average during the 9-month construction period. No significant adverse impacts on the ability of communities to provide housing are anticipated.

Motels, hotels, and trailer or RV parking will be the most available housing option for temporary residents. An Internet search identified more than 1,000 hotel and motel rooms in communities within a commutable distance to the Facility (The Dalles Area Chamber of Commerce, 2009; Travel Oregon, 2009; Tripadvisor.com, 2009). Some rooms are available in Arlington and Condon. Most rooms were found in The Dalles and Hermiston, Oregon, which are both located outside the analysis area. Additional rooms may be available in establishments that do not have information on the Internet. Furthermore, additional rooms may be available in communities located in the state of Washington (e.g., Goldendale), within 30 miles of the Facility. Additional temporary housing will be available in overnight facilities located at Oregon state parks and private RV campgrounds. Memaloose and Deschutes state parks, for example, have nearly 100 sites combined that can accommodate RVs as well as over 100 tent sites (Oregon State Parks, 2009). Although not all of these housing facilities will be available at any given time, adequate supplies are available in relation to the number of temporary workers.

U.4.6.2 Operations

For the up to 15 new permanent households anticipated because of Facility operations, it is assumed that adequate opportunities will be available to purchase housing or to construct new housing in the analysis area, or within a commutable distance from the Facility outside of the analysis area.

Given the factors described in this section and the general availability of housing opportunities, no significant adverse impacts on the ability of communities to provide housing are anticipated from Facility construction or operations.

U.4.7 Transportation

Adverse construction and operational impacts to traffic safety or travel times from the Facility are not anticipated. While construction-related traffic may cause short-term traffic delays (because of large, slow-moving delivery trucks), the delays will be temporary and can be mitigated with the following measures to further minimize impacts:

- Providing notices to adjacent landowners when construction takes place to help minimize access disruptions;
- Providing proper road signage and warnings of "Equipment on Road," "Truck Access," or "Road Crossings;"
- Implementing traffic diversion equipment (such as advance signage and pilot cars) whenever possible when slow or oversize loads are being hauled;
- Encouraging carpooling for the construction workforce to reduce traffic volume;
- Employing flagpersons necessary to direct traffic when large equipment is exiting or entering public roads to minimize risk of accidents; and
- Maintaining at least one travel lane at all times so that roadways will not be closed to traffic due to construction vehicles entering or exiting public roads.

Advance warning in the form of signage and notices to landowners may reduce the effect construction vehicles have on OR 19 and county roadways. By providing notice to landowners ahead of time, citizens will be aware of temporary access disruptions as well as potential delays and may be able to adjust their travel accordingly. To further reduce the effect of construction vehicles, flagpersons will efficiently guide large or oversize vehicles as they enter or exit any public roadway.

Although short-term delays may occur, traffic operations will be maintained by keeping at least one travel lane of the transporter route open at all times. This will be important on OR 19 and Cedar Springs Lane since they are typically only two lanes in each direction, and efficient detour routes are not available due to the rural nature of the area.

Flagpersons may facilitate two-way traffic on one lane by alternately restricting travel directions. This method will not require full lane closures, detours, or reroutes. Flagpersons will also monitor through traffic on public roadways as necessary so that they are not in conflict with construction vehicles.

Unlike large construction vehicles, the construction workforce will most likely travel during the morning and afternoon peaks of a typical workday. Although local Gilliam County traffic volumes are low, by encouraging carpooling among workers, fewer vehicles can be anticipated on the roadway during this time, therefore reducing the effect of construction on typical commuters.

U.4.8 Police Protection

U.4.8.1 Construction and Operations

The additional temporary and permanent workforce is not anticipated to create any significant concerns. A letter from the Gilliam County Sheriff's Office confirms that they provide services in the analysis area (see Attachment U-1). If needed, backup law enforcement will be available from the Oregon State Police Eastern Region and from local police in the surrounding jurisdictions (Arlington, Condon, Milton-Freewater, and Pendleton). The relatively small number of new temporary and permanent residents is not anticipated to place significant new demands on the providers of police protection in the area. Therefore, the Facility will not have a significant adverse impact on the ability of local communities to provide police protection or law enforcement services.

U.4.9 Fire Protection and Emergency Response

A conversation with the North Gilliam County Rural Fire Protection District indicated that they had no concerns with Facility construction or operations with respect to providing fire protection services (Coppock, pers. comm.). This statement is confirmed by a letter from the Fire Protection District (see Attachment U-2). Steps that will be taken to prevent fires during construction will include establishing roads before accessing the site to keep vehicles away from grass, using diesel vehicles whenever possible (to prevent potential ignition by catalytic converters), avoiding idling vehicles in grassy areas, and keeping cutting torches and similar equipment away from grass.

U.4.9.1 Operations

The relatively small number of new temporary and permanent residents is not anticipated to place significant new demands on the fire protection forces that serve the area. For the reasons provided above, the Facility will not have an impact on the ability of surrounding communities to provide fire protection during construction or operations.

U.4.10 Health Care

U.4.10.1 Construction and Operations

It is the Applicant's formal policy that safety of people and conservation of the environment come first in the conduct of operations. The Applicant is committed to a safe and healthy workplace that promotes a zero accident culture in which no one is harmed in association with business activities. The Applicant also is committed to being an environmentally conscious company that promotes development of clean energy production and storage with minimal adverse environmental effects. Finally, the Applicant is committed to continuous improvement to identify and control risks so that company performance meets high expectations. Therefore, relative to environment, health, and safety (EHS) issues, all organizations and individuals will do the following:

- Operate in compliance with or exceed all EHS governmental laws, regulations, ordinances, standards and permit requirements, and established Applicant policies and standards;

- Ensure all employees are involved in EHS programs with appropriate training and communication to work responsibly, make decisions to carry out their duties, and to be accountable for the results;

- Provide a structure that ensures effective EHS management throughout the business with risks, impacts, and legal requirements controlled through appropriate actions and governance;

- Ensure that EHS goals and stretch targets are set, communicated to all employees, and performance monitored to promote continuous improvement;

- Work to proactively prevent incidents, accidents, and environmental damage before these occur by sustainable actions and process improvements at all locations;

- Promote the health and wellness of employees by identifying and controlling workplace health risks, promoting work-life balance, and encouraging employees and their families to be proactive about their health through communication, activities, and the provision of robust health insurance;

- Require that contractors and others associated with operations comply with EHS requirements, and never be asked to perform anything unsafe or in violation of environmental laws;

- Ensure that public safety, security of people and assets, conservation, and environmental stewardship are fundamental to company operations;

- Design, construct, and operate facilities in ways that minimize their negative EHS impacts, and maximize their positive EHS contribution, as available technology and conditions permit; and

- Play a leading role in the development of a renewable energy market through strategic relationships with industry, regulatory bodies, and other external stakeholders, with open communication that maintains their confidence in the Applicant's commitment to EHS in company operations.

This policy commits the company to its core belief, which is integral to its business philosophy and success, that an excellent environmental, health, and safety culture among all employees will deliver superior performance that protects employees, contractors, the public, and the environment.

U.4.11 Schools

U.4.11.1 Construction and Operations

As described in Section U.3.11, no demand for school facilities is anticipated during Facility construction, and only minimal demand is anticipated from the small increase in local population from new permanent employees during Facility operations.

Actual impacts on schools will depend on the housing choices of new residents with children, which is unknown. Given the relatively dispersed area in which new residents are likely to settle, the relatively small number of anticipated new schoolchildren, and the number of schools available, it is unlikely that any one school will receive more new students than could be accommodated. As a result, no significant adverse impacts on the ability of communities to provide school services are anticipated as a result of Facility construction or operation.

U.4.12 Mitigation Measures

The proposed Facility will not result in any significant adverse impacts on the public service and utility providers in the analysis area. Therefore, no mitigation is required or proposed.

U.5 PROPOSED MONITORING PROGRAMS

OAR 345-021-0010(1)(u)(E) *The applicant's proposed monitoring program, if any, for impacts to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0010;*

Response:

It is anticipated that county and local roadways will safely accommodate Facility construction traffic. In some cases, however, county and local roadways may require improvement before construction can begin as described in Section U.3.7.4. To ensure the integrity of local roads, the certificate holder will coordinate with local transportation officials to make improvements where necessary to accommodate Facility construction traffic.

The certificate holder will cooperate with the County Road Department to ensure that any unusual damage or wear caused by the use of the County's roads by the certificate holder and its contractors during the Facility's construction will be the responsibility of the certificate holder. The certificate holder will assess the road conditions in the project area prior to the start of construction and will evaluate the roads following the Facility's completion to determine any significant change in condition. Inspections will include monitoring of roadway conditions after the completion of construction activities. Monitoring could include use of photographs, videotape, and engineer field notes to document road conditions.

The Applicant proposes that site certificate conditions such as Conditions 36, 37, 38, and 71 from the Leaning Juniper II Wind Power Facility First Amended Site Certificate be included in the site certificate for the Montague Wind Power Facility. Specifically, the Applicant proposes the following conditions for the Facility:

36

The certificate holder shall cooperate with the Gilliam County Road Department to ensure that any unusual damage or wear to county roads that is caused by construction of the facility is repaired by the certificate holder. Upon completion of construction, the certificate holder shall restore county roads to pre-construction condition or better, to the satisfaction of the County Road Department.

37

During construction of the facility, the certificate holder shall implement measures to reduce traffic impacts, including:

(a) Providing notice to adjacent landowners when heavy construction traffic is anticipated.

(b) Providing appropriate traffic safety signage and warnings.

(c) Requiring flaggers to be at appropriate locations at appropriate times during construction to direct traffic reduce accident risks.

(d) Using traffic diversion equipment (such as advanced signage and pilot cars) when slow or oversize construction loads are anticipated.

(e) Maintaining at least one travel lane at all times to the extent reasonably possible so that roads will not be closed to traffic because of construction vehicles. [Amendment #1]The certificate holder shall include traffic control measures in contract specifications for construction of the facility.

(f) Encouraging carpooling for the construction workforce.

(g) Including traffic control procedures in contract specifications for construction of the facility.

(h) Keeping the access from Highway 19 free of gravel that tracks out onto the highway.

38

The certificate holder shall ensure that no equipment or machinery is parked or stored on any county road except while in use.

71

During construction, the certificate holder shall limit truck traffic to designated existing and improved road surfaces to avoid soil compaction, to the extent possible.

These proposed conditions include both monitoring and mitigation measures but together assure appropriate actions are undertaken to assure that transportation services are adequately addressed during the Facility's construction and operation.

Once construction is complete, these improved county roads will remain in place, providing increased quality of travel for the public.

U.6 CONCLUSION

The evidence provided above demonstrates that the Council's public services standard is met because the Facility will not result in a significant adverse impact on the ability of any of the communities in the analysis area to provide the listed government services.

Construction of the Facility will require heavy vehicles of various types with a sizable number of trips. To determine whether these trips will affect traffic safety, several appropriate assumptions and comparisons to calculations made during the Leaning Juniper II Wind Power Facility site certificate application process were made. The objective was to arrive at a realistic estimate of total construction vehicles associated with the Facility and a reasonable allocation of those vehicles across designated haul routes. These trips were matched against the routes to be used on the state highway system. Vehicle types were compared to highway design standards and existing roadways. Average daily construction vehicle trips were compared to ADTs on the haul routes. Discussions were held with Gilliam County Department of Public Works (Kennedy, 2009). Further, the Applicant proposes monitoring and mitigation measures to address traffic. The results of these sets of analyses showed that the construction vehicles associated with the Facility will not have a significant impact on traffic safety.

Based on the evidence presented in this Exhibit, the Council may find in accordance with OAR 345-022-0120, that the construction and operation of the Facility, taking into account mitigation, are not likely to result in significant adverse impacts to the ability of the providers within the analysis area to provide the following services: sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, health care, and schools.

U.7 REFERENCES

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Figures

Figure U-1

Major Transporter Routes

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

KLICKITAT COUNTY
BENTON COUNTY
MORROW COUNTY
SHERMAN COUNTY
GILLIAM COUNTY
Columbia River
I-84
Roosevelt
Arlington
Boardman
Ione
Lexington
Heritage Ln
Blalock Canyon Road
Eightmile Rd
Oregon Hwy 74
Heppner Hwy
Montague Ln
Cedar Springs Ln
Bernhold Rd
Oregon Hwy 19
John Day Hwy
Weatherford Rd
Tree (fka Cameron Rd) Ln
Fairview Rd
Fourmile Rd
Upper Fourmile Rd
Mason Rd
Davidson Rd
Baseline Rd

- Proposed Major Transporter Route - Primary
- Proposed Major Transporter Route - Alternate
- 10-mile Analysis Area
- Site Boundary
- Micrositing Corridor

Proposed Permanent Facilities

- Proposed Turbine

Existing Facilities

- Existing Transmission Line
- Limited Access Highway
- Highway
- Major Road
- Major Railroad Line
- State Boundary
- County Boundary
- City Limit

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Figure U-2

Public Roads

1.5-MW Turbine Layout
(Maximum Turbine Layout)

Montague Wind Power Facility

KLICKITAT COUNTY
BENTON COUNTY
MORROW COUNTY
SHERMAN COUNTY
GILLIAM COUNTY
Columbia River
I-84
Roosevelt
Arlington
Goodman
Lexington
Heritage Ln
Blalock Canyon Road
Locust St
Eightmile Rd
Oregon Hwy 74
Heppner Hwy
Montague Ln
Cedar Springs Ln
Bernhold Rd
Oregon Hwy 19
John Day Hwy
Weatherford Rd
Tree (fka Cameron Rd) Ln
Eightmile Rd
Fairview Rd
Fourmile Rd
Fairview Ln
Mason Rd
Upper Fourmile Rd
Baseline Rd

- Public, Paved
- Public, Gravel
- Other Public Road
- 10-mile Analysis Area
- Site Boundary
- Micrositing Corridor

Proposed Permanent Facilities

- Proposed Turbine

Existing Facilities

- Existing Transmission Line
- Major Railroad Line
- State Boundary
- County Boundary
- City Limit

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Modify Date: 1/19/2010

ATTACHMENT U-1

Correspondence with Gilliam County Sheriff's Office

GILLIAM COUNTY
SHERIFF'S OFFICE

GARY BETTENCOURT, SHERIFF

P.O. BOX 685
221 S. OREGON STREET
CONDON, OREGON 97823
TEL: 541-384-2851 – EXT. 146
FAX: 541-384-2878

November 20, 2009

Herald Schulz
CH2M Hill
2020 SW 4th Ave., Third Floor
Portland, OR 97201

The Gilliam County Sheriff's Office is the primary response police agency for the area in which the Montague Wind Facility is located. This project is in a relatively low crime area in our county.

The Sheriff's Office will respond appropriately and as necessary to all complaints that come from the Montague Wind Facility Project.

Sincerely,

Gary Bettencourt, Sheriff

ATTACHMENT U-2

Correspondence with Gilliam County Fire Protection District

Gilliam County Fire Services

PO Box 599
Arlington, OR 97812
(541) 454-2900 or (541) 384-5555

December 15, 2009

Nathan Williams
CH2M Hill
2020 SW 4th Ave., Third Floor
Portland, OR 97201

North Gilliam County Rural Fire Protection District (RFPD) is the primary fire response provider for the area in Gilliam County in which the Montague Wind Facility will be located.

North Gilliam County RFPD does not provide either confined space or high angle rescue. Beyond those two areas of expertise, it has been determined that the wind farm will not have a significant impact on the operations of North Gilliam County RFPD.

Sincerely,

Shannon K. Coppock

Shannon K. Coppock
Gilliam County Fire Services Coordinator

EXHIBIT V

WASTE MINIMIZATION

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

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V-2 Letter from Sherman County Oregon State University Extension Service

V.1 INTRODUCTION

OAR 345-021-0010(1)(v) *Information about the applicant's plans to minimize the generation of solid waste and wastewater and to recycle or reuse solid waste and wastewater, providing evidence to support a finding by the Council as required by OAR 345-022-0120. The applicant shall include:*

Response: The evidence provided in this Exhibit demonstrates that Iberdrola Renewables, Inc. (Applicant) will minimize solid waste and wastewater generated by the proposed Montague Wind Power Facility (Facility) and will recycle and reuse waste as described in the solid waste and wastewater plans. Additionally, the Applicant's plans to manage generated waste will result in minimal impact on surrounding and adjacent areas.

OAR 345-021-0010(1)(v) requires that the site certificate application for the proposed energy facility address waste minimization as required by OAR 345-022-0120. OAR 345-022-0120 requires that

"[T]o the extent reasonably practicable:

(a) The applicant's solid waste and wastewater plans are likely to minimize generation of solid waste and wastewater in the construction and operation of the facility, and when solid waste or wastewater is generated, to result in recycling and reuse of such wastes; [and]

(b) The applicant's plans to manage the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility are likely to result in minimal adverse impact on surrounding and adjacent areas."

OAR 345-022-0120, however, is not a directly applicable approval criterion for wind energy facilities and special criteria facilities like the Facility. See OAR 345-022-0120(2) and (3), 345-015-0310. At the same time, the Council may apply the requirements of OAR 345-022-0120(1) as conditions on the Facility's site certificate. Therefore, this Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(v) and provides evidence to support a finding by the Council as required by OAR 345-022-0120.

V.2 TYPES OF WASTE

OAR 345-021-0010(1)(v)(A) *A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate, including an estimate of the amount of solid waste and wastewater.*

Response: See sections V.2.1 through V.2.3.

V.2.1 Waste Produced During Construction

A variety of nonhazardous, inert construction waste will be generated during Facility construction. Construction waste primarily will consist of concrete waste from

construction of concrete pads for turbines, meteorological towers, transmission line support structures, and the Facility Collector Substations (collector substations); wood waste from wood forms used for concrete pad construction; and scrap metal steel from construction of turbine towers, meteorological towers, and transmission line support structures. Some additional waste could include erosion control materials, such as straw (from mulch and straw wattles) and silt fencing, and packaging materials for associated turbine parts and other electrical equipment.

Wastewater will be generated during construction from washdown of concrete trucks after concrete loads have been emptied. Washdown will be up to the contractor and may occur at contractor-owned batch plant(s).

Concrete truck chutes may be washed down at each foundation site to prevent the concrete from hardening within the chutes. In these cases, the concrete wastewater will be washed out into a dedicated concrete washout area located at each completed turbine foundation. The concrete washout area will be constructed in a corner of the foundation excavation. The bottom will consist of the compacted foundation subgrade and the sides will consist of the excavation side cut, hardened concrete foundation, and soil berms at each end to construct a confined area. The soil used to construct the washout area berms (along with any concrete solids) will be buried as part of the turbine foundation backfill. This method for concrete washout water management is a regularly utilized management practice for construction of wind generation facilities within the area. Previous National Pollutant Discharge Elimination System (NPDES) permit applications, including the Hay Canyon Wind Project in Sherman County, Oregon; the Helix Wind Project in Umatilla County, Oregon; and the Star Point Wind Project in Sherman County, Oregon, have incorporated this concrete washout water management practice in the erosion and sediment control plan. This practice has been accepted by the Oregon Department of Environmental Quality (DEQ) (Hesse, 2008).

Portable toilets will be provided for onsite sewage handling during construction. The toilets will be pumped and cleaned regularly by the construction contractor. No other wastewater will be generated during construction.

V.2.2 Waste Produced During Operations

Little solid waste will be generated from Facility operations. Office waste, such as paper and food packaging/scraps, will be generated at the operations and maintenance (O&M) facility(s). Minor and potentially hazardous waste could include oily rags or similar waste related to turbine lubrication and other maintenance, as described in Exhibit G. The only other source of waste will be incidental waste from repair or replacement of electrical or turbine equipment. No industrial wastewater will be generated during operations.

The Applicant proposes to construct a septic system to serve the sanitary uses at each O&M building. The estimated number of permanent employees is 10 to 30. The design capacity of the proposed new septic system is less than 2,500 gallons per day. The Applicant will obtain a construction-installation permit from DEQ's Eastern Division prior to construction of the onsite septic system(s). Gilliam County does not administer

construction permits for onsite septic systems. The operations personnel will be responsible for the waste management program during operation. Personnel will ensure that solid waste is disposed of in dumpsters, and any hazardous waste is properly disposed of in accordance with applicable rules.

V.2.3 Waste Produced By Retirement

When the Facility is retired or decommissioned, the turbine towers, collector substations, overhead transmission lines, and overhead transmission line support structures will be removed from the site and the materials reused or sold for scrap. Inert underground electrical cables and underground concrete pads (associated with the turbines, meteorological towers, and transmission line support structures) will be left in place, provided landowner permission is obtained, but no such equipment will be left within 3 feet of the ground surface, so that agricultural activities may continue. It is anticipated that at least some of the improved roads will be left in place by the adjacent landowner.

Leaving concrete pads and other equipment 3 feet below the surface upon retirement of the Facility will allow agricultural activities to continue with no adverse effect. The practice of leaving concrete pads and other equipment in place at depths greater than 3 feet below ground surface is commonly accepted as having no adverse effect on agricultural activities. Jordan Maley of Gilliam County and Sandy Macnab of Sherman County provided letters supporting this industry standard (see Attachments V-1 and V-2). Mr. Maley is a Gilliam County Dryland Cropping Systems Extension Agent at the Oregon State University (OSU) Extension Service and Ms. Macnab is a Sherman County Crops Agent at the OSU Extension Service. As indicated by the OSU Extension Service, because plowing depths are no more than 12 inches, leaving concrete pads and other equipment 3 feet below the surface will allow normal farming operations to resume. The restoration process will likely include movement of topsoil to fill any void left by tower removal, a type of shallow cut and fill that is widely employed in the construction of erosion control structures associated with dryland agriculture common in central Oregon (Maley, 2006; Macnab, 2005;).

V.3 STRUCTURES, SYSTEMS, AND EQUIPMENT

OAR 345-021-0010(1)(v)(B) *A description of any structures, systems and equipment for management and disposal of solid waste, wastewater and storm water.*

Response: Structures, systems, and equipment used for the proper management and disposal of solid waste, wastewater, and stormwater during Facility construction and operations are discussed in sections V.3.1 and V.3.2.

V.3.1 Construction Structures, Systems, and Equipment

As described in Section V.2, a variety of inert construction waste will be generated as a result of Facility construction, including wood waste from construction of wood forms used for concrete pads, concrete waste from turbine pad construction, scrap metal steel

from turbine tower construction, erosion and sediment control material (such as silt fences), and packaging material from equipment.

Wastewater may be generated during construction as a result of washing down concrete truck chutes. As described in Section V.2, the concrete washout water will be washed out at the contractor-owned batch plant(s) or into a dedicated concrete washout area at each turbine foundation. The concrete washout area will be constructed in a corner of the foundation excavation. . Portable toilets will be provided for onsite sewage handling during construction and will be pumped and cleaned regularly by the construction contractor. No other wastewater will be generated during construction.

Generation of waste from construction will be minimized through detailed estimating of materials needs and through efficient construction practices. Any waste generated during construction will be recycled when feasible. Steel scrap will be collected and transported to a recycling facility. Depending on the size and quantity of scrap and leftover materials, wood waste will also be recycled. Concrete waste will be used as fill onsite or at another site or, if no reuse option is available, disposed of at the nearby Arlington Landfill. Packaging waste (such as paper and cardboard) will be separated and recycled. Any nonrecyclable waste will be collected and transported to a local landfill (most likely the Arlington Landfill).

Minor and potentially hazardous materials could include oily rags or similar waste related to turbine lubrication and other maintenance, as described in Exhibit G and listed in Table G-1. These materials will be used primarily during operations but potentially during construction as well. The hazardous materials will be stored within a secondary containment area to prevent any contamination from leaks or spills. Hazardous materials will be used in a manner that is protective of human health and the environment and will comply with all applicable local, state, and federal environmental laws and regulations. Accidental releases of hazardous materials (e.g., vehicle fuel during construction or lubricating oil for turbines) will be prevented or minimized through proper containment of these substances during use and transportation to the Facility. Hazardous materials will be used primarily within the turbines themselves, where any spill will be contained. Any oily waste, rags, or dirty or hazardous solid waste will be collected in sealable drums and removed for recycling or disposal by a licensed contractor.

An NPDES 1200-C stormwater permit will be obtained from DEQ. Stormwater during construction will be managed in compliance with the 1200-C permit, which will include a site-specific erosion and sediment control plan (ESCP). In general, the construction of roads, turbine foundations, and other facilities will be regulated by the ESCP, which will outline the minimum best management practices (BMPs) that will be implemented to prevent erosion and minimize possible sediment transport offsite. The ESCP will focus on implementing BMPs to prevent erosion (from both wind and water) rather than on controlling sedimentation after erosion has already occurred.

The following erosion control measures will likely be implemented during Facility construction:

Stabilized Construction Entrance/ Exit: A stabilized construction entrance/exit will be installed at locations where dirt (exposed, disturbed land) or newly constructed roads intersect existing paved roads. Stabilized entrances will also be installed at the construction laydown areas. The stabilized construction entrances/exits will be inspected and maintained for the duration of Facility operation.

Maintain Existing Vegetation: To the extent practicable, existing vegetation will be preserved.

Silt Fencing: Silt fencing will be installed at various locations throughout the Facility. It will be installed on contour downgradient of all excavations, including construction of the turbine footings. Silt fencing will also be installed downgradient of the O&M facility(s). Silt fencing will be used as perimeter control, and it will be installed around the perimeter of material stockpiles and the perimeter of construction staging areas.

Straw Wattles: Straw wattles may be installed to decrease the velocity of sheet flow stormwater. They will be used along the downgradient edge of access roads adjacent to slopes or sensitive area.

Mulching: Mulch will be provided to immediately stabilize soil exposed as a result of land-disturbing activities. Mulch will also be used during the reseeding of disturbed areas.

Stabilization Matting: Jute matting, straw matting, or turf reinforcement matting may be used to stabilize slopes that could become exposed during installation of access roads, or to stabilize intermittent streams disturbed during construction of road crossings. The use of erosion control matting, along with revegetation techniques, will allow for stabilization.

Soil Binders and Tackifiers: Soil binders and tackifiers may be used on exposed slopes to stabilize them until vegetation is established.

Concrete Washout Area: Concrete chutes and trucks will be washed out in dedicated areas near the turbine foundation construction area or at the contractor-owned concrete batch plant(s). Soil from the concrete washout area will be backfilled with the stockpiled soil over the completed footing to ensure that the surface soils maintain infiltration capacity. Concrete washout will be handled in this method to prevent concrete washout water from leaving a localized area, and to ensure that the restored surface soil maintains positive infiltration.

Stockpile Management: To facilitate installation of the turbine footings, large excavations will be created. The soil from these excavations will be temporarily stockpiled and used as backfill at the completion of the footing. While the material is stockpiled, silt fencing will be used as perimeter control, and the stockpiled material will be covered with a thick layer of mulch or by plastic sheeting that is adequately anchored.

Revegetation: At the completion of land-disturbing activities, the site will be revegetated with an approved seed mix. The seed will be applied with mulch to protect the seeds as the grass establishes.

Check Dams and Sediment Traps: Check dams and sediment traps will be used during the construction of low-impact ford crossings or culvert installations. The check dams and sediment traps will minimize downstream disturbances during construction of the stream crossings.

Pollutant Management: During construction, source control measures will be implemented to reduce the potential of chemical pollution to surface water or groundwater during construction. Chemical pollution could occur as a release of diesel fuel or lubricating oils, or from improper debris and waste handling. Fuels and oils will be stored in a dedicated area, and construction vehicles will be fueled and maintained only in dedicated areas. Handling, storage, and disposal of materials will be consistent with federal, state, and local ordinances, and in a manner that will not cause stormwater contamination.

V.3.2 Operations Structures, Systems, and Equipment

Little solid waste will be generated from Facility operations. Office waste, such as paper and food packaging/scraps, will be generated at the O&M facility(s). Minor and potentially hazardous waste could include oily rags or similar waste related to turbine lubrication and other maintenance, as described in Exhibit G. The only other source of waste will be incidental waste from repair or replacement of electrical or turbine equipment. Solid waste generated during Facility operations will most likely be disposed of at the nearby Arlington Landfill, similar to the solid waste generated during construction.

The only materials that will be brought onto the site will relate to maintenance or replacement of Facility elements (e.g., electrical equipment, nacelle, or turbine components). The only materials that will be removed from the site will be parts or elements replaced during maintenance activities. Those materials removed or replaced will not constitute significant amounts.

No industrial wastewater will be generated during operations. Blade washing is not anticipated to occur because the manufacturer does not recommend it. However, if the manufacturer were to recommend blade washing in the future, the washwater created by blade washing would not be considered industrial wastewater. The amount of water required would be below the DEQ threshold (see Exhibit G).

The construction of the Facility will increase the impervious area within the watershed with the construction of new pervious gravel roads, pervious gravel around the turbine towers, collector substations, and O&M facility(s). The increase in impervious area will most likely not result in a significant amount of additional stormwater during operation.

V.4 WATER USE REDUCTION

OAR 345-021-0010(1)(v)(C) *A discussion of any actions or restrictions proposed by the applicant to reduce consumptive water use during construction and operation of the facility.*

Response: During Facility construction, water will be used on an as-needed basis to construct concrete foundations, suppress dust on the roads (and other areas disturbed as a result of grading), wash out concrete truck shoots, and suppress fire. To reduce the water used for dust suppression during construction, materials such as mulch, soil tackifiers, and soil binders may be placed on exposed soils to minimize dust without the use of daily water. During Facility operation, minimal water use is anticipated. The water used at the O&M building(s) will meet building code requirements for water conservation practices.

V.5 PLANS FOR RECYCLING AND REUSE

OAR 345-021-0010(1)(v)(D) *The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A).*

Response: Waste minimization and recycling will be implemented during Facility construction and operation. See sections V.5.1 through V.5.3.

V.5.1 Recycling During Construction

Generation of waste from Facility construction will be minimized through detailed estimating of materials needs and through efficient construction practices. Any waste generated during construction will be recycled when feasible. Steel scrap will be collected and transported to a recycling facility. Depending on size and quantity of scrap and leftover materials, wood waste will also be recycled. Concrete waste will be used as fill onsite or at another site or, if no reuse option is available, removed to the nearby Arlington Landfill. Packaging waste (such as paper and cardboard) will be separated and recycled. Any nonrecyclable waste will be collected and transported to a local landfill (most likely the Arlington Landfill).

V.5.2 Recycling During Operations

Minimal waste will be generated during Facility operations. Waste from the O&M building(s) (for example, paper, cans, and bottles) will be collected and recycled as feasible. Nonrecyclable waste will be collected and transported to the nearby Arlington Landfill.

V.5.3 Recycling During Retirement

In the event of Facility retirement, most of the aboveground waste will be removed and reused, as described in Section V.3.1.

V.6 ADVERSE IMPACTS OF WASTE DISPOSAL

OAR 345-021-0010(1)(v)(E) *A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of solid waste, wastewater and stormwater during construction and operation of the facility.*

Response: As a result of the minimal quantity and inert nature of most of the potential waste, there is no anticipated adverse impact on surrounding or adjacent areas from waste generated at the Facility during construction, operation, or retirement. Most waste will be removed from the site and either reused, recycled, or disposed of at the nearby Arlington Landfill if necessary. Any waste disposed of onsite (for example, concrete waste and wastewater) will be inert. This waste will be disposed of in a manner consistent with applicable regulations and protective of human health and the environment.

V.7 EVIDENCE THAT ADVERSE IMPACTS WOULD BE MINIMAL

OAR 345-021-0010(1)(v)(F) *Evidence that adverse impacts described in [E] are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.*

Response: Adverse impacts caused by Facility waste will be minimal. Evidence to support this statement is provided in this Exhibit and in Exhibit G, where the Applicant's proposed measures to avoid, reduce, or otherwise mitigate any possible impacts on the site or adjacent land are discussed. Examples of such measures include storing oily waste, such as rags or dirt, in sealable drums and removing the waste for recycling or disposal by a licensed contractor; and locating spill kits containing items such as absorbent pads on equipment and in the onsite temporary storage facilities to respond to accidental spills that may occur. Further, during construction, equipment (for example, graders and dozers) will be available to respond to spills and to quickly construct berms or ditches, if necessary.

Disposal of materials as onsite fill will be conducted in accordance with OAR 340-093-0080 and other applicable regulations. OAR 340-093-0080 provides a variance or permit exemption for disposal of inert waste. For a variance, certain requirements of OAR Chapter 340, Divisions 93 through 97 may be waived when circumstances of the solid waste disposal site location, operating procedures, or other conditions indicate that the purpose and intent of OAR Chapter 340, Divisions 93 through 97 can be achieved without strict adherence to all of the requirements. See OAR 340-093-0080(1). For a permit exemption, the inert waste must be demonstrated to be substantially the same as "clean fill" as required by OAR 340-093-0080(2). Clean fill is defined as material consisting of soil, rock, concrete, brick, building block, tile, or asphalt paving, which do not contain contaminants that could adversely impact the waters of the State or public health. See OAR 340-093-0030(13). To meet the clean fill definition, the inert construction debris will be separated from other debris that is not inert.

The only clean fill that has the potential to be disposed of onsite is waste concrete generated during construction. As described in Section V.2.1, concrete wastewater or

waste concrete (excess cement mix from a construction site; batches of concrete that do not meet specifications) may be buried at the turbine foundation, covered with at least 3 feet of topsoil, and regraded to match existing contours.

Any packing materials, paper, and refuse will be separated, accumulated in dumpsters, and periodically removed for recycling or disposal by a licensed waste hauler. Portable toilets will be provided for onsite sewage handling during construction and will be pumped and cleaned regularly by the construction contractor.

Transportation of waste to landfills or recycling facilities will involve periodic truck trips over public and private roads between the Facility and the nearest landfill or recycling facilities. Given the number and frequency of these trips and the anticipated volume of waste materials, these trips are not anticipated to have adverse impacts on the adjacent or surrounding area.

V.8 PROPOSED MONITORING PROGRAM

OAR 345-021-0010(1)(v)(G) *The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts.*

Response: During construction, the contractor will be responsible for monitoring waste generation and management activities, and for ensuring that waste is recycled or disposed of in an appropriate manner. Because minimal adverse impacts from waste or wastewater will occur on the adjacent or surrounding areas during operation, no monitoring program is proposed.

V.9 CONCLUSION

The evidence provided above demonstrates that the Council's waste minimization standard is met because waste will be minimized, reused, or recycled where feasible and because minimal adverse impacts on the surrounding or adjacent areas will result from the management of waste related to the Facility.

V.10 REFERENCES

Hesse, Todd; Oregon Department of Environmental Quality. 2008. E-mail correspondence with Nathan Williams, CH2M HILL. May 2, 2008.

Macnab, Sandy; Sherman County Oregon State Extension Service. 2005. Letter dated September 29, 2005.

Maley, Jordan; Gilliam County Oregon State Extension Service. 2006. Letter dated May 8, 2006.

ATTACHMENT V-1

Letter from Gilliam County Oregon State University Extension Service

Extension Service
Gilliam County

OSU

OREGON
STATE
UNIVERSITY

333 South Main Street
PO Box 707
Condon, Oregon 97823

Telephone
541-384-2271
Fax
541-384-2571

May 8, 2006

PPM Energy
Sara McMahon
Project Manager
Suite 700
1125 NW Couch
Portland, OR 97209

Dear Ms. McMahon,
Regarding the Energy Facility Siting Council questions pertaining to the Leaning Juniper II energy development plan, I would like to provide the following input on the proposal.

It is my understanding the wind tower siting contracts include a provision for restoration of the land following decommissioning. Returning that land to crop production once the towers are removed and foundations buried three feet below the land surface should not pose a problem for future agricultural management. The restoration process will likely include movement of top soil to fill any void left by tower removal. This type of shallow cut and fill is already widely practiced in the construction of erosion control structures in our county. Land productivity is not significantly impacted by this type of activity. Once the land is returned to farming, typical tillage depth in this region is approximately 8 inches, and rarely over one foot in depth. For that reason, the buried foundation mass would lie well below the level of any tillage activity.

Feel free to contact me if you have questions concerning this input to the EFSC process.

Sincerely yours,

Jordan B. Maley
Dryland Cropping Systems Extension Agent
Oregon State University Extension Service – Gilliam County

Oregon State UNIVERSITY | Extension Service Gilliam County

Agriculture, 4-H Youth, Family & Community Development, Forestry, and Extension Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Gilliam county cooperating. The Extension Service offers its programs and materials equally to all people.

ATTACHMENT V-2

Letter from Sherman County Oregon State University Extension Service

Extension Service Sherman County
Oregon State University, 409 Hood Street, PO Box 385, Moro, OR 97039
T 541-565-3230 | F 541-565-3330 | http://extension.oregonstate.edu/sherman/

September 29, 2005

PPM Energy
Jesse Gronner
1125 NW Couch
Suite 700
Portland, Ore. 97209

Mr. Gronner,

Regarding the FSEC questions pertaining to the Phase III energy development plan for Sherman County, I would like to provide some answers to some of the questions posed.

Although the contracts call for the sites to be restored upon possible decommissioning of the towers, the questions regarding farming over those sites should not be a problem. Typical tillage in this area is primarily in the 6 to 8 inch zone, occasionally as deep as 10 inches and rarely if ever, over 12.

When the original soil was removed, most of the topsoil was spread around the farm ground in the area of the tower site and it could be pushed back in to the holes upon decommissioning. Farmers in this area frequently scrape the topsoil to build sediment dams and terrace as conservation practices to control erosion and there are skilled contractors in the area very capable of pushing enough nearby topsoil into position without going so deep they expose non-producing bedrock or hard pans. If extra fill dirt is needed, there are a number of sites behind old sediment dams or fill that has been stored after removal for a sewage filtration pond that could be available for that purpose.

If you have any other questions, please do not hesitate to contact me.

Sincerely,

Sandy Macnab

Sandy Macnab
Oregon State University Extension Service
Sherman County Crops Agent

Agriculture, 4-H Youth, Family & Community Development, Forestry, and Extension Sea Grant Programs. Oregon State University, United States Department of Agriculture, and Sherman County cooperating. The Extension Service offers its programs and materials equally to all people.

EXHIBIT W

SITE RESTORATION
OAR 345-021-0010(1)(w)

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W-1 Cost Estimate for Decommissioning

W.1 INTRODUCTION

OAR 345-021-0010(1)(w) *Information about site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1). The applicant shall include:*

Response: The evidence provided in this Exhibit demonstrates that the standard contained in OAR 345-022-0050(1) can be met because the proposed Montague Wind Power Facility (Facility) can be retired (decommissioned) and the Facility site restored to a useful, nonhazardous condition that allows continued use for agriculture. Further, Iberdrola Renewables, Inc. (Applicant) will put in place adequate security to ensure that decommissioning will be funded to necessary levels.

The construction and operation of the Facility will involve minimal amounts of hazardous material and solid waste (as described in Exhibits B, G, and V). Therefore, restoring the site to a useful, nonhazardous condition will require simple removal of Facility features to below grade and subsequent soil restoration and revegetation. This Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(w).

W.2 ESTIMATED USEFUL LIFE OF PROPOSED FACILITY

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

Response: For financial evaluation and contractual purposes, the Facility is assumed to have a useful life of 25 to 30 years. The trend in the wind energy industry, however, has been to "repower" older wind energy projects by upgrading existing towers and other infrastructure with more efficient turbines and related equipment. Based on today's market for renewable power, it is likely that the Facility will be upgraded with more efficient equipment and, therefore, could have a useful life for much longer than 30 years.

W.3 SITE RESTORATION ACTIONS AND TASKS

(B) Specific actions and tasks to restore the site to a useful, non-hazardous condition.

Response: If the Facility is retired, the Applicant will obtain the necessary authorization from the appropriate regulatory agencies and landowners to proceed with decommissioning of Facility components. The first step in decommissioning will be dismantling all turbines, towers, pad transformers, operations and maintenance (O&M) facility(s), and related aboveground equipment (aboveground collection system, transmission line, and substations). Turbine towers, nacelles, and pad transformers will have considerable value and will thus be removed and sold for use or scrap. Unsalvageable material will be disposed of at authorized sites (as described in Exhibit V).

A subsequent step in decommissioning will be removal of concrete turbine pads to an appropriate depth below the soil surface. The Applicant's lease agreements specify that in the event of Facility retirement, all turbine foundations will be removed to a

minimum depth of 3 feet below grade and soils will be restored, as is the standard industry practice. Portions of underground electrical and communication cable buried below 3 feet will be left in place. These actions will allow agricultural use of the Facility site after decommissioning. The soil surface will be restored as close as reasonably possible to its original condition.

Reclamation procedures will be based on site-specific requirements and techniques commonly employed at the time the area is to be reclaimed. Procedures will likely include regrading to restore soil and original contours and revegetating disturbed areas with native plant seed mixes or agricultural crops, as appropriate, based on the use of surrounding lands.

One of the final steps in decommissioning will be removal of Facility roads. Decommissioned roads will be reclaimed to restore the surface grade and soil to a condition useful for agriculture or grazing, depending on the use of surrounding lands. Roads also may be left in place based on landowner preference. It is expected that landowners generally will not want the Applicant to decommission the widened portions of farm roads that pre-existed the Facility, but will want the Applicant to decommission the new access roads built for the Facility.

The decommissioning will be done consistent with the Facility revegetation plan required as part of the site certificate. The revegetation plan will be similar to the Plan included as Attachment B to the *Leaning Juniper II Wind Power Facility Final Order* (September 21, 2007).

W.4 ESTIMATED COSTS OF SITE RESTORATION

(C) An estimate, in current dollars, of the total and unit costs of restoring the site to a useful, non-hazardous condition.

Response: The Applicant estimates the net cost of retiring the Facility and restoring the site based on the cost of removal, minus the scrap value of the components in the turbines, to range from $13,915,771 to $15,655,649 in first quarter 2010 dollars. The Applicant understands that the Department has generated its own estimates of the cost of removal and of the scrap value of Facility components. The Applicant's dollar estimate was based on comparing the net cost of retiring a Facility ranging in size from 269 GE 1.5-MW turbines to 134 Vestas 3.0-MW turbines.

The Applicant is prepared to post decommissioning security to ensure the Facility's prompt removal once the Facility is no longer operational. The Applicant asks the Council to recognize the costs of said decommissioning security and requests that the Council take into account the following when establishing the amount and timing of said bond:

1. The risk of the Facility ceasing operations in the first 10 years is extremely low.
2. The wind turbines will have a significant resale value in the early years of the Facility.

3. The scrap value of the turbines and towers warrants consideration.

4. The landowner leases require the Applicant to decommission the Facility.

The Applicant prefers that the decommissioning security requirement become effective in the later years of the Facility's life (e.g., in year 15). At this point, the Facility will still have substantial commercial value, but decommissioning could be expected after another 15 to 20 years.

(D) A discussion and justification of the methods and assumptions used to estimate site restoration costs.

Response: The Applicant's cost estimate is based on a worst-case scenario of decommissioning 269 GE 1.5-MW turbines and related or supporting facilities. Decommissioning the smaller but more abundant 269 GE 1.5-MW turbines would cost more than decommissioning 134 Vestas 3.0-MW turbines, as shown in Tables W-1 and W-2 in Attachment W-1. The cost estimate includes removal of turbines, towers, pad transformers, meteorological towers, collector substations, O&M facility building(s) not to exceed 8,000 square feet each, and aboveground collector and transmission lines; excavation of foundations and underground collector lines down to a depth of 3 feet (consisting of the junction boxes); and return of soils to preconstruction grade, including the removal or restoration of roadways for the Facility.

The revenue from the scrap value of steel was calculated based on an independent analysis from a metals expert, using the current scrap value escalated at Gross Domestic Product Implicit Price Deflator. Each GE 1.5-MW turbine contains approximately 220 metric tons of steel, including both the tower and nacelle. Each Vestas 3.0-MW turbine contains approximately 348 metric tons of steel, including both the tower and nacelle. The scrap value was calculated based on the following:

- 220 net tons per unit for the 269 GE 1.5-MW turbines for a total of 59,180 total net tons

- 348 net tons per unit for the 134 Vestas 3.0-MW turbines for a total of 46,632 total net tons

Based on the independent analysis, scrap value for the Facility was calculated to be $5,562,920 for the 269 GE 1.5-MW turbines and $4,383,408 for the 134 Vestas 3.0-MW turbines, as shown in Tables W-1 and W-2, respectively.

The net cost of retiring the Facility under the worst-case scenario (1.5-MW turbines) will be $21,218,569 less the scrap value of $5,562,920, or $15,655,649 (Table W-1). The Applicant's proposed cost estimate also includes an additional 10 percent for administration and project management costs and an additional 10 percent for future development contingency. This amount will be sufficient to fund the restoration of the Facility to a useful, nonhazardous condition. Please see Exhibit M for a discussion of the security the Applicant is proposing to cover this amount.

W.5 PROPOSED MONITORING PLAN FOR HAZARDOUS MATERIALS

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

Response: A monitoring plan, such as periodic environmental site assessment and reporting, will be unnecessary at this site because the Facility will not produce any site contamination by hazardous materials.

ATTACHMENT *W*-1

Cost Estimate for Decommissioning

Table W-1

Site Restoration Cost Estimate (1st Quarter 2010 Dollars) for 269 1.5-MW Turbines

Montague Wind Power Facility

Cost Estimate Component	Quantity	Unit Cost	Extension
Turbines and Towers			
Disconnect electrical and ready for disassembly (per tower)	269	$1,050	$282,450
Remove turbine blades, hubs, and nacelles (per tower)	269	$5,594	$1,504,786
Remove turbine towers (per net ton of steel)	59,180	$72.01	$4,261,552
Foundation and Pad Areas			
Remove and load pad-mounted transformers (per tower)	269	$2,417	$650,173
Remove turbine foundations (per cubic yard of concrete)	12,562	$47.34	$594,688
Met Towers			
Dismantle and dispose of met towers (per tower)	8	$8,921	$71,368
Collector Substations			
Dismantle and dispose of collector substation	2	$84,602	$169,204
Operations and Maintenance Facility(s)			
Dismantle and dispose of O&M Facility(s)	2	$47,156	$94,312
Electrical System			
Remove 230-kV transmission line (per mile)	17.0	$22,593	$383,177
Remove above-ground 34.5-kV collector (per mile)	27.3	$5,241	$143,079
Remove below-ground junction boxes to 4' below grade (each)	54	$1,420	$76,680
Access Roads			
20-ft road removal, grading, and seeding (per mile)	69.3	$21,887	$1,516,769
Temporary Areas			
Access roads and met towers (per acre)	612	$6,001	$3,673,332
Transmission lines, staging areas, crane paths (per acre)	1209	$2,985	$3,608,865
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$476,172	$476,172
Subtotal			**$17,506,607**
Adjust to 1Q2010 dollars			**$17,553,331**
Performance Bond		1%	$175,533
Gross Cost			**$17,682,140**
Administration and Project Management		10%	$1,768,214
Future Development Contingency		10%	$1,768,214
Total Site Restoration Cost			**$21,218,569**
Less Scrap Value of Steel (per ton of steel)	59,180	$94	-$5,562,920
Total Site Restoration Cost (less scrap value of steel)			**$15,655,649**
Total Site Restoration Cost (Rounded To Nearest $1,000)			**$15,656,000**

Table W-2

Site Restoration Cost Estimate (1st Quarter 2010 Dollars) for 134 3.0-MW Turbines

Montague Wind Power Facility

Cost Estimate Component	Quantity	Unit Cost	Extension
Turbines and Towers			
Disconnect electrical and ready for disassembly (per tower)	134	$1,050	$140,700
Remove turbine blades, hubs, and nacelles (per tower)	134	$5,594	$749,596
Remove turbine towers (per net ton of steel)	46,632	$72.01	$3,357,970
Foundation and Pad Areas			
Remove and load pad-mounted transformers (per tower)	134	$2,417	$323,878
Remove turbine foundations (per cubic yard of concrete)	7,443	$47.34	$352,334
Met Towers			
Dismantle and dispose of met towers (per tower)	8	$8,921	$71,368
Collector Substations			
Dismantle and dispose of collector substations	2	$84,602	$169,204
Operations and Maintenance Facility(s)			
Dismantle and dispose of O&M Facility(s)	2	$47,156	$94,312
Electrical System			
Remove 230-kV transmission line (per mile)	17.0	$22,593	$383,177
Remove above-ground 34.5-kV collector (per mile)	27.3	$5,241	$143,079
Remove below-ground junction boxes (each) to 4' below grade	27	$1,420	$38,340
Access Roads			
20-ft road removal, grading, and seeding (per mile)	69.3	$21,887	$1,516,769
Temporary Areas			
Access roads and met towers (per acre)	612	$6,001	$3,673,332
Transmission lines, staging areas, crane paths (per acre)	1209	$2,985	$3,607,701
General Costs			
Permits, mobilization, engineering, overhead, utility disconnects (unit cost)	1	$476,172	$476,172
Subtotal			**$15,097,933**
Adjust to 1Q2010 dollars			**$15,138,229**
Performance Bond		1%	$151,382
Gross Cost			**$15,249,316**
Administration and Project Management		10%	$1,524,932
Future Development Contingency		10%	$1,524,932
Total Site Restoration Cost			**$18,299,179**
Less Scrap Value of Steel (per ton of steel)	46,632	$94	-$4,383,408
Total Site Restoration Cost (less scrap value of steel)			**$13,915,771**
Total Site Restoration Cost (Rounded To Nearest $1,000)			**$13,916,000**

EXHIBIT X

NOISE

OAR 345-021-0010(1)(x)
OAR 345-035-0035

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X.1 INTRODUCTION

OAR 345-021-0010(1)(x) *Information about noise generated by construction and operation of the proposed facility, providing evidence to support a finding by the Council that the proposed facility complies with the Oregon Department of Environmental Quality's noise control standards in OAR 340-035-0035.*

Response: This Exhibit provides a baseline noise assessment for the proposed Montague Wind Power Facility (Facility).

Iberdrola Renewables, Inc. (Applicant) proposes to construct a wind generation facility in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). Up to 269 turbines will be located at the Facility site, depending on the final turbine size and vendor (as further described in Exhibit B, Section B.1.3).

The Facility will use turbines up to 3.0 MW in size or up to 110 decibels on an A-weighted scale (dBA) maximum sound power level. Because the final turbine size, vendor, number, and actual generating capacity have not yet been determined, this Exhibit analyzes noise results for two turbine sizes that represent a range of turbine sizes and noise results. The two turbine sizes represent a range of alternative turbine technologies (i.e., encompassing the scale and impacts of the turbines) that could potentially be used at the Facility. The minimum turbine layout is 134 3.0-MW turbines. The maximum turbine layout is 269 1.5-MW turbines. The final layout will have 134 to 269 turbines, with any combination of 3.0-MW turbines and 1.5-MW turbines. The total number of turbines will not exceed 269, and the total MW will not exceed 404.

To demonstrate that the Applicant has a reasonable likelihood of designing a facility in compliance with the noise standards, noise analyses were conducted for both the maximum turbine layout and the minimum turbine layout. The noise results from these two scenarios are presented. After the precise turbine locations and type have been selected and prior to Facility construction, the Applicant will submit for the Oregon Department of Energy's (the Department's) review an acoustical analysis of the final Facility design along with evidence, including any noise waivers, that demonstrate compliance with OAR 340-035-0035. The Applicant will not start construction of major Facility components until the Department is satisfied that the Facility has satisfied the requirements of OAR 340-035-0035.

X.1.1 Acoustical Background

It is useful to understand how noise is defined and measured. Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several different ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Table X-1 summarizes the technical noise terms used in this Exhibit.

Table X-1. Definitions of Acoustical Terms

Term	Definitions
Ambient noise level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals.
A-weighted sound pressure level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Statistical noise level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (for example, L_{50} is the level exceeded 50 percent of the time).

Table X-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Table X-2. Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
Civil defense siren (100 ft)	130		
Jet takeoff (200 ft)	120		Pain threshold
	110	Rock music concert	
Pile driver (50 ft)	100		Very loud
Ambulance siren (100 ft)			
	90	Boiler room	
Freight cars (50 ft)		Printing press plant	
Pneumatic drill (50 ft)	80	In kitchen with garbage disposal running	
Freeway (100 ft)			
	70		Moderately loud
Vacuum cleaner (10 ft)	60	Data processing center	
Department Store; Light traffic (100 ft)	50	Private business office	
Large transformer (200 ft)	40		Quiet
Soft whisper (5 ft)	30	Quiet bedroom	
	20	Recording studio	
	10		Hearing threshold

Source: Beranek, L.L., 1988.

X.1.2 Analysis Area and Facility Site

The analysis area for noise impacts includes all areas that could be affected by construction or operational noise resulting from the Facility.

The Facility components are proposed on private land for which the Applicant has negotiated or is in the final stages of negotiating long-term wind energy leases with the landowners, or on private land for which the Applicant is in the process of obtaining easements from landowners and other wind developers. The wind energy leases allow the Applicant to permit, construct, and operate wind energy facilities for a defined period. In exchange, the landowners receive compensation from the Applicant. The terms of the wind energy leases allow landowners to continue their farming operations (primarily cultivation of wheat) in and around the wind turbine generators and other facilities where the farming activities do not affect the operation and maintenance of the wind generation equipment. Easements also will be negotiated with adjacent landowners for road and collector cable access, as needed.

X.1.3 Existing Noise Conditions

For this Exhibit, the Facility is presumed to be located on "previously unused" land, as defined in OAR Chapter 340, Division 35. In accordance with these rules, this Exhibit assumes an L_{50} ambient noise level of 26 dBA.

X.2 PREDICTED NOISE LEVELS

The applicant shall include:

OAR-345-021-0010(1)(x)(A) *Predicted noise levels resulting from construction and operation of the proposed facility*.

Response:

X.2.1 Construction

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control studied noise from individual pieces of construction equipment, as well as from construction sites of power plants and other types of facilities (see Table X-3). Because specific information about types, quantities, and operating schedules of construction equipment is not known at this stage, data from the EPA document for industrial projects of similar size have been used. These data are conservative because the evolution of construction equipment has generally been toward quieter design. Use of these data is reasonable for estimating noise levels, given that they are still widely used by acoustical professionals.

Table X-3. Average Noise Levels from Common Construction at a Reference Distance of 50 feet (dBA)

Construction Equipment	Typical Average Noise Level at 50 ft, dBA
Air compressor	81
Backhoe	85
Concrete mixer	85
Concrete pump	82
Crane, mobile	83
Dozer	80
Generator	78
Grader	85
Loader	79
Paver	89
Pile driver	101
Pneumatic tool	85
Pump	76
Rock drill	98
Saw	78
Scraper	88
Shovel	82
Truck	91

Source: U.S. EPA, 1971.

Table X-4 shows the total composite noise level at a reference distance of 50 feet, based on the equipment operating for each phase of construction and the typical usage factor for each piece of equipment. The noise level at 1,500 feet is also shown. The calculated level at 1,500 feet is probably conservative, because the only attenuating mechanism considered was geometric spreading, which results in an attenuation rate of 6 dBA per doubling of distance; attenuation related to the presence of structures, trees or vegetation, ground effects, and terrain is not considered.

Table X-4. Composite Construction Site Noise Levels

Construction Phase	Composite Equipment Noise Level at 50 feet, dBA	Composite Equipment Noise Level at 1,500 feet, dBA
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

X.2.2 Operations

The Facility will use turbines up to 3.0 MW in size. The minimum turbine layout is 134 3.0-MW turbines. The maximum turbine layout is 269 1.5-MW turbines. The total number of turbines will not exceed 269. Table X-5 presents the potential turbine dimensions for the GE 1.5-MW and Vestas 3.0-MW turbines.

Table X-5. Potential Turbine Dimensions

Turbines	1.5-MW GE Turbine	3.0-MW Vestas Turbine
Tower Type	Tubular	Tubular
Hub Height	262 ft (80 m)	328 ft (100 m)
Blade (Rotor) Diameter	253 ft (77 m)	328 ft (100 m)
Total Turbine Height	389 ft (119 m)	492 ft (150 m)

Source: Exhibit B, Table B-1.
ft = feet.
m = meter.

As described in Exhibit B, the Applicant seeks micrositing flexibility for the Facility with regard to the final layout for turbines and associated access roads and collector cables. Exhibit C contains a precise definition and map of these corridors. Before construction, the Applicant will determine the number of turbines in each corridor, the spacing between turbines, and their precise locations within the corridor, based on the wind turbine models selected and other various siting criteria. To demonstrate that the Applicant has a reasonable likelihood of designing a facility in compliance with the noise standards, noise analyses were conducted for both the maximum turbine layout and the minimum turbine layout. The potential layouts presented in Exhibit C were used to develop the noise model. As mentioned earlier, the Applicant will submit for the Department's review an acoustical analysis of the final Facility design, along with evidence, including any noise waivers, that demonstrate compliance with OAR 340-035-0035. The Applicant will not start construction of major Facility components until the Department is satisfied that the Facility has satisfied the requirements of OAR 340-035-0035.

As part of the noise modeling, each wind turbine was considered to be a point source of noise at the hub height identified in Table X-5. Table X-6 presents the maximum overall and octave band sound power levels determined in accordance with International Electrotechnical Commission (IEC) 61400-11 (2002) for the 1.5-MW GE turbine and the 3.0-MW Vestas turbine. Although not required by the rule, the octave band levels shown in Table X-6 were conservatively adjusted upwards by 2 dBA in the model. This adjustment reflects the typical sound power levels under warranty by the turbine manufacturer.

Table X-6. Maximum Sound Power Levels

	Overall	Octave Band Center Frequency, Hz (A-weighted)							
	(dBA)	63	125	250	500	1,000	2,000	4,000	8,000
GE 1.5-MW	104	85	94	97	99	98	95	87	78
Vestas 3.0-MW	110	94	98	103	105	104	101	95	85

Figures X-1 and X-2 present the noise contours for the 1.5-MW and 3.0-MW turbine layouts, respectively, including the two Facility Collector Substations (collector substations). Transformers are expected to have a National Electrical Manufacturers Association (NEMA) sound rating of 87 dBA.

The model results are presented in Table X-7 for the 1.5-MW maximum turbine layout and in Table X-8 for the 3.0-MW minimum turbine layout. Anticipated noise levels for the receptor IDs predicted to be 32 dBA or above are summarized in Tables X-7 and X-8. As shown in the tables and figures, predicted levels do not exceed 47 dBA at any modeled receptor under either the maximum or minimum turbine layout, and thus comply with the 50-dBA limit in Table 8 of OAR chapter 340, division 35.

As stated in Section X.1, Introduction, after the precise turbine types and turbine layouts have been selected, and before construction of the Facility, the Applicant will submit for the Department's administrative review, pursuant to a Council-approved methodology, the IEC 61400-11 or other appropriate acoustical test reports for the selected turbines, along with an acoustical analysis of the Facility performed with the same methodology as this analysis. At that time, the Applicant will also submit to the Department evidence that it has secured the noise easements necessary for sensitive receptors at which the standard would otherwise be exceeded, so that Facility noise levels will not exceed allowed levels under the applicable OAR standards.

Table X-7. Summary of Predicted Noise Levels (dBA)—GE 1.5-MW Turbines

Receptor ID	Predicted Noise Level	Receptor ID	Predicted Noise Level	Receptor ID	Predicted Noise Level
R271	45	R289	43	R284	38
R277	45	R290	43	R003	37
R294	45	R006	42	R002	37
R279	45	R091	42	R342	35
R280	45	R291	41	R341	34
R281	44	R276	41	R001	34
R093	44	R346	41	R295	33
R273	44	R092	41	R340	33
R292	44	R005	40	R339	33

Table X-7. Summary of Predicted Noise Levels (dBA)—GE 1.5-MW Turbines

Receptor ID	Predicted Noise Level	Receptor ID	Predicted Noise Level	Receptor ID	Predicted Noise Level
R288	**44**	**R275**	**40**	**R286**	**33**
R347	**44**	**R324**	**38**	**R269**	**32**
R293	**44**	**R268**	**38**	**R274**	**32**
R332	**44**	**R282**	**38**		
R278	**43**	**R283**	**38**		

Table X-8. Summary of Predicted Noise Levels (dBA)—Vestas 3.0-MW Turbines

Receptor ID	Predicted Noise Level	Receptor ID	Predicted Noise Level	Receptor ID	Predicted Noise Level
R280	**47**	R289	**45**	R003	**40**
R294	**47**	R275	**44**	R001	**38**
R281	**47**	R278	**44**	R295	**37**
R279	**47**	R271	**44**	R274	**36**
R347	**47**	R086	**44**	R342	**36**
R292	**47**	R005	**44**	R341	**36**
R093	**47**	R091	**43**	R286	**35**
R293	**46**	R092	**42**	R269	**35**
R332	**46**	R290	**42**	R339	**35**
R291	**46**	R324	**40**	R348	**35**
R276	**45**	R268	**40**	R340	**35**
R273	**46**	R002	**40**	R310	**35**
R346	**46**	R282	**40**	R338	**33**
R006	**45**	R284	**40**	R337	**32**
R288	**45**	R004	**40**	R343	**32**
R277	**45**	R283	**40**		

X.3 COMPLIANCE WITH OAR 340-035-0035

OAR 345-021-0010(1)(x)(B) *An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035, including a discussion and justification of the methods and assumptions used in the analysis.*

Response:

X.3.1 Summary of Applicable Noise Regulations

OAR Chapter 340, Division 35, specifically addresses wind energy facilities, as follows:

- OAR 340-035-0035(1)(b)(B)(iii)(I) establishes the option for a proposed wind energy facility to assume a background L_{50} ambient noise level of 26 dBA.

- OAR 340-035-0035(1)(b)(B)(iii)(IV) requires a proposed wind energy facility to satisfy the ambient noise standard, where a landowner has not waived the standard, by predicting facility noise levels at the appropriate measurement point, assuming that all of the proposed wind facility's turbines are operating between cut-in speed and the wind speed corresponding to the maximum sound power level established by IEC 61400-11. These predictions are to be compared to the assumed ambient noise level of 26 dBA, or to the actual ambient background L_{10} and L_{50} noise levels, if measured. The facility complies with the ambient background standard if this comparison shows that the increase in noise is not more than 10 dBA over this entire range of wind speeds.

- OAR 340-035-0035(1)(b)(B)(iii)(VI) requires that the Facility predict compliance with the "Table 8" limits set forth in the regulations, which are summarized in Table X-9. Compliance must occur at the appropriate measurement point, with reference to the turbine's maximum sound power level, following procedures established by IEC 61400-11, and assuming that all of the Facility's turbines are operating at the maximum sound power level.

Table X-9. State of Oregon Statistical Noise Limits for Industrial and Commercial Sources (OAR 340-035-0035)

Statistical Descriptor	Maximum Permissible Statistical Noise Levels (dBA)	
	Daytime (7:00 a.m. – 10:00 p.m.)	Nighttime (10:00 p.m. – 7:00 a.m.)
L_{50}	55	50
L_{10}	60	55
L_1	75	60

Note:

Based on "Table 8" of OAR 340-0035: New Industrial and Commercial Noise Source. Standards and OAR 340-0035(1)(b)(B)(i).

X.3.2 Analysis of Facility Compliance

X.3.2.1 Maximum Allowable Noise Level

Assuming an ambient level of 26 dBA, the maximum allowable noise level produced by the Facility, as measured at a sensitive receptor such as a home, is an increase of 10 dBA over the ambient level across the entire range of wind speeds between the cut-in wind speed and the wind speed corresponding to the maximum sound power level, or 36 dBA (26 dBA +10 dBA). In accordance with OAR 340-035-0035(1)(b)(B)(iii)(IV), the 36-dBA level must be complied with when all turbines operate at the maximum sound power level established by IEC 61400-11. At wind speeds corresponding to sound power levels less than maximum (for example, during cut-in wind speeds), the resulting noise level also will be less. Therefore, it is not necessary to predict noise levels for each wind speed between cut-in and the maximum sound power level when assuming an ambient level of 26 dBA.

If the Facility complies with the OAR 340-035-0035(1)(b)(B)(iii)(IV) limit of 36 dBA at a receptor, it necessarily also complies with OAR 340-035-0035(1)(b)(B)(iii)(VI), namely, the Table 8 limit of 50 dBA, at that same receptor.

In addition to the foregoing limits, OAR 340-035-0035(1)(f) establishes standards that regulate octave band sound pressure levels and audible discrete tones. Such standards can be applied by the Oregon Department of Environmental Quality (DEQ) when it believes subsections (1)(a), (b), or (c) (summarized in Table X-10) do not adequately protect the health, safety, or welfare of the public. Impulse sound is also regulated in OAR 340-035-0035(1)(d), but wind turbines do not generate impulse sound.

The noise limits apply at "appropriate measurement points" on "noise-sensitive property." The "appropriate measurement point" is defined in OAR 340-035-0035 as whichever of the following is farther from the noise source:

- 25 feet (7.6 meters) toward the noise source from that point on the noise-sensitive building nearest the noise source
- That point on the noise-sensitive property line nearest the noise source

"Noise-sensitive property" is defined as "real property normally used for sleeping, or normally used as schools, churches, hospitals, or public libraries. Property used in industrial or agricultural activities is not noise-sensitive property unless it meets the foregoing criteria in more than an incidental manner." Residences are the only noise-sensitive property identified in the Facility area.

X.3.2.2 Methods and Assumptions

Standard acoustical engineering methods used in the noise analysis of the Leaning Juniper II Wind Power Facility and Helix Wind Power Facility Application for Site Certificates were used in the noise analysis for the Montague Facility. The noise model, CADNA/A by Datakustik GmbH of Munich, Germany, is a sophisticated software program that enables complete noise modeling of complex industrial plants. The sound

propagation factors used in the model have been adopted from ISO 9613 (ISO, 1993) and VDI 2714 (VDI, 1988). Atmospheric absorption for conditions of 10°C and 70 percent relative humidity (conditions that favor propagation) was computed in accordance with ISO 9613-1 and the Simple Ground procedure per ISO 9613-2 as requested by the Department. Topography was included in the model. This model and methodology have been previously required by the Department.

All turbines and substations were assumed to be operating at the sound power levels shown in Table X-10. The modeled turbine levels were increased 2 dBA above the estimated maximum sound power level shown in Table X-6 consistent with typical sound power levels under warranty.

OAR 340-035-0035(1)(b)(B)(iii)(I) establishes the option for a wind energy facility to assume a background L_{50} ambient noise level of 26 dBA.

Table X-10. Modeled Octave Band Sound Power Levels

	Overall (dBA)	Octave Band Center Frequency, Hz (A-weighted)							
		63	125	250	500	1,000	2,000	4,000	8,000
GE 1.5-MW Turbine	106	87	96	99	101	100	97	89	80
Vestas 3.0-MW Turbine	112	96	100	105	107	106	103	97	87
Substation Transformers (87-dBA NEMA)[a]	106	83	95	97	103	100	96	91	82

[a] Transformers are expected to have a National Electrical Manufacturers Association (NEMA) sound rating of 87 dBA or less. A total of three transformers were modeled, and each contributed less than 10 dBA to the nearest receptor.

X.3.3 Construction

OAR 340-035-0035(5)(g) specifically exempts construction activity. Therefore, by regulatory definition, there will be no construction noise impacts. Section X.2.1 and Table X-4 present the expected construction noise levels.

Decommissioning activities will be similar to the activities anticipated during the construction phase, but shorter in duration. Therefore, decommissioning will not cause a significant noise impact.

X.3.4 Operations

The maximum operational noise levels for the 1.5-MW and 3.0-MW turbine layouts based on the turbine dimensions identified in Table X-5 are presented in Tables X-7 and X-8, respectively, and in Figures X-1 and X-2, respectively. As shown in Tables X-7 and X-8, the "Table 8 limit" of 50 dBA is complied with at all receptors under both the 1.5-MW and 3.0-MW turbine layouts. After the precise turbine types and turbine layouts have been selected, and before construction of the Facility, the Applicant will submit for Department administrative review, pursuant to Council-approved methodology, the IEC 61400-11 or other appropriate acoustical test reports for the selected turbines, along

with an acoustical analysis of the Facility performed with the same methodology as this analysis. At that time, the Applicant will also submit to the Department evidence that it has secured the noise easements necessary for sensitive receptors, so that Facility noise levels will not exceed allowed levels under the applicable OAR standards.

X.4 PROPOSED MITIGATION MEASURES

OAR 345-021-0010(1)(x)(C) *Any measures the applicant proposes to reduce noise levels or noise impacts or to address public complaints about noise from the facility.*

Response:

The Applicant proposes to secure the noise easements or waivers necessary to ensure that Oregon noise standards are met at all noise-sensitive receptors. In addition, the Applicant proposes the conditions discussed in Section X.6.

X.5 PROPOSED MONITORING MEASURES

OAR 345-021-0010(1)(x)(D) *Any measures the applicant proposes to monitor noise generated by operation of the facility.*

Response:

A noise monitoring program is not proposed because of the absence of predicted impacts. Nonetheless, the Applicant proposes the conditions discussed in Section X.6.

X.6 PROPOSED SITE CERTIFICATE CONDITIONS

As mentioned in Section X.3.4, after the precise turbine types and turbine layouts have been selected, and before construction of turbine foundations, the Applicant will submit for Department administrative review, pursuant to Council-approved methodology, the IEC 61400-11 or other appropriate acoustical test reports for the selected turbines, along with an acoustical analysis of the Facility performed with the same methodology as this analysis. At that time, the Certificate holder will also submit to the Department evidence that it has secured the noise easements necessary for sensitive receptors, so that Facility noise levels will not exceed allowed levels under the applicable OAR standards.

The Applicant proposes that site certificate conditions such as conditions 100 and 101 from the *Helix Wind Power Facility Site Certificate* (July 31, 2009) be included in the site certificate for the Montague Wind Power Facility. These conditions are also consistent with conditions 93 and 94 from the *Leaning Juniper II Wind Power Facility First Amended Site Certificate* (November 20, 2009). Specifically, the Applicant proposes the following conditions:

Condition 100

"To reduce construction noise impacts at nearby residences, the certificate holder shall:

(a) Confine the noisiest operations of heavy construction equipment to the daylight hours;

(b) Require contractors to install and maintain exhaust mufflers on all combustion engine-powered equipment; and

(c) Establish a complaint response system at the construction manager's office to address noise complaints."

and

Condition 101

"Before beginning construction, the certificate holder shall provide to the Department:

(a) Information that identifies the final design locations of all turbines to be built at the facility.

(b) The maximum sound power level for the substation transformers and the maximum sound power level and octave band data for the turbines selected for the facility based on manufacturers' warranties or confirmed by other means acceptable to the Department.

(c) The results of noise analysis of the facility to be built according to the final design performed in a manner consistent with the requirements of OAR 340-035-0035(1)(b)(B)(iii) (IV) and (VI) demonstrating to the satisfaction of the Department that the total noise generated by the facility (including the noise from turbines and substation transformers) would meet the ambient degradation test and maximum allowable test at the appropriate measurement point for all potentially-affected noise sensitive properties.

(d) For each noise-sensitive property where the certificate holder relies on a noise wavier to demonstrate compliance in accordance with OAR 340-035-0035(1)(b)(B)(iii)(III), a copy of the legally effective easement or real covenant pursuant to which the owner of the property authorizes the certificate holder's operation of the facility to increase ambient statistical noise levels L_{10} and L_{50} by more than 10 dBA at the appropriate measurement point. The legally-effective easement or real covenant must: include a legal description of the burdened property (the noise sensitive property); be recorded in the real property records of the county; expressly benefit the certificate holder; expressly run with the land and bind all future owners, lessees or holders of any interest in the burdened property; and not be subject to revocation without the certificate holder's written approval."

These two proposed conditions contain measures to ensure that appropriate actions are undertaken to adequately address noise during the Facility's construction and operation.

X.7 CONCLUSION

This noise analysis concludes that applicable DEQ noise regulations will be met for the construction and operation of the Facility. The Applicant has provided information about the predicted noise levels during the Facility's construction and operation in accordance with OAR 345-021-0010(1)(x)(A), and included an analysis of the Facility's compliance with applicable DEQ noise regulations per OAR 345-021-0010(1)(x)(B). In addition, pursuant to OAR 345-021-0010(1)(x)(C) and (D), the Applicant has provided information demonstrating that it will secure noise waivers where necessary and will implement the proposed conditions to address noise, including addressing any complaints from the public. Accordingly, the Applicant has provided sufficient evidence to support the Council's finding that the Facility complies with applicable DEQ noise control standards in OAR 340-035-0035.

X.8 REFERENCES

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Figures

Figure X-1

Predicted Noise Contours (dBA)

1.5-MW Turbine Layout
(Minimum Turbine Layout)

Montague Wind Power Facility

Site Boundary
Micrositing Corridor
House
36-dBA Noise Contour
50-dBA Noise Contour

Proposed Permanent Facilities

Proposed Turbine
Proposed 5-Acre Facility Collector Substation

Existing Facilities

Public Road
Private Road
Major Railroad Line
County Boundary

N
W E
S

0 1 2 3
Miles

IBERDROLA RENEWABLES

MORROW COUNTY
GILLIAM COUNTY

File: Z:\Projects\OR\Montague\MapDocuments\Report Figures\EFSC\Figure X-1 - Predicted 15MW Turbine Layout Noise Contours.mxd

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Figure X-2

Predicted Noise Contours (dBA)

3.0-MW Turbine Layout
(Minimum Turbine Layout)

Montague Wind Power Facility

Site Boundary
Micrositing Corridor
House
36-dBA Noise Contour
50-dBA Noise Contour

Proposed Permanent Facilities

Proposed Turbine
Proposed 5-Acre Facility Collector Substation

Existing Facilities

Public Road
Private Road
Major Railroad Line
County Boundary

N
W E
S

0 1 2 3
Miles

IBERDROLA RENEWABLES

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EXHIBIT Y

CARBON DIOXIDE EMISSIONS

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

Exhibit Y requires information about a base load gas plant, a non-base load power plant, or a nongenerating energy facility that emits carbon dioxide. Exhibit Y is not required for this application because Iberdrola Renewables, Inc. (Applicant) is not proposing to construct any facilities that emit carbon dioxide.

EXHIBIT Z

COOLING TOWERS
OAR 345-021-0010(1)(z)

Exhibit Z requires information about evaporative cooling towers and cooling tower plumes. Exhibit Z is not required for this application because Iberdrola Renewables, Inc. (Applicant) is not proposing to construct an evaporative cooling tower.

EXHIBIT AA

ELECTRIC TRANSMISSION LINE

OAR 345-021-0010(1)(aa)
OAR 345-024-0090(1),(2)

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ATTACHMENTS

AA-1 Results of the Bonneville Power Administration Corona and Field Effect Program for Monopole 34.5-kV Collector Lines
AA-2 Results of the EPRI EMF Workstation: ENVIRO Program for H-Frame 34.5-kV Collector Lines
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AA.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). No more than 269 turbines will be located at the Facility site, depending on the final turbine size and vendor (as further described in Exhibit B, Section B.1.3). Please refer to Exhibit C, Figures C-1, C-2, and C-3, and C-4 through C-7, for maps of the site vicinity, Facility location, and Facility components, respectively.

OAR 345-021-0010(1)(aa) *If the proposed facility includes an electric transmission line:*

AA.1.1 Response: Please refer to responses in Section AA.2 below.

AA.1 ELECTRIC AND MAGNETIC FIELDS

OAR 345-021-0010(1)(aa)(A) *Information about the expected electric and magnetic fields, including:*

AA.1.1 Distance from Transmission Line Centerline to Edge of Right-of-Way

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

Response:

AA.1.1.1 230-kV Overhead Transmission Line

A new overhead 230-kilovolt (kV) transmission line will connect the Facility to the existing 500-kV Bonneville Power Administration (BPA) Slatt-Buckley transmission line at the Slatt Interconnection Substation (Slatt substation) located approximately 1.5 miles southeast of Arlington, Oregon. The new overhead 230-kV transmission line will run from the Facility's western collector substation to the central collector substation and from the central collector substation to BPA's Slatt substation. The overhead 230-kV transmission line segment from the western collector substation to the central collector substation is approximately 8.2 miles or up to 9 miles in length. Three potential routes are under evaluation for the transmission line segment from the central collector substation to the Slatt substation: a preferred transmission line route that is approximately 8.8 miles long, an Alternate 1 route that is approximately 8.2 miles long, and an Alternate 2 route that is approximately 8.8 miles long. The portion of the transmission line from the central collector substation to the Slatt substation will be up to 10 miles in length. The three routes are shown in Figures C-4 and C-6.

The proposed corridor for the transmission line will not include public rights-of-way. The Applicant has chosen to utilize corridors made available in its private land leases and easements rather than utilize public rights-of-way to avoid the possibility that the County may, at a later date, wish to expand public roads within existing public rights-of-way. Accordingly, for the overhead 230-kV transmission line the distance between the centerline and the edge of the right-of-way is undefined.

AA.1.1.2 34.5-kV Collector Cables

The power collection system portion of the Facility's electrical system consists of the collector cable system that will be installed along and between the turbine strings. This system will collect power generated by the individual wind turbines and route the power to the collector substations for delivery into the utility power grid. Electricity is generated by the turbines at 600 to 1,000 volts. A transformer adjacent to each tower transforms the power to 34.5 kV. The power collection system will operate at 34.5 kV.

The majority of the collector cable system will be buried directly in the soil approximately 3 feet below the ground surface. However, where site-specific considerations require, the collector system may be aboveground. Using aboveground structures allows the collector lines to "span" canyons and intermittent streams and thus to reduce environmental impacts. The overhead pole structures will generally be up to 100 feet tall, depending on terrain.

Approximately 76 miles of collector cables will be placed underground, and approximately 15 miles will run on overhead pole structures.

For the 34.5-kV collector cables, the distance between the centerline and the edge of the right-of-way is undefined. The collector system lines and any overhead collector cables will occupy private land pursuant to leases or easements with landowners; the leases will authorize placement of the cables and restrict inconsistent or competing uses of the property, but will not contain any defined right-of-way with a fixed width. Therefore, no new right-of-way will be required and no existing right-of-way will be widened.

AA.1.2 Types of Occupied Structures within 200 Feet of Centerline of Proposed Transmission Lines

(ii) The type of each occupied structure, including but not limited to residences, commercial establishments, industrial facilities, schools, daycare centers and hospitals, within 200 feet on each side of the proposed center line of each proposed transmission line;

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

Response:

AA.1.2.1 230-kV Overhead Transmission Line

There are no known occupied buildings, residences, or other sensitive receptors within 200 feet on either side of the centerline of the preferred overhead transmission line route. Therefore, the potential for human exposure to electric and magnetic fields (EMF) from the 230-kV transmission line is negligible.

AA.1.2.2 34.5-kV Collector Cables

There are no occupied buildings, residences, or other sensitive receptors within 200 feet on either side of the centerline of the proposed overhead collector lines. Therefore, the

potential for human exposure to electric and magnetic fields (EMF) from these overhead 34.5-kV collector lines is negligible.

AA.1.3 Graphs of Electric and Magnetic Field Levels

(iv) At representative locations along each proposed transmission line, a graph of the predicted electric and magnetic fields levels from the proposed center line to 200 feet on each side of the proposed center line;

Response:

AA.1.3.1 Overview of Electric and Magnetic Fields Produced by Power Lines

All electric utility wires and devices generate alternating EMF. The earth itself generates steady-state magnetic and electric fields. The EMF produced by the alternating current (AC) electrical power system in the United States has a frequency of 60 hertz (Hz), meaning that the fields change from positive to negative and back to positive, 60 times per second.

In AC power systems, voltage swings positive to negative and back to positive, a 360-degree cycle, 60 times every second. Current follows the voltage, flowing forward, reversing direction, and returning to the forward direction, again a 360-degree cycle, 60 times every second. Each AC three-phase circuit carries power over three conductors. One phase of the circuit is carried by each of the three conductors. The AC voltage and current in each phase conductor are out of sync with the other two phases by 120 degrees, or one-third of the 360-degree cycle. The fields from these conductors tend to cancel out because of the phase difference. However, when a person stands under a transmission line or over a buried circuit of underground lines, one conductor is always significantly closer and will most likely contribute a net uncanceled field at the person's location assuming the three-phase currents are equal.

Electric Fields

Electric fields around transmission lines are produced by electrical charges, measured as voltage, on the energized conductor. Electric field strength is directly proportional to the line's voltage; that is, increased voltage produces a stronger electric field. The electric field is inversely proportional to the distance a sensor is from the conductors, so that the electric field strength declines as the distance from the conductor increases. For this transmission line, the voltage and electric field alternate at a frequency of 60 Hz. The strength of the electric field is measured in units of kilovolts per meter (kV/m). The voltage, and therefore the electric field, around a transmission line remains practically steady and is not affected by the common daily and seasonal fluctuations in usage of electricity by customers.

Magnetic Fields

Magnetic fields around transmission lines are produced by the electrical load, or the amount of current flow, through the conductors measured in terms of amperage. Like

the electric field, the magnetic field alternates at a frequency of 60 Hz. The magnetic field strength is directly proportional to the amperage; that is, increased power flow results in increased amperage which produces a stronger magnetic field. The magnetic field is inversely proportional to the sensor's distance from the conductors. Also, like the electric field, the magnetic field strength declines as the distance from the conductor increases. Magnetic fields are expressed in units of milligauss (mG). However, unlike voltage, the amperage and therefore the magnetic field around a transmission line, fluctuate hourly and daily as the amount of current flow varies. The strength of the magnetic field depends on the current in the conductor, the geometry of the construction, the degree of cancellation from other conductors, and the distance from the conductors or cables.

AA.1.3.2 EMF Calculations for 34.5-kV Underground Collection System

For an underground 34.5-kV circuit, the electric field is totally contained within the insulation of the cable and the soil over the line. Each cable has a semiconducting insulation shield and a grounded concentric neutral, made up of multiple strands of copper wire that encircle the cable just under the outer jacket. This means that the cable jacket has no measurable voltage to ground, or between other cable jackets, and that the cables can be touched safely, although it is not recommended. Because the electric field is contained within the buried cables, no electric field is measurable at the surface of the ground.

Underground cables and the soil in which they are buried do not contain the magnetic fields generated in the conductors. Therefore, the net magnetic field of buried cables is measurable on the surface of the ground above the cables.

AA.1.3.3 EMF Calculations for 34.5-kV and 230-kV Overhead Transmission Lines

Figure AA-1 illustrates the typical proposed monopole overhead structural configuration of the 34.5-kV single-circuit distribution collection line with a shield wire. The ground-level magnetic field intensity across the corridor is determined by the currents and geometry of these typical facilities.

Figure AA-2 illustrates the typical proposed monopole overhead structural configuration of the 34.5-kV double-circuit distribution line with a shield wire. For this construction, the phase positions on one side of the structure are reversed to achieve better electric and magnetic field cancellation.

Figure AA-3 illustrates the typical proposed H-frame overhead structural configuration of the 34.5-kV single-circuit distribution collection line with a ground wire.

Figure AA-4 illustrates the typical proposed H-frame overhead structural configuration of the 34.5-kV double-circuit distribution line with a ground wire. For this construction, the phase positions on one side of the structure are reversed to achieve better electric and magnetic field cancellation.

Figure AA-5 illustrates the typical proposed monopole overhead structural configuration of the 230-kV single-circuit distribution line with a shield wire.

Figure AA-6 illustrates the typical proposed H-frame overhead structural configuration of the 230-kV single-circuit distribution line with a ground wire.

Line Loads for EMF Calculation

It is important that any discussion of EMF include the assumptions used to calculate these fields. It is also important to remember that EMF in the vicinity of the power lines varies with regard to line design, line loading, distance from the line, and other factors. The electric field depends upon line voltage, which remains nearly constant for a transmission line in normal operation. The magnetic field is proportional to line loading (amperage), which varies as power generation is changed by the intensity of the wind. Maximum magnetic fields are produced at the maximum (peak) conductor currents.

The entire 34.5-kV overhead line in this study is rated for a nominal voltage of 34.5-kV measured phase to phase. The peak line loading value assumed for each overhead circuit is 60 megavolt amperes (MVA), or approximately 1,000 amperes per phase conductor. This value is used in the EMF study for both the single and double circuits, and both the monopole and H-frame support structures. The conductor for both types of support structures is assumed to be a single conductor per phase of 1,590 thousand circular mil (kcmil) aluminum conductor steel reinforced (ACSR) "Falcon" with a diameter of 1.545 inches.

The segment of the overhead 230-kV transmission line connecting the Facility to BPA's existing 500-kV line, and the segment connecting the collector substation in the western portion of the site boundary to a central collector substation, are rated for a nominal voltage of 230-kV measured from phase to phase. The peak line loading value assumed for the overhead 230-kV transmission line connecting the Facility to BPA's existing 500-kV line is 404 MW, or approximately 1,014 amperes per phase conductor. This value is used in the EMF study for both the monopole and H-frame support structures. The peak line loading value assumed for the overhead 230-kV transmission line connecting the collector substation in the western portion of the site boundary to a central collector substation is 120 MW, or approximately 300 amperes per phase conductor. This value is used in the EMF study for both the monopole and H-frame support structures. The conductor for both types of support structures is assumed to be a single conductor per phase of 954 kcmil ACSR "Rail" with a diameter of 1.165 inches.

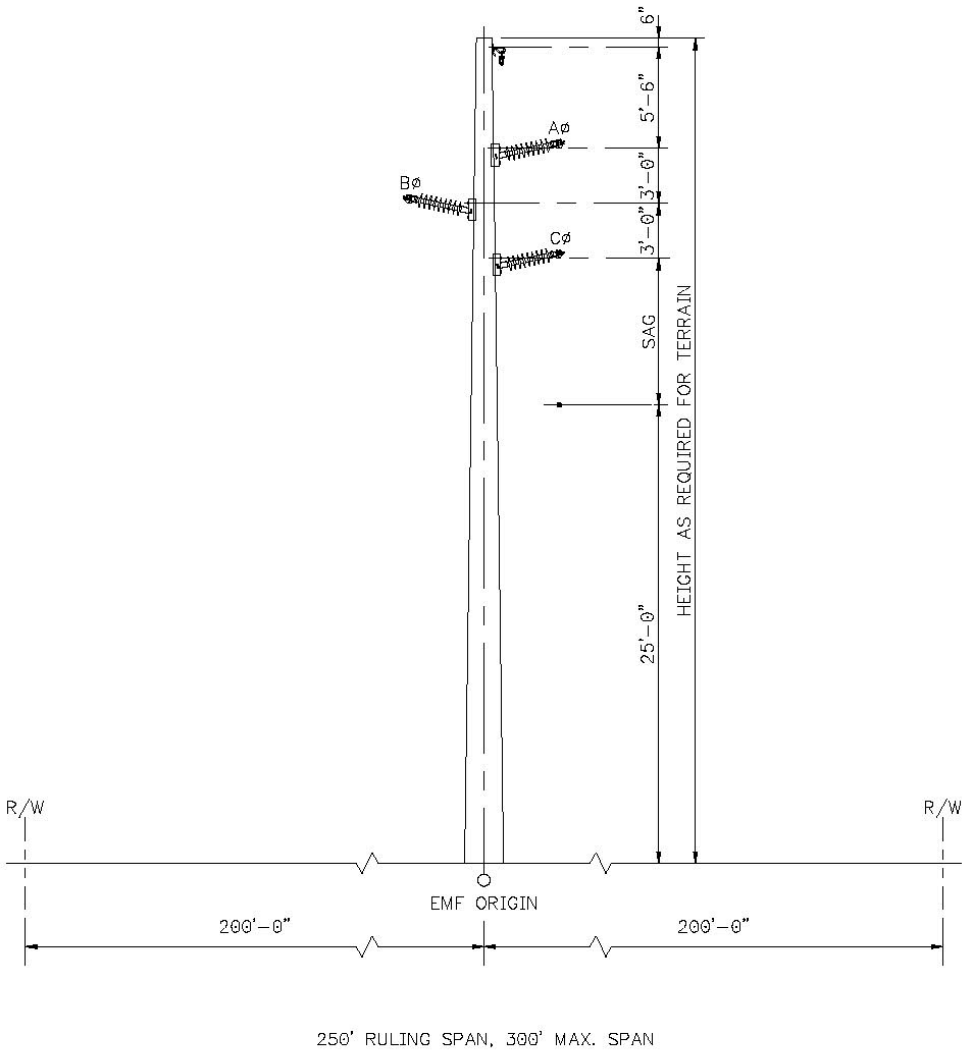

Figure AA-1. Typical Overhead 34.5-kV Single-Circuit, Monopole Support Structure

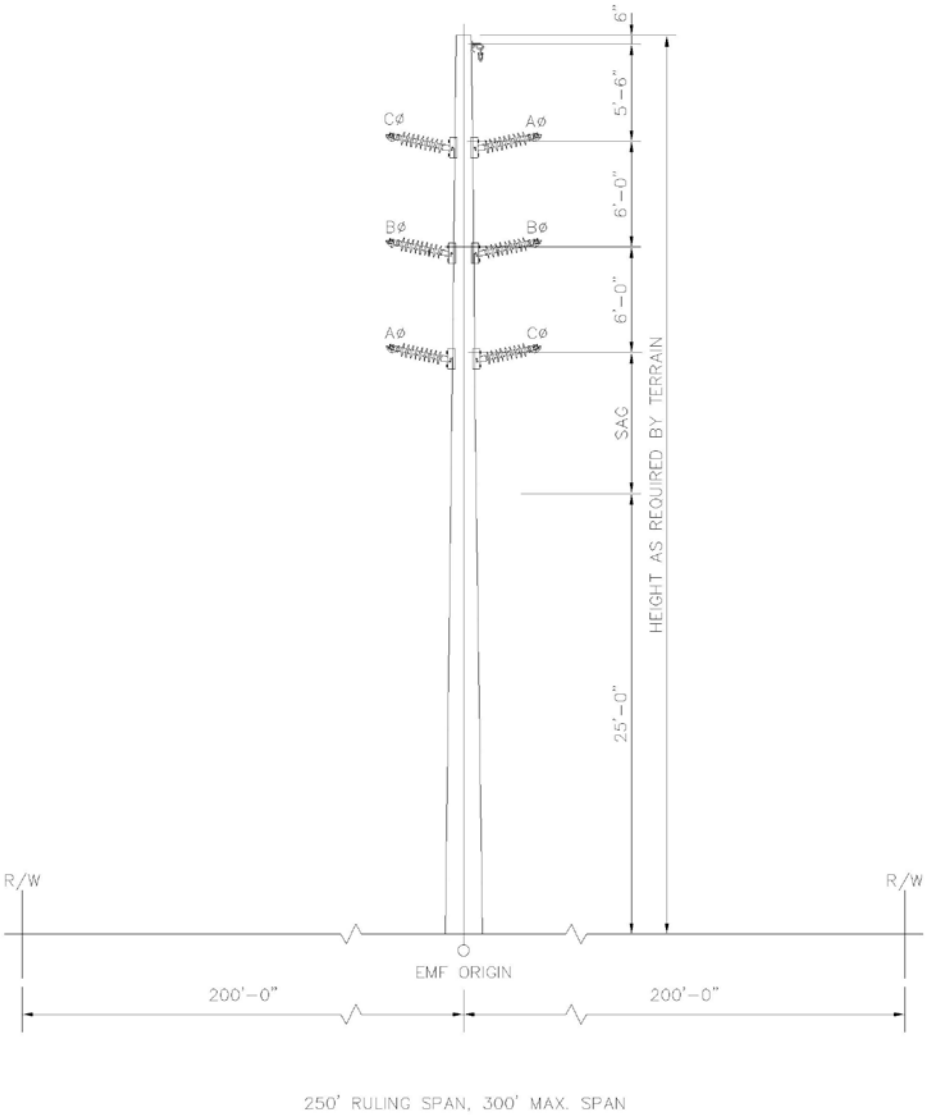

Figure AA-2. Typical Overhead 34.5-kV Double-Circuit, Monopole Support Structure

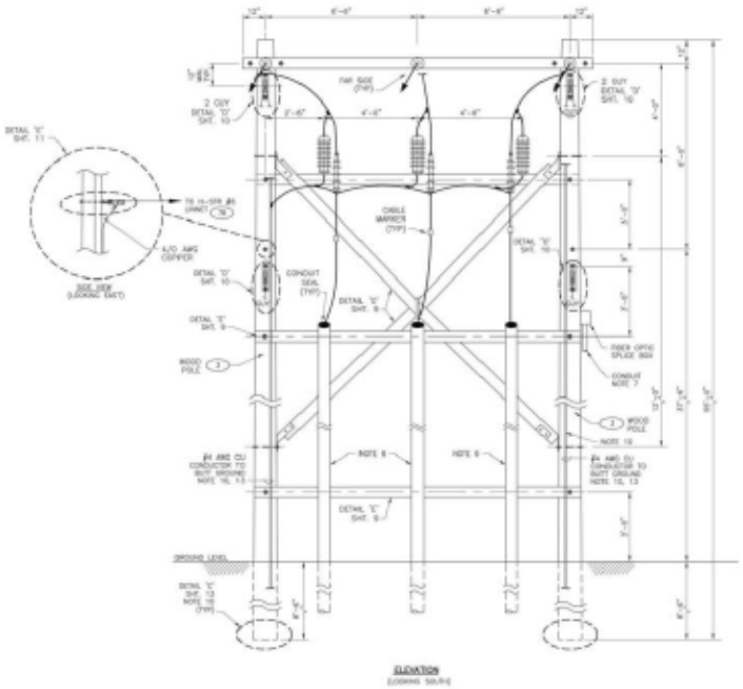

Figure AA-3. Typical Overhead 34.5-kV Single-Circuit, H-Frame Support Structure

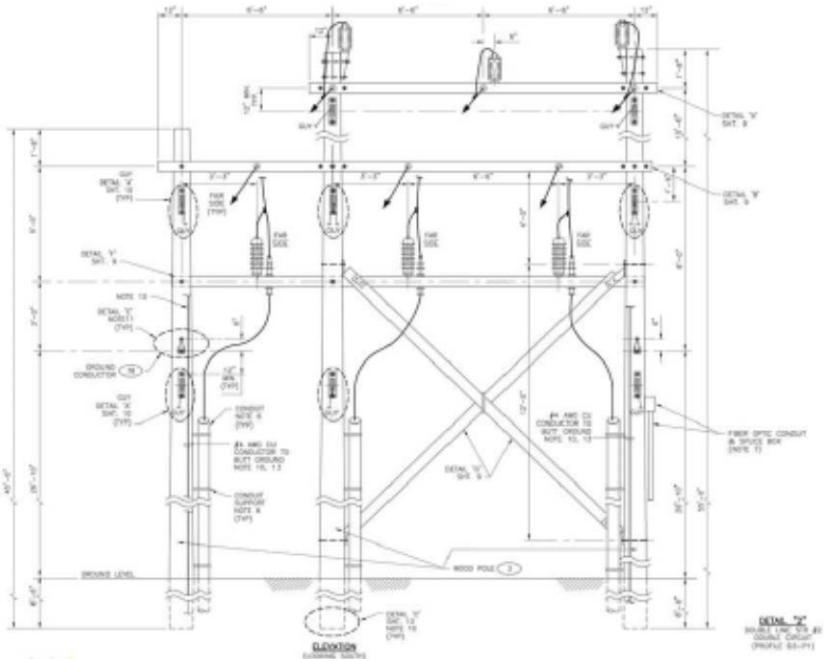

Figure AA-4. Typical Overhead 34.5-kV Double-Circuit, H-Frame Support Structure

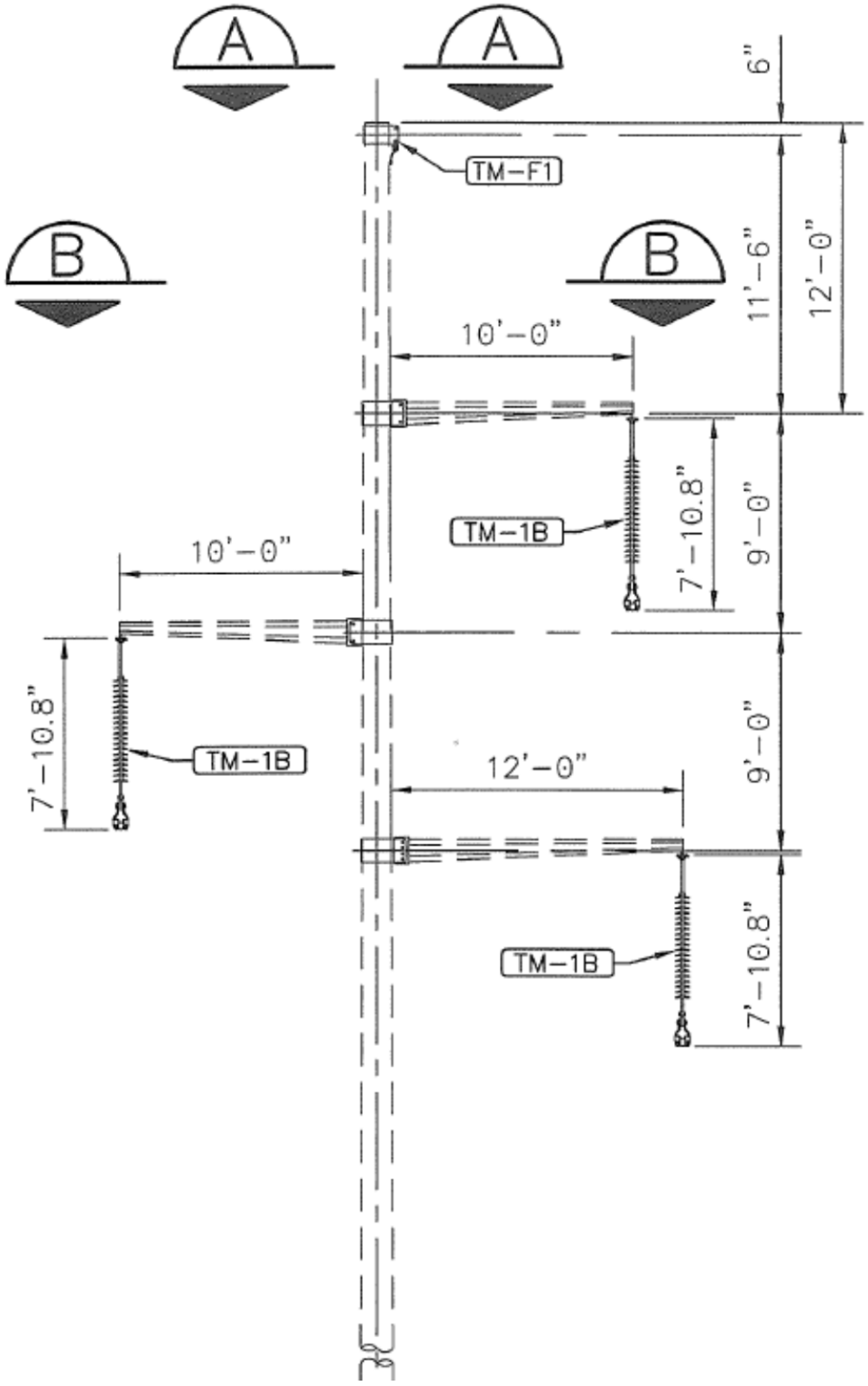

Figure AA-5. Typical Overhead 230-kV Single-Circuit, Monopole Support Structure

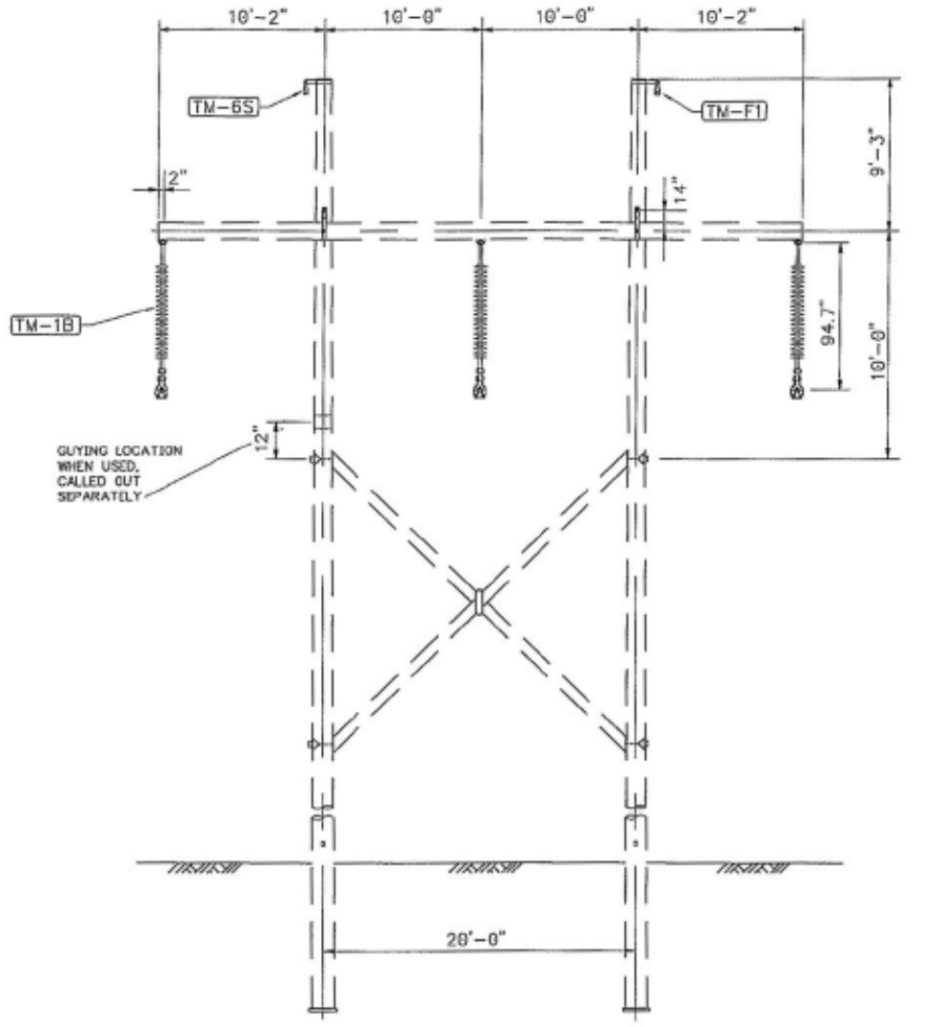

Figure AA-6. Typical Overhead 230-kV Single-Circuit, H-Frame Support Structure

Calculation Methods

The calculation methods used for the analysis are provided in Chapter 8 of the *Transmission Line Reference Book, 345-kV and Above* (Electric Power Research Institute [EPRI], 1985, Third Edition). The software tool program used for the monopole overhead 34.5-kV analyses, called "Corona and Field Effect Program (Version 3)," was developed by BPA and is based on the methods and equations of the *Transmission Line Reference Book*. This program and others like it have been used to predict electric and magnetic field levels for many years. The predicted values of field strength from these programs have been consistently confirmed by field measurements. The results of the BPA Corona and Field Effect Program are provided in Attachment AA-1.

The software tool program used for the H-frame overhead 34.5-kV analyses and 230-kV analyses, called "EMFWorkstation: ENVIRO (Version 3.52)," is a new Windows-based model developed by EPRI that uses the same BPA calculation algorithms as the Corona and Field Effect Program, with a friendlier interface. The results of the ENVIRO Program are provided in Attachments AA-2 and AA-3.

To estimate the maximum fields, calculations are performed at mid-span where the conductor has sagged to its lowest point between structures (the estimated maximum sag point). This section addresses the estimates of the maximum possible 60-Hz AC electric and magnetic field strengths that will be produced by the proposed 34.5-kV and 230-kV overhead facilities. These estimates are computed for a height of 1 meter (3.3 feet) above the ground on the proposed line routes.

Results of 34.5-KV Overhead EMF Calculations

Table AA-1 gives the calculated values of the magnetic and the electric field at the centerline of the collector line and at 200 feet either side of the centerline which is the closest distance a residence or other sensitive receptor would be located. The plots are for the projected maximum currents during peak load. The values are computed with conductors at maximum sag (minimum conductor ground clearance), which is assumed to be 25 feet for the single and double-circuit 34.5-kV monopole support structures and single-circuit 34.5-kV H-frame support structure, and 20 feet for the double-circuit 34.5-kV H-frame support structure. The actual magnetic field values vary, as load varies hourly, daily, seasonally, and as conductor sag changes with ambient temperature and where the receptor is located between the transmission structures (the magnetic fields will be less at the structures since the conductors will be higher off the ground). The levels shown represent the highest magnetic fields expected for the proposed project. Average fields along the ground between poles, and over a year's time would be considerably less than the peak or even the typical values shown.

TABLE AA-1. CALCULATED MAXIMUM MAGNETIC AND ELECTRIC FIELD VALUES FOR 34.5-kV OVERHEAD CIRCUITS

Support Structure	Figure	Voltage	Magnetic Field			Electric Field		
			(mGauss)			(kV/M)		
			Left Side (200')	Centerline	Right Side (200')	Left Side (200')	Centerline	Right Side (200')
Monopole	AA-7 AA-8	34.5-kV Single-Circuit	1.45	98.7	1.46	0.003	0.302	0.003
	AA-9 AA-10	34.5-kV Double-Circuit	0.15	59.8	0.15	0.002	0.221	0.002
H-Frame	AA-11 AA-12	34.5-kV Single-Circuit	0.49	136.5	3.46	0.002	0.123	0.002
	AA-13 AA-14	34.5-kV Double-Circuit	1.05	130.3	1.03	0.002	0.139	0.003

As shown in Table AA-1, magnetic field and electric field values are higher beneath the collector line than at 200 feet either side of the line.

These results are plotted on the graphs shown in Figures AA-7 through AA-14. For the 34.5-kV single-circuit, monopole support structure, see Figure AA-7 for the magnetic field profile and Figure AA-8 for the electric field graph. For the 34.5-kV double-circuit, monopole support structure, see Figure AA-9 for the magnetic field profile and Figure AA-10 for the electric field graph. For the 34.5-kV single-circuit, H-frame support structure, see Figure AA-11 for the magnetic field profile and Figure AA-12 for the electric field graph. For the 34.5-kV double-circuit, H-frame support structure, see Figure AA-13 for the magnetic field profile and Figure AA-14 for the electric field graph.

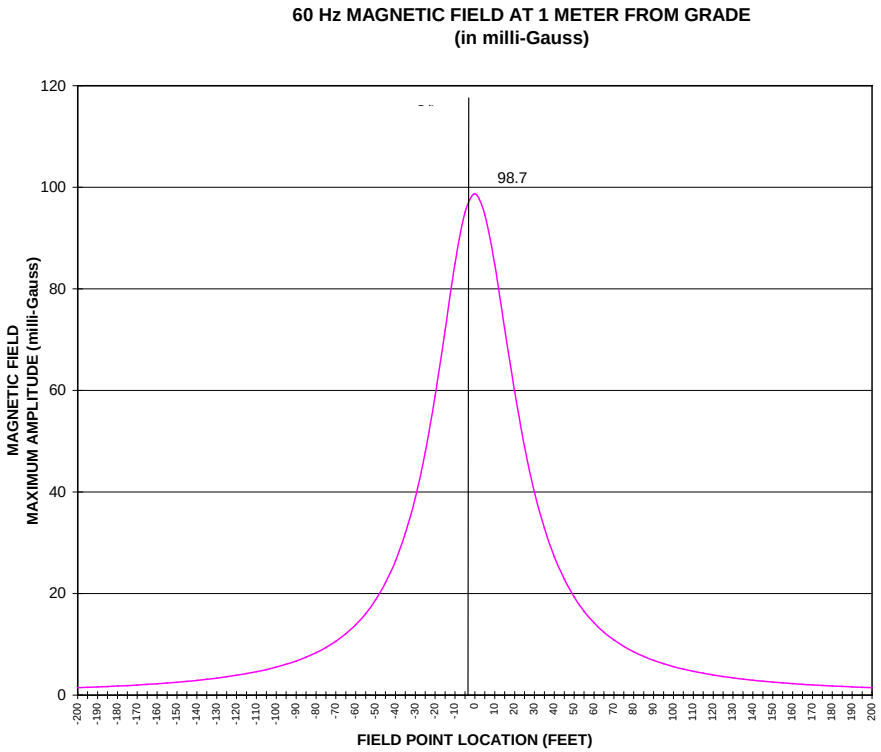

Figure AA-7. Magnetic Field Profile for 34.5-kV Single-Circuit, Monopole Support Structure

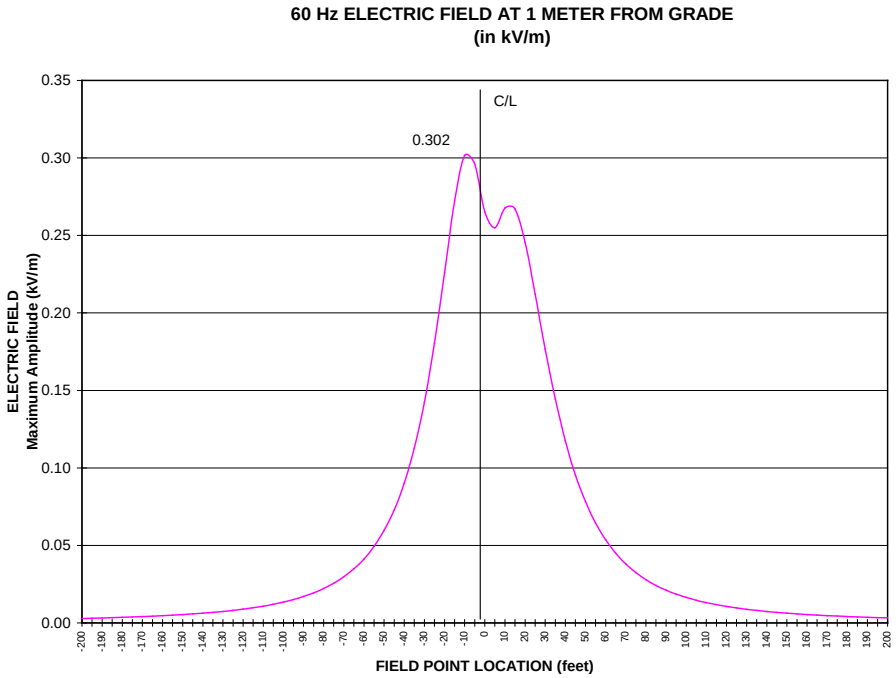

Figure AA-8. Electric Field Profile for 34.5-kV Single-Circuit, Monopole Support Structure

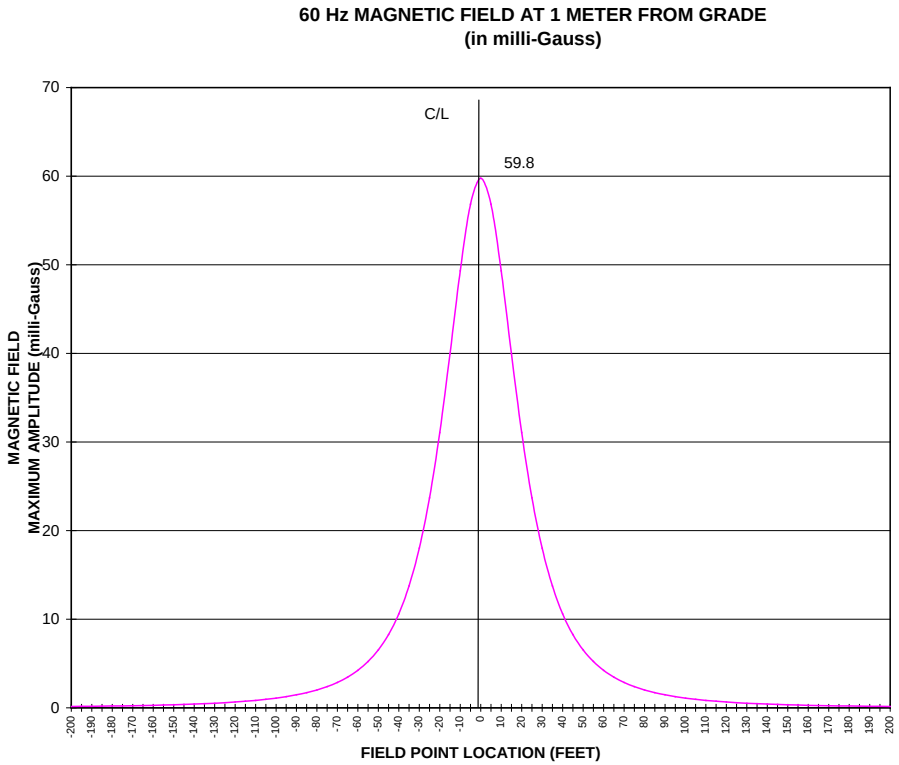

Figure AA-9. Magnetic Field Profile for 34.5-kV Double-Circuit, Monopole Support Structure

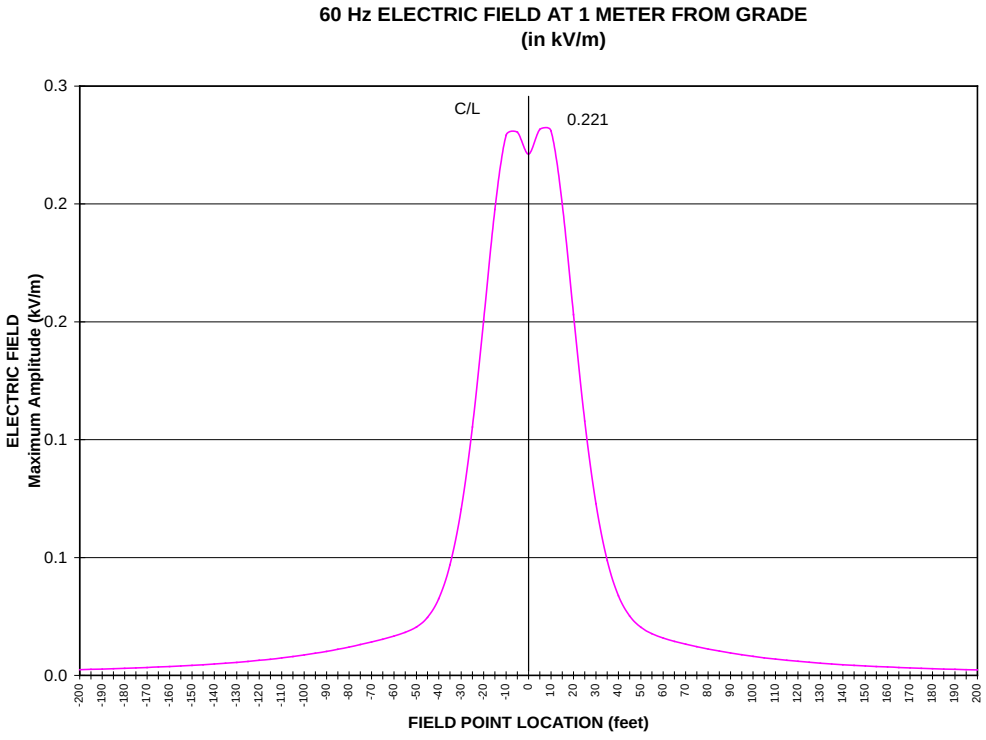

Figure AA-10. Electric Field Profile for 34.5-kV Double-Circuit, Monopole Support Structure

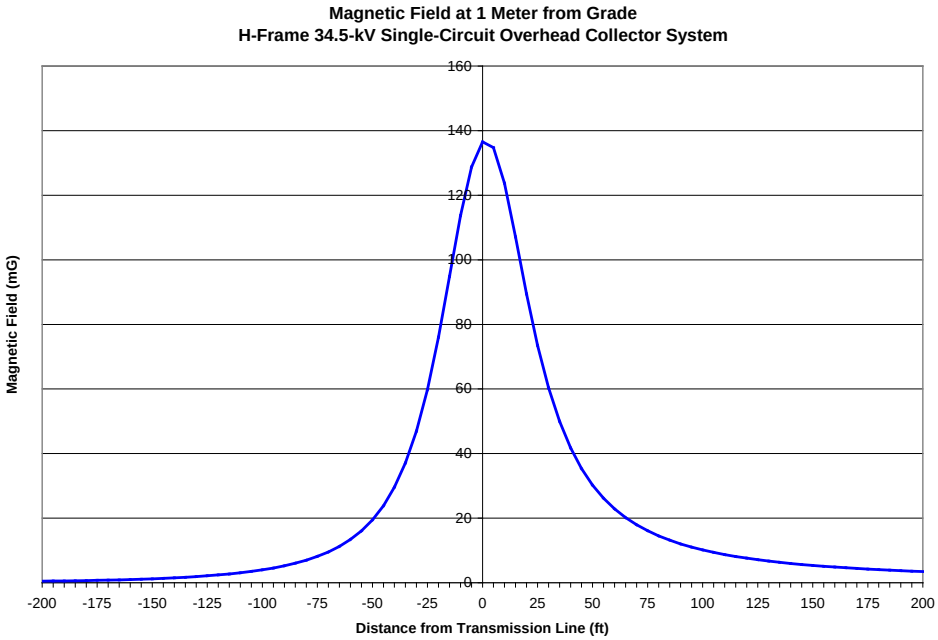

Figure AA-11. Magnetic Field Profile for 34.5-kV Single-Circuit, H-Frame Support Structure

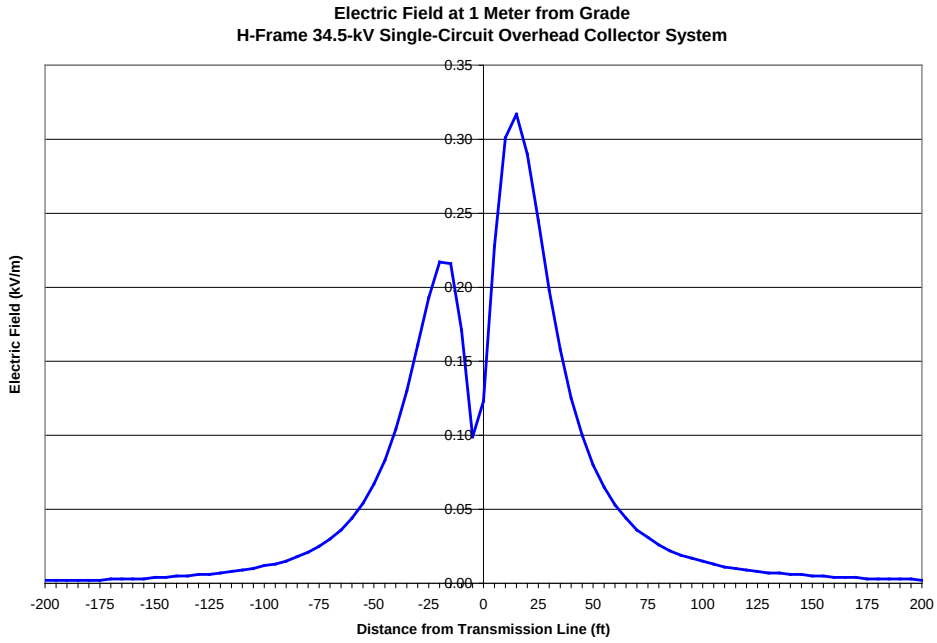

Figure AA-12. Electric Field Profile for 34.5-kV Single-Circuit, H-Frame Support Structure

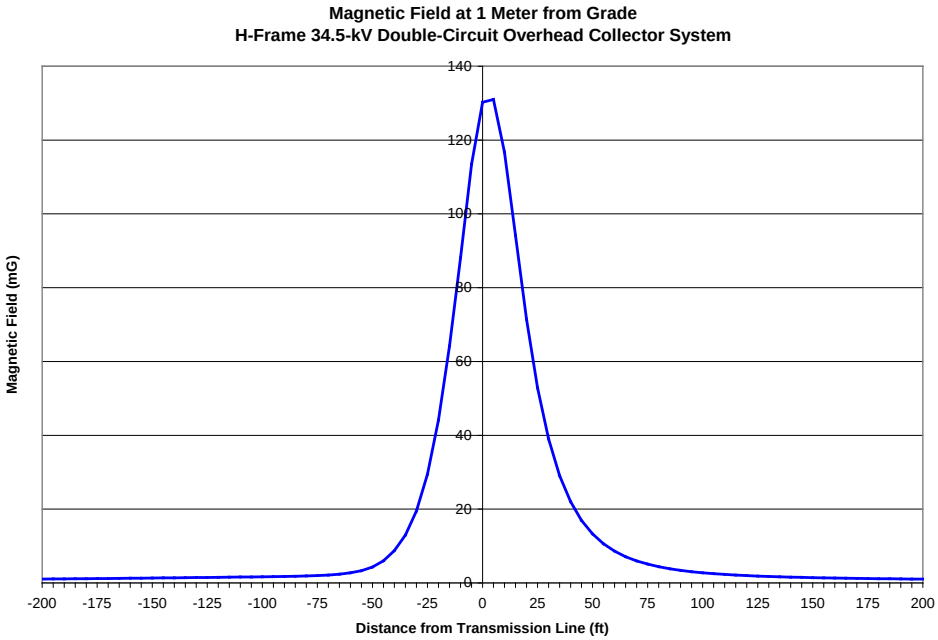

Figure AA-13. Magnetic Field Profile for 34.5-kV Double-Circuit, H-Frame Support Structure

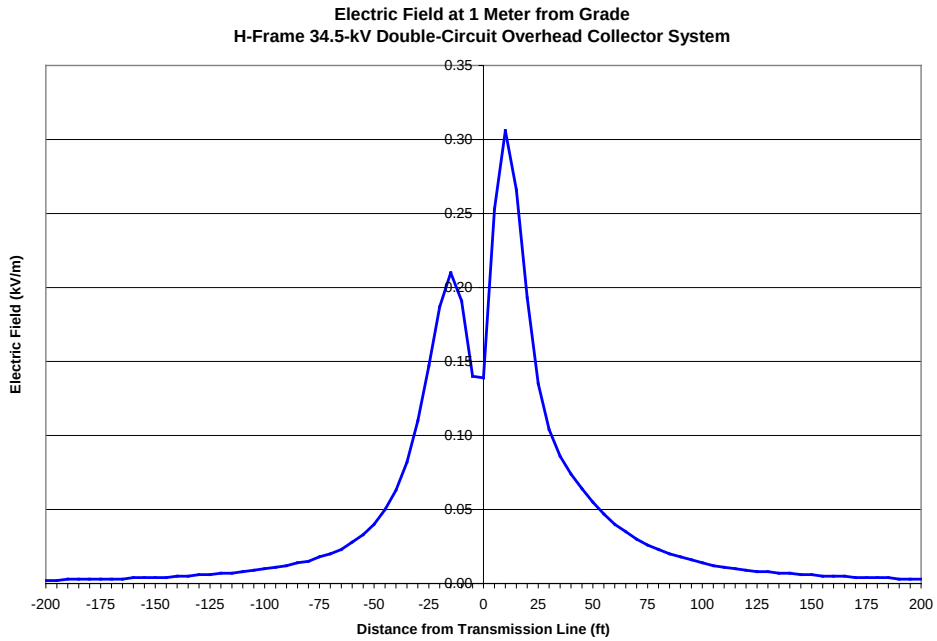

Figure AA-14. Electric Field Profile for 34.5-kV Double-Circuit, H-Frame Support Structure

Results of 230-KV Overhead EMF Calculations

For the line connecting the Facility to BPA's existing 500-kV line, Table AA-2 gives the calculated values of the magnetic and the electric field at the centerline of the transmission line and at 200 feet either side of the centerline, which is the closest distance a residence or other sensitive structure could be located. For the line connecting the collector substation in the western portion of the site boundary to a central collector substation, Table AA-3 gives the calculated values of the magnetic and the electric field at the centerline of the transmission line and at 200 feet either side of the centerline, which is the closest distance a residence or other sensitive structure could be located. The plots are for the projected maximum currents during peak load to allow for use of the same line by future wind farms and the typical line loading anticipated to be produced by the Facility operating at full capacity. The values are computed with conductors at maximum sag (minimum conductor ground clearance). The actual magnetic field values vary, as load varies hourly, daily, seasonally, and as conductor sag changes with ambient temperature and where the receptor is located between the transmission structures (the magnetic fields will be less at the structures since the conductors will be higher off the ground). The levels shown represent the highest magnetic fields expected for the proposed project. Average fields along the ground between poles, and over a year's time would be considerably less than the peak or even the typical values shown.

TABLE AA-2**.** CALCULATED MAXIMUM AND TYPICAL MAGNETIC AND ELECTRIC FIELD VALUES FOR 230-kV CIRCUIT CONNECTING CENTRAL COLLECTOR TO BPA EXISTING 500-KV

Support Structure	Figure	Voltage	Magnetic Field (mGauss)			Electric Field (kV/M)		
			Left Side (200')	Centerline	Right Side (200')	Left Side (200')	Centerline	Right Side (200')
Monopole	AA-15 AA-16	230-kV Single-Circuit Peak Load (1,014 Amps)	3.63	126.9	4.20	0.040	1.45	0.040
H-Frame	AA-17 AA-18		5.83	201.9	5.49	0.035	1.31	0.035

As shown in Table AA-2, magnetic field and electric field values are higher beneath the transmission line than at 200 feet either side of the line.

These results are plotted on the graphs shown in Figures AA-15 and AA-18. For the monopole support structure, see Figure AA-15 for the magnetic field profile and Figure AA-16 for the electric field graph. For the H-frame support structure, see Figure AA-17 for the magnetic field profile and Figure AA-18 for the electric field graph.

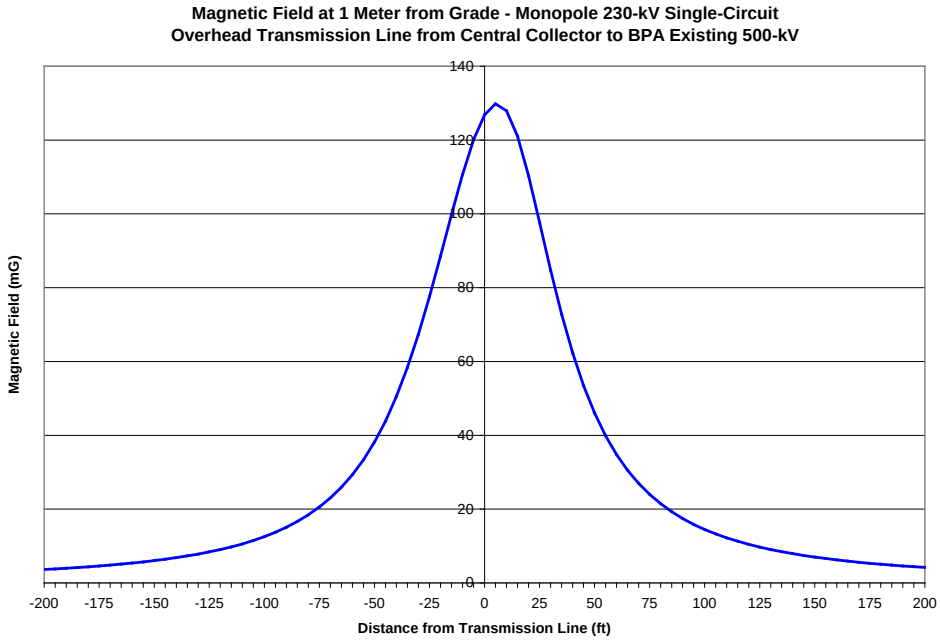

Figure AA-15. Magnetic Field Profile for 230-kV Single-Circuit, Monopole Support Structure, Central Collector to BPA Existing 500-kV

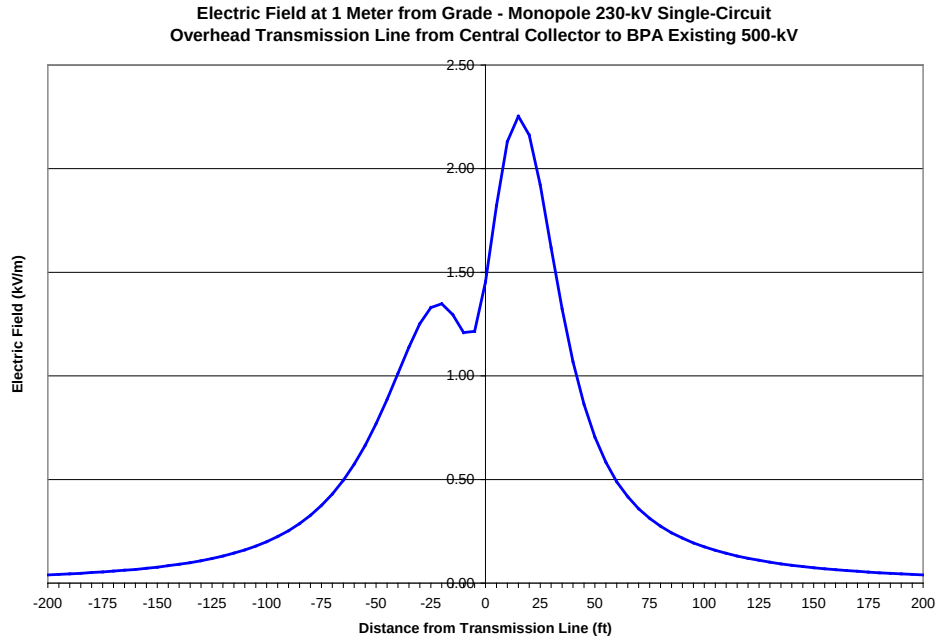

Figure AA-16. Electric Field Profile for 230-kV Single-Circuit, Monopole Support Structure, Central Collector to BPA Existing 500-kV

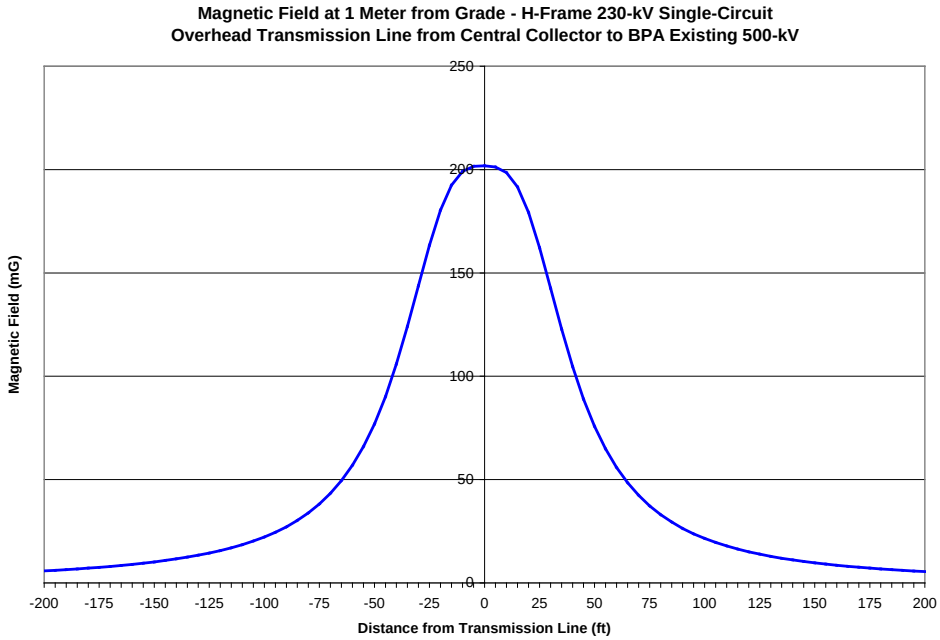

Figure AA-17. Magnetic Field Profile for 230-kV Single-Circuit, H-Frame Support Structure, Central Collector to BPA Existing 500-kV

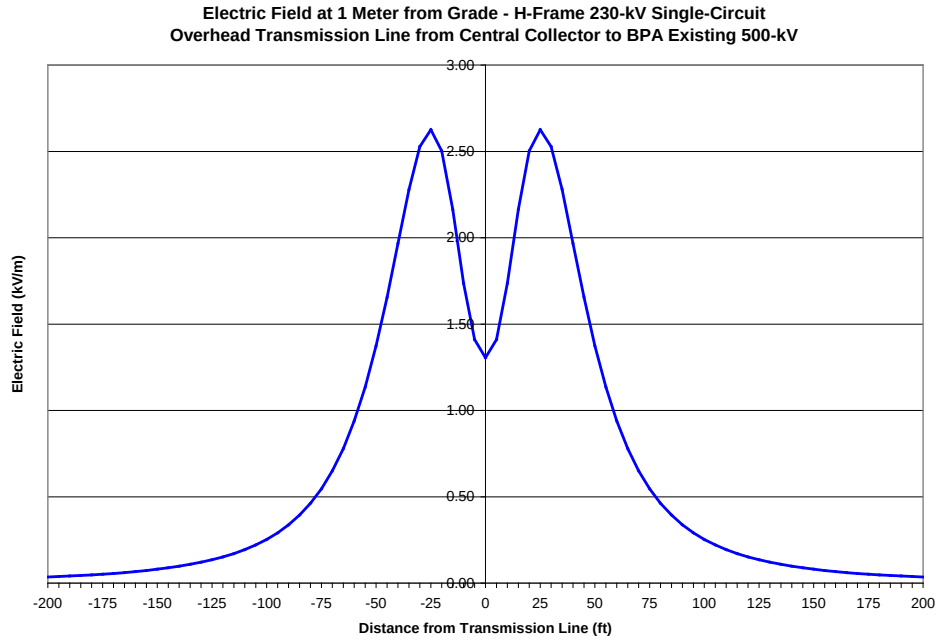

Figure AA-18. Electric Field Profile for 230-kV Single-Circuit, H-Frame Support Structure, Central Collector to BPA Existing 500-kV

TABLE AA-3. CALCULATED MAXIMUM AND TYPICAL MAGNETIC AND ELECTRIC FIELD VALUES FOR 230-kV CIRCUIT CONNECTING WESTERN COLLECTOR TO CENTRAL COLLECTOR

Support Structure	Figure	Voltage	Magnetic Field (mGauss)			Electric Field (kV/M)		
			Left Side (200')	Centerline	Right Side (200')	Left Side (200')	Centerline	Right Side (200')
Monopole	AA-19 AA-20	230-kV Single-Circuit Peak Load (300 Amps)	1.08	37.7	1.25	0.040	1.45	0.040
H-Frame	AA-21 AA-22		1.73	59.9	1.63	0.035	1.31	0.035

As shown in Table AA-3, magnetic field and electric field values are higher beneath the transmission line than at 200 feet either side of the line.

These results are plotted on the graphs shown in Figures AA-19 and AA-22. For the monopole support structure, see Figure AA-19 for the magnetic field profile and Figure AA-20 for the electric field graph. For the H-frame support structure, see Figure AA-21 for the magnetic field profile and Figure AA-22 for the electric field graph.

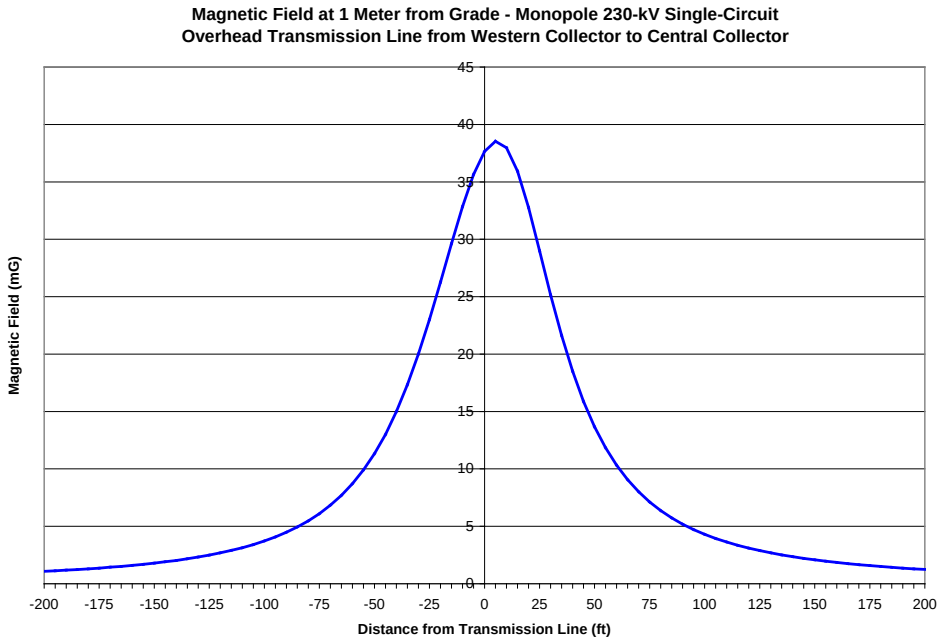

Figure AA-19. Magnetic Field Profile for 230-kV Single-Circuit, Monopole Support Structure, Western Collector to Central Collector

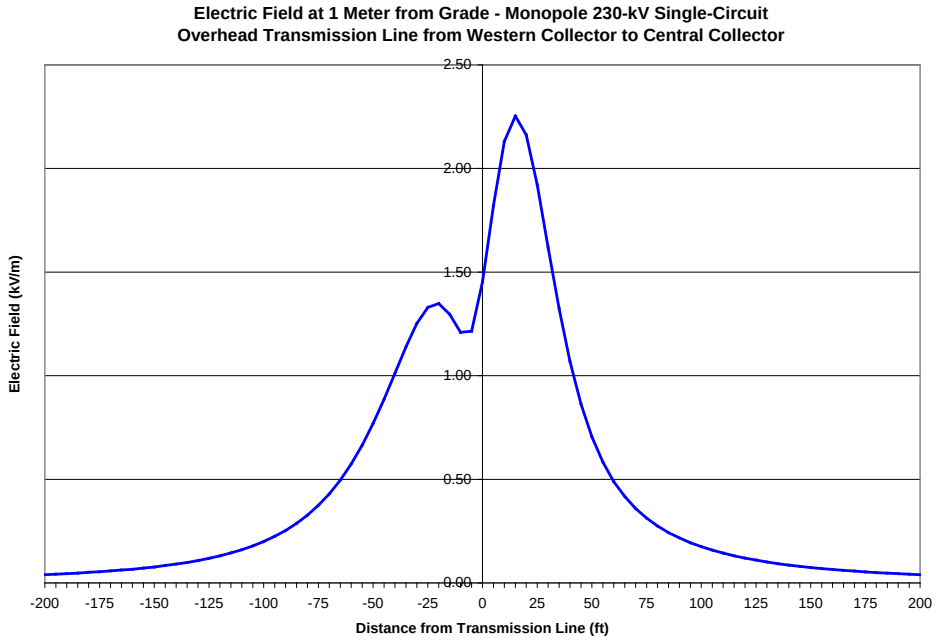

Figure AA-20. Electric Field Profile for 230-kV Single-Circuit, Monopole Support Structure, Western Collector to Central Collector

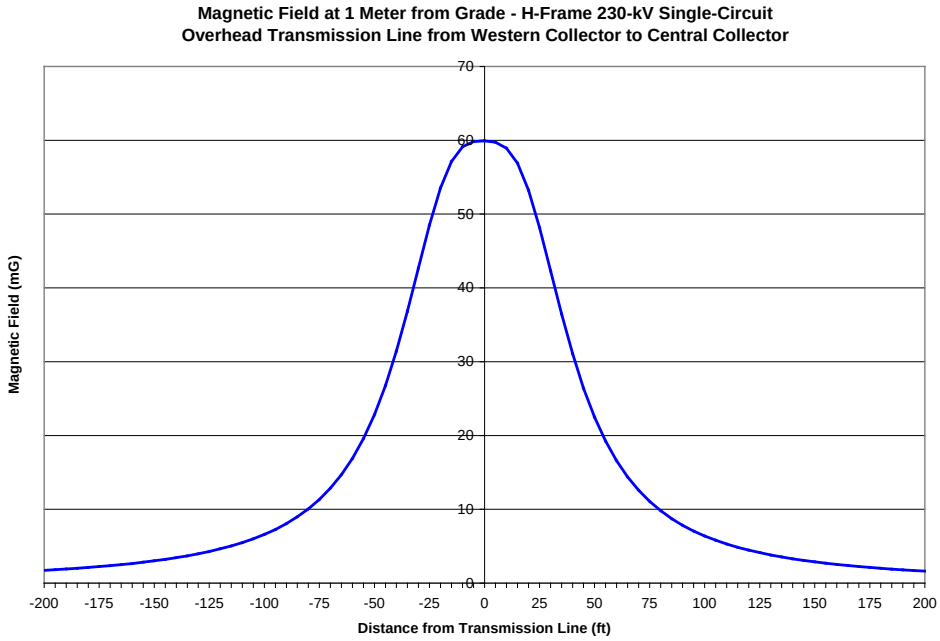

Figure AA-21. Magnetic Field Profile for 230-kV Single-Circuit, H-Frame Support Structure, Western Collector to Central Collector

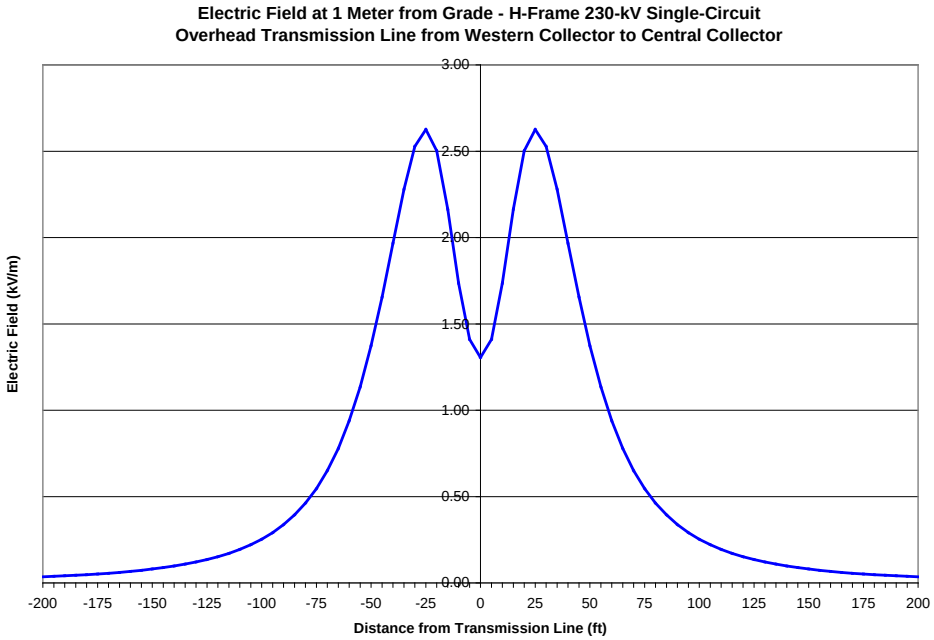

Figure AA-22. Electric Field Profile for 230-kV Single-Circuit, H-Frame Monopole Support Structure, Western Collector to Central Collector

AA.1.3.4 Measures Proposed to Reduce Electric or Magnetic Field Levels

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

Response: For the 34.5-kV and 230-kV overhead single-circuit lines, the lines will be located no closer than 200 feet from occupied buildings. In addition, the electric and magnetic fields will be reduced by the triangular conductor configuration for the monopole design.

For the 34.5-kV overhead double-circuit lines, measures will be taken to reduce EMF. Mitigation of EMF will involve the transposing of conductors to improve the cancellation of fields. For the monopole double-circuit 34.5-kV overhead lines, conductors will be arranged, with A, B, and C phases, from top to bottom, on one side of the pole, and with C, B, and A phases, from top to bottom, on the other side of the pole. For the H-frame double-circuit 34.5-kV overhead lines, conductors will be arranged, with A, B, and C phases, from left to right, on the top of the pole, and with C, B, and A phases, from left to right, on the bottom of the pole. Construction drawings will clearly designate the intended phase positions and connections.

AA.1.3.5 Assumptions and Methods Used in Electric and Magnetic Field Analyses

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

Response: See Section AA.2.3.3. Attachment AA-1 shows data inputs and assumptions used in the electric and magnetic field analysis conducted using the BPA Corona and Field Effects (Version 3) program. Attachments AA-2 and AA-3shows data inputs and assumptions used in the electric and magnetic field analysis conducted using the EPRI EMFWorkstation: ENVIRO (Version 3.52) program.

AA.1.3.6 Monitoring Program

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

Response: The Applicant contracted Triaxis Engineering to analyze EMF for the 34.5-kV monopole overhead collector lines. CH2M HILL analyzed EMF for the 230-kV overhead transmission line and the 34.5 H frame lines. These analyses were conducted using the peak electrical currents expected on the lines that produce the highest magnetic fields so the analyses are conservative.

AA.2 ALTERNATING CURRENT ELECTRIC FIELDS

OAR 345-024-0090 *To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:*

(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;

Response: The electric fields on the corridor of the proposed 34.5-kV single-circuit and double-circuit lines and on the 230-kV single-circuit transmission line do not exceed 9 kV per meter (see Figures AA-8, AA-10, AA-12, AA-14, AA-16, AA-18, AA-20, and AA-22). These figures demonstrate that of the proposed 34.5-kV single-circuit and double-circuit lines and 230-kV single-circuit line, the maximum electric field modeled is less than 3.0 kV per meter, which is less than the 9 kV per meter standard set forth in OAR 345-024-0090(1).

AA.3 INDUCED VOLTAGE AND CURRENT

OAR 345-024-0090 *To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant: ****

(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.

Response: The Applicant has designed the proposed collector line and transmission line so that induced currents resulting from the collector line and transmission line and related or supporting facilities will be as low as reasonably achievable. Below is an analysis of the risk of induced currents from the proposed overhead and underground lines.

AA.3.1 Analysis of Induced Voltage and Current

AA.3.1.1 Induced Voltage

Voltage is the electrical pressure that pushes current through a conducting wire or object. An object, such as a bird, person, vehicle, or barbed-wire fence that is insulated from ground and in an electric field will possess an induced voltage. A bird flying through the field is safe because the induced voltage cannot make current flow through the bird, unless there is a conducting path for the current. Induced voltages can only be a hazard when the object is shorted to ground, allowing a path for current to flow. The conductivity of the air around the overhead conductor will determine the upper limit of the current that can flow when the object is shorted to ground.

A common induced voltage hazard occurs on wire fences that parallel overhead transmission lines. If the fence is ungrounded, it possesses the voltage of the net electric field of the overhead conductors at the location of the fence. A person touching such a fence becomes a conducting path for the current and will feel a momentary shock. The AC static voltage on the fence bleeds off quickly but can be annoying. This hazard is easily removed by bonding the fence wires along the length of the fence to grounding rods that are driven into the soil.

As stated in Section AA.2, the underground 34.5-kV lines will not cause a voltage to appear on fences that parallel the underground circuits because the electric fields will be shielded by the earth over the underground lines. Therefore, the grounding of fences in proximity to the underground lines is unnecessary. Underground circuits generate only magnetic fields, and these fields pose no shock hazard to people.

AA.3.1.2 Induced Current

A current carrying conductor will induce a current to flow in another conductor that is parallel to it. Induced currents are due to the net AC magnetic field. In the common case cited above, grounded fences create electrical loops in which induced currents can flow. The value of the induced current will depend on the magnetic field strength, the size, and shape of the conducting object, and the object-to-ground resistance.

Induced currents are not a hazard to people because almost no voltage is involved. However, induced currents are a concern for railroad communications and for pipeline cathodic protection systems that parallel transmission lines.

There are no such facilities within a mile of collector lines and sufficient distance occurs from the transmission line such that induced current will not be an issue.

AA.4 RADIO AND TV INTERFERENCE

OAR 345-021-0010(1)(aa)(B) *An evaluation of alternate methods and costs of reducing radio interference likely to be caused by the transmission line in the primary reception area near interstate, U.S. and state highways;*

Response: Not applicable. The 34.5-kV underground collector lines will not cause radio or television interference. The overhead 230-kV transmission line can generate random corona radiation during wet weather as a result of rain drops on the wire or to a lesser amount in dry weather as a result of dust, insects, or sharp points on the conductors or suspension hardware. However, 34.5-kV overhead collector lines do not generate the same level of corona radiation as the 230-kV overhead transmission line. In addition, there are no occupied buildings or residences within 200 feet on either side of the proposed centerline of the overhead transmission line or collector line. Therefore, the approximate 17 miles (up to 19 miles) of 230-kV overhead transmission line and the approximate 15 miles of overhead 34.5-kV collector lines are not expected to generate any radio or TV interference at any occupied building.

AA.5 CONCLUSION

Based on the above information, the Applicant has satisfied the requirement of OAR 345-021-0010(1)(aa), and the Council may find that the standards contained in OAR 345-024-0090 have been satisfied.

ATTACHMENT AA-1

Results of the Bonneville Power Administration Corona and Field Effect Program for Monopole 34.5-kV Overhead Collector Lines

ATTACHMENT AA-2

Results of the EPRI EMF Workstation: ENVIRO Program for H-Frame 34.5-kV Overhead Collector Lines

ATTACHMENT AA-3

Results of the EPRI EMF Workstation: ENVIRO Program for 230-kV Overhead Transmission Lines

34.5-kV Single-Circuit Overhead Collector Lines

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     Û E F F E C T S   P R O G R A M   V E R.  3   Û
     Û   Source: Bonneville Power Administration   Û
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-15.0	-41.2	-66.2	-21.6	-38.6	-62.4	.000000	.272	.07182
-10.0	-40.8	-65.8	-20.1	-37.1	-61.2	.000000	.302	.08495
-5.0	-40.6	-65.6	-19.5	-36.5	-60.7	.000000	.296	.09505
.0	-40.7	-65.7	-19.9	-36.9	-61.0	.000000	.265	.09870
5.0	-40.9	-65.9	-21.2	-38.2	-62.1	.000000	.255	.09467
10.0	-41.3	-66.3	-23.1	-40.1	-63.5	.000002	.268	.08476
15.0	-41.8	-66.8	-25.2	-42.2	-65.0	.000004	.267	.07224
20.0	-42.3	-67.3	-27.3	-44.3	-66.3	.000005	.245	.05982
25.0	-42.9	-67.9	-29.0	-46.0	-67.5	.000006	.212	.04895
30.0	-43.4	-68.4	-30.6	-47.6	-68.6	.000006	.177	.04002
35.0	-43.9	-68.9	-32.1	-49.1	-69.7	.000007	.144	.03290
40.0	-44.3	-69.3	-33.5	-50.5	-70.6	.000006	.117	.02728
45.0	-44.8	-69.8	-34.9	-51.9	-71.4	.000006	.096	.02285
50.0	-45.2	-70.2	-36.1	-53.1	-72.2	.000006	.078	.01933
55.0	-45.6	-70.6	-37.3	-54.3	-72.9	.000006	.064	.01652
60.0	-45.9	-70.9	-38.4	-55.4	-73.6	.000006	.054	.01425
65.0	-46.3	-71.3	-39.4	-56.4	-74.2	.000005	.045	.01240
70.0	-46.6	-71.6	-40.4	-57.4	-74.8	.000005	.038	.01087
75.0	-46.9	-71.9	-41.3	-58.3	-75.3	.000005	.032	.00960
80.0	-47.2	-72.2	-42.2	-59.2	-75.8	.000005	.028	.00853
85.0	-47.4	-72.4	-43.0	-60.0	-76.3	.000005	.024	.00763
90.0	-47.7	-72.7	-43.7	-60.7	-76.7	.000004	.021	.00686
95.0	-47.9	-72.9	-44.4	-61.4	-77.1	.000004	.019	.00619
100.0	-48.2	-73.2	-45.1	-62.1	-77.6	.000004	.016	.00562
105.0	-48.4	-73.4	-45.8	-62.8	-77.9	.000004	.015	.00512
110.0	-48.6	-73.6	-46.4	-63.4	-78.3	.000004	.013	.00469
115.0	-48.8	-73.8	-46.9	-63.9	-78.7	.000004	.012	.00431
120.0	-49.0	-74.0	-47.5	-64.5	-79.0	.000004	.011	.00397
125.0	-49.2	-74.2	-48.0	-65.0	-79.4	.000003	.010	.00367
130.0	-49.4	-74.4	-48.5	-65.5	-79.7	.000003	.009	.00340
135.0	-49.6	-74.6	-49.0	-66.0	-80.0	.000003	.008	.00316
140.0	-49.8	-74.8	-49.4	-66.4	-80.3	.000003	.007	.00294
145.0	-49.9	-74.9	-49.9	-66.9	-80.6	.000003	.007	.00275
150.0	-50.1	-75.1	-50.3	-67.3	-80.9	.000003	.006	.00257
155.0	-50.2	-75.2	-50.7	-67.7	-81.1	.000003	.006	.00241
160.0	-50.4	-75.4	-51.1	-68.1	-81.4	.000003	.005	.00227
165.0	-50.5	-75.5	-51.5	-68.5	-81.7	.000003	.005	.00213
170.0	-50.7	-75.7	-51.8	-68.8	-81.9	.000003	.005	.00201
175.0	-50.8	-75.8	-52.2	-69.2	-82.1	.000003	.004	.00190
180.0	-50.9	-75.9	-52.5	-69.5	-82.4	.000003	.004	.00180
185.0	-51.1	-76.1	-52.8	-69.8	-82.6	.000003	.004	.00170
190.0	-51.2	-76.2	-53.1	-70.1	-82.8	.000003	.004	.00162
195.0	-51.3	-76.3	-53.4	-70.4	-83.0	.000002	.003	.00154
200.0	-51.5	-76.5	-53.7	-70.7	-83.3	.000002	.003	.00146

34.5-kV Double-Circuit Overhead Collector Lines

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     Û E F F E C T S   P R O G R A M   V E R.  3   Û
     Û   Source: Bonneville Power Administration   Û
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-45.0	-39.0	-64.0	-30.3	-47.3	-68.0	.000000	.025	.00827
-40.0	-38.6	-63.6	-28.8	-45.8	-67.2	.000000	.033	.01061
-35.0	-38.1	-63.1	-27.2	-44.2	-66.2	.000000	.047	.01375
-30.0	-37.6	-62.6	-25.6	-42.6	-65.1	.000000	.070	.01801
-25.0	-37.1	-62.1	-24.0	-41.0	-63.8	.000000	.105	.02370
-20.0	-36.7	-61.7	-22.0	-39.0	-62.3	.000000	.151	.03107
-15.0	-36.2	-61.2	-20.1	-37.1	-60.9	.000000	.198	.03997
-10.0	-35.8	-60.8	-18.6	-35.6	-59.7	.000000	.229	.04932
-5.0	-35.6	-60.6	-18.0	-35.0	-59.2	.000000	.230	.05683
.0	-35.5	-60.5	-18.4	-35.4	-59.5	.000000	.221	.05976
5.0	-35.6	-60.6	-18.0	-35.0	-59.2	.000000	.232	.05683
10.0	-35.8	-60.8	-18.7	-35.7	-59.8	.000003	.231	.04932
15.0	-36.2	-61.2	-20.1	-37.1	-60.9	.000006	.200	.03997
20.0	-36.7	-61.7	-22.1	-39.1	-62.4	.000011	.153	.03107
25.0	-37.1	-62.1	-24.0	-41.0	-63.8	.000015	.108	.02370
30.0	-37.6	-62.6	-25.6	-42.6	-65.1	.000017	.073	.01801
35.0	-38.1	-63.1	-27.2	-44.2	-66.2	.000018	.049	.01375
40.0	-38.6	-63.6	-28.8	-45.8	-67.2	.000019	.034	.01061
45.0	-39.0	-64.0	-30.3	-47.3	-68.1	.000018	.025	.00827
50.0	-39.4	-64.4	-31.7	-48.7	-68.9	.000018	.020	.00654
55.0	-39.8	-64.8	-32.9	-49.9	-69.6	.000018	.018	.00523
60.0	-40.1	-65.1	-34.0	-51.0	-70.3	.000017	.016	.00423
65.0	-40.5	-65.5	-35.1	-52.1	-71.0	.000017	.014	.00346
70.0	-40.8	-65.8	-36.1	-53.1	-71.6	.000016	.013	.00286
75.0	-41.1	-66.1	-37.0	-54.0	-72.2	.000015	.012	.00239
80.0	-41.4	-66.4	-37.9	-54.9	-72.8	.000015	.011	.00202
85.0	-41.7	-66.7	-38.8	-55.8	-73.3	.000014	.010	.00171
90.0	-41.9	-66.9	-39.6	-56.6	-73.8	.000014	.009	.00147
95.0	-42.2	-67.2	-40.4	-57.4	-74.2	.000013	.009	.00126
100.0	-42.4	-67.4	-41.1	-58.1	-74.7	.000013	.008	.00110
105.0	-42.6	-67.6	-41.7	-58.7	-75.1	.000012	.007	.00096
110.0	-42.8	-67.8	-42.4	-59.4	-75.5	.000012	.007	.00084
115.0	-43.1	-68.1	-43.0	-60.0	-75.9	.000012	.006	.00074
120.0	-43.3	-68.3	-43.6	-60.6	-76.3	.000011	.006	.00066
125.0	-43.4	-68.4	-44.2	-61.2	-76.6	.000011	.006	.00058
130.0	-43.6	-68.6	-44.7	-61.7	-77.0	.000011	.005	.00052
135.0	-43.8	-68.8	-45.2	-62.2	-77.3	.000010	.005	.00047
140.0	-44.0	-69.0	-45.7	-62.7	-77.6	.000010	.005	.00042
145.0	-44.2	-69.2	-46.1	-63.1	-77.9	.000010	.004	.00038
150.0	-44.3	-69.3	-46.6	-63.6	-78.2	.000010	.004	.00035
155.0	-44.5	-69.5	-47.0	-64.0	-78.5	.000009	.004	.00031
160.0	-44.6	-69.6	-47.4	-64.4	-78.8	.000009	.004	.00029
165.0	-44.8	-69.8	-47.8	-64.8	-79.1	.000009	.003	.00026
170.0	-44.9	-69.9	-48.2	-65.2	-79.3	.000009	.003	.00024
175.0	-45.1	-70.1	-48.6	-65.6	-79.6	.000008	.003	.00022
180.0	-45.2	-70.2	-48.9	-65.9	-79.8	.000008	.003	.00020
185.0	-45.3	-70.3	-49.2	-66.2	-80.1	.000008	.003	.00019
190.0	-45.5	-70.5	-49.6	-66.6	-80.3	.000008	.003	.00017
195.0	-45.6	-70.6	-49.9	-66.9	-80.5	.000008	.002	.00016
200.0	-45.7	-70.7	-50.2	-67.2	-80.7	.000008	.002	.00015

RESULTS OF ENVIRO PROGRAM

STUDY FILE NAME: C:\PROGRA~1\EPRI\EMFW_251\ENVIRO\345SCCOH.I01

DATE: 11/23/2009 TIME: 10:30

34.5-kV SC Collector System H-

BUNDLE INFORMATION

BNDL #	CIRC #	VOLTAGE (kV)	VOLTAGE ANGLE (DEG)	LOAD (AMPS)	CURRENT ANGLE (DEG)	# OF COND	COORDINATES X (FT)	COORDINATES Y (FT)	PHASE
1	1	34.5	.0	1004.0	.0	1	-6.5	25.0	A
2	2	34.5	240.0	1004.0	120.0	1	.0	25.0	B
3	3	34.5	120.0	1004.0	240.0	1	6.5	25.0	C
4	4	.0	.0	.0	.0	1	-6.5	17.0	GND

MINIMUM GROUND CLEARANCE = 17.000 FT.

SUBCONDUCTOR INFORMATION - REGULAR BUNDLES

BNDL #	DIAMETER (IN)	SPACING (IN)	DC RESIST. (OHMS/MI)	AC RESIST. (OHMS/MI)	AC REACT. (OHMS/MI)
1	1.545	.000	.05810	.06110	.358000
2	1.545	.000	.05810	.06110	.358000
3	1.545	.000	.05810	.06110	.358000
4	1.545	.000	.05810	.06110	.358000

MAXIMUM SURFACE GRADIENT (kV/cm)

BNDL #	Type	ACrms	PEAK(+)	PEAK(-)
1	AC	2.09	2.95	-2.95
2	AC	2.27	3.21	-3.21
3	AC	2.05	2.90	-2.90
4	Ground Wire	.18	.25	-.25

AC ELECTRIC FIELD PROFILE at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	MAXIMUM FIELD (kV/m)	MINOR/MAJOR ELLIPSE AXES (ratio)	VERTICAL (kV/m)	HORIZONTAL (kV/m)	SPACE POTENTIAL (kV)
-200.0	-60.96	.002	.010	.002	.000	.002
-195.0	-59.44	.002	.010	.002	.000	.002

-190.0	-57.91	.002	.010	.002	.000	.002
-185.0	-56.39	.002	.010	.002	.000	.002
-180.0	-54.86	.002	.010	.002	.000	.002
-175.0	-53.34	.002	.010	.002	.000	.002
-170.0	-51.82	.003	.010	.003	.000	.003
-165.0	-50.29	.003	.010	.003	.000	.003
-160.0	-48.77	.003	.010	.003	.000	.003
-155.0	-47.24	.003	.010	.003	.000	.003
-150.0	-45.72	.004	.010	.004	.000	.004
-145.0	-44.20	.004	.010	.004	.000	.004
-140.0	-42.67	.005	.010	.005	.000	.005
-135.0	-41.15	.005	.010	.005	.000	.005
-130.0	-39.62	.006	.010	.006	.000	.006
-125.0	-38.10	.006	.010	.006	.000	.006
-120.0	-36.58	.007	.010	.007	.001	.007
-115.0	-35.05	.008	.010	.008	.001	.008
-110.0	-33.53	.009	.010	.009	.001	.009
-105.0	-32.00	.010	.010	.010	.001	.010
-100.0	-30.48	.012	.010	.012	.001	.012
-95.0	-28.96	.013	.010	.013	.001	.013
-90.0	-27.43	.015	.009	.015	.002	.015
-85.0	-25.91	.018	.009	.018	.002	.018
-80.0	-24.38	.021	.009	.021	.002	.021
-75.0	-22.86	.025	.008	.025	.003	.025
-70.0	-21.34	.030	.008	.030	.004	.030
-65.0	-19.81	.036	.007	.036	.005	.036
-60.0	-18.29	.044	.007	.043	.006	.044
-55.0	-16.76	.054	.006	.053	.007	.054
-50.0	-15.24	.067	.006	.066	.009	.066
-45.0	-13.72	.083	.005	.082	.012	.083
-40.0	-12.19	.104	.005	.103	.015	.103
-35.0	-10.67	.130	.005	.129	.019	.129
-30.0	-9.14	.161	.006	.160	.021	.160
-25.0	-7.62	.193	.008	.192	.019	.191
-20.0	-6.10	.217	.013	.217	.008	.213
-15.0	-4.57	.216	.023	.215	.018	.208
-10.0	-3.05	.171	.044	.163	.053	.155
-5.0	-1.52	.099	.084	.056	.082	.052
.0	.00	.123	.088	.084	.091	.082
5.0	1.52	.228	.067	.216	.073	.209
10.0	3.05	.301	.047	.299	.036	.290
15.0	4.57	.317	.030	.317	.010	.310
20.0	6.10	.290	.019	.289	.025	.286
25.0	7.62	.245	.012	.243	.031	.243
30.0	9.14	.198	.008	.196	.029	.197
35.0	10.67	.158	.006	.156	.024	.157
40.0	12.19	.125	.005	.124	.019	.125
45.0	13.72	.100	.004	.098	.015	.099
50.0	15.24	.080	.004	.079	.011	.080
55.0	16.76	.065	.005	.064	.009	.064
60.0	18.29	.053	.005	.052	.007	.053
65.0	19.81	.044	.005	.043	.005	.044
70.0	21.34	.036	.005	.036	.004	.036
75.0	22.86	.031	.005	.030	.003	.031
80.0	24.38	.026	.006	.026	.003	.026
85.0	25.91	.022	.006	.022	.002	.022
90.0	27.43	.019	.006	.019	.002	.019
95.0	28.96	.017	.006	.017	.002	.017
100.0	30.48	.015	.006	.015	.001	.015
105.0	32.00	.013	.006	.013	.001	.013
110.0	33.53	.011	.006	.011	.001	.011
115.0	35.05	.010	.006	.010	.001	.010
120.0	36.58	.009	.006	.009	.001	.009
125.0	38.10	.008	.006	.008	.001	.008
130.0	39.62	.007	.006	.007	.000	.007
135.0	41.15	.007	.006	.007	.000	.007

140.0	42.67	.006	.006	.006	.000	.006
145.0	44.20	.006	.006	.005	.000	.006
150.0	45.72	.005	.006	.005	.000	.005
155.0	47.24	.005	.006	.005	.000	.005
160.0	48.77	.004	.006	.004	.000	.004
165.0	50.29	.004	.006	.004	.000	.004
170.0	51.82	.004	.005	.004	.000	.004
175.0	53.34	.003	.005	.003	.000	.003
180.0	54.86	.003	.005	.003	.000	.003
185.0	56.39	.003	.005	.003	.000	.003
190.0	57.91	.003	.005	.003	.000	.003
195.0	59.44	.003	.005	.003	.000	.003
200.0	60.96	.002	.005	.002	.000	.002

AC CURRENTS IN EACH BUNDLE:

BNDL #	----- AC CURRENTS (Amperes) ----- REAL	IMAGINARY	TOTAL	BUNDLE POSITION X-COORD	Y-COORD
1	1004.00	.00	1004.00	-6.50	25.00
2	-502.00	869.49	1004.00	.00	25.00
3	-502.00	-869.49	1004.00	6.50	25.00
4	-37.27	-35.73	51.63	-6.50	17.00

****
* *
* MAGNETIC FIELD PROFILE *
* at 3.28 feet above ground *
* *
****

LATERAL DISTANCE (feet)	(meters)	<---------- AC MAGNETIC FIELD ----------> MAJOR AXIS (mG)	MINOR/ MAJOR (RATIO)	VERTICAL COMP (mG)	HORIZONTAL COMP (mG)	RMS RESULTANT (mG)
-200.0	-60.96	.49	.289	.44	.26	.51
-195.0	-59.44	.52	.273	.46	.28	.54
-190.0	-57.91	.56	.256	.49	.31	.58
-185.0	-56.39	.61	.238	.53	.34	.63
-180.0	-54.86	.67	.221	.58	.37	.68
-175.0	-53.34	.73	.205	.63	.40	.74
-170.0	-51.82	.80	.189	.69	.44	.82
-165.0	-50.29	.89	.175	.76	.49	.90
-160.0	-48.77	.98	.162	.84	.54	.99
-155.0	-47.24	1.09	.151	.93	.60	1.10
-150.0	-45.72	1.21	.140	1.03	.67	1.23
-145.0	-44.20	1.35	.131	1.15	.74	1.37
-140.0	-42.67	1.51	.122	1.28	.83	1.52
-135.0	-41.15	1.70	.115	1.42	.94	1.71
-130.0	-39.62	1.90	.108	1.59	1.06	1.91
-125.0	-38.10	2.14	.102	1.78	1.20	2.15
-120.0	-36.58	2.41	.096	2.00	1.37	2.42
-115.0	-35.05	2.72	.091	2.24	1.57	2.73
-110.0	-33.53	3.08	.086	2.52	1.80	3.10
-105.0	-32.00	3.50	.082	2.83	2.08	3.51
-100.0	-30.48	3.99	.078	3.19	2.42	4.00
-95.0	-28.96	4.56	.074	3.60	2.82	4.57
-90.0	-27.43	5.23	.070	4.07	3.32	5.25
-85.0	-25.91	6.03	.066	4.60	3.93	6.05

-80.0	-24.38	6.99	.062	5.21	4.68	7.00
-75.0	-22.86	8.14	.058	5.90	5.64	8.16
-70.0	-21.34	9.54	.054	6.67	6.84	9.56
-65.0	-19.81	11.26	.050	7.54	8.39	11.28
-60.0	-18.29	13.40	.046	8.48	10.39	13.41
-55.0	-16.76	16.08	.041	9.46	13.02	16.10
-50.0	-15.24	19.49	.035	10.37	16.52	19.50
-45.0	-13.72	23.87	.028	11.02	21.19	23.88
-40.0	-12.19	29.58	.021	11.00	27.46	29.58
-35.0	-10.67	37.07	.011	9.52	35.83	37.07
-30.0	-9.14	46.93	.001	5.11	46.66	46.93
-25.0	-7.62	59.81	.016	4.85	59.62	59.81
-20.0	-6.10	76.02	.036	23.74	72.27	76.07
-15.0	-4.57	94.86	.061	54.25	78.04	95.04
-10.0	-3.05	113.73	.092	92.58	66.88	114.21
-5.0	-1.52	128.75	.124	124.95	34.89	129.73
.0	.00	136.54	.142	135.04	28.04	137.92
5.0	1.52	134.75	.138	115.41	72.02	136.04
10.0	3.05	123.73	.118	75.09	99.42	124.59
15.0	4.57	107.11	.093	33.48	102.23	107.57
20.0	6.10	89.41	.070	6.50	89.39	89.63
25.0	7.62	73.50	.051	15.85	71.87	73.59
30.0	9.14	60.37	.037	23.40	55.70	60.41
35.0	10.67	49.94	.027	25.90	42.73	49.96
40.0	12.19	41.76	.019	25.76	32.89	41.77
45.0	13.72	35.34	.014	24.40	25.56	35.34
50.0	15.24	30.25	.010	22.59	20.12	30.25
55.0	16.76	26.18	.007	20.68	16.05	26.18
60.0	18.29	22.88	.005	18.85	12.97	22.88
65.0	19.81	20.18	.003	17.17	10.61	20.18
70.0	21.34	17.95	.002	15.66	8.78	17.95
75.0	22.86	16.09	.002	14.31	7.35	16.09
80.0	24.38	14.51	.002	13.12	6.21	14.51
85.0	25.91	13.17	.002	12.06	5.30	13.17
90.0	27.43	12.02	.002	11.12	4.56	12.02
95.0	28.96	11.02	.003	10.29	3.95	11.02
100.0	30.48	10.15	.003	9.55	3.45	10.15
105.0	32.00	9.39	.004	8.89	3.03	9.39
110.0	33.53	8.72	.005	8.30	2.68	8.72
115.0	35.05	8.13	.006	7.77	2.38	8.13
120.0	36.58	7.60	.006	7.29	2.13	7.60
125.0	38.10	7.12	.007	6.86	1.91	7.12
130.0	39.62	6.70	.009	6.47	1.73	6.70
135.0	41.15	6.31	.010	6.12	1.57	6.31
140.0	42.67	5.96	.011	5.79	1.43	5.96
145.0	44.20	5.65	.012	5.49	1.30	5.65
150.0	45.72	5.36	.013	5.22	1.20	5.36
155.0	47.24	5.09	.014	4.97	1.10	5.09
160.0	48.77	4.85	.016	4.74	1.02	4.85
165.0	50.29	4.63	.017	4.53	.94	4.63
170.0	51.82	4.42	.018	4.33	.88	4.42
175.0	53.34	4.23	.019	4.15	.82	4.23
180.0	54.86	4.05	.021	3.98	.76	4.05
185.0	56.39	3.89	.022	3.82	.72	3.89
190.0	57.91	3.73	.023	3.67	.67	3.73
195.0	59.44	3.59	.025	3.54	.63	3.59
200.0	60.96	3.46	.026	3.41	.60	3.46

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*
*
* AUDIBLE NOISE
* GENERATED ACOUSTIC POWER
* (dB above 1uW/m)
*
*
****

BNDL #	Type	Summer Fair	L5 RAIN	L50 RAIN
1	AC	******	******	******
2	AC	******	******	******
3	AC	******	******	******
4	Ground Wire	******	******	******

****
*
* AUDIBLE NOISE
*
* Microphone is 5.00 feet above ground *
* Altitude 1000. ft
*
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<---------- HVTRC CALCULATION METHOD ---------->

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	L50 FAIR (dB(A))	L5 RAIN (dB(A))	L50 RAIN (dB(A))	Leq(24) (dB(A))	Ldn (dB(A))
-200.0	-60.96	.0	.0	.0	.0	.0
-195.0	-59.44	.0	.0	.0	.0	.0
-190.0	-57.91	.0	.0	.0	.0	.0
-185.0	-56.39	.0	.0	.0	.0	.0
-180.0	-54.86	.0	.0	.0	.0	.0
-175.0	-53.34	.0	.0	.0	.0	.0
-170.0	-51.82	.0	.0	.0	.0	.0
-165.0	-50.29	.0	.0	.0	.0	.0
-160.0	-48.77	.0	.0	.0	.0	.0
-155.0	-47.24	.0	.0	.0	.0	.0
-150.0	-45.72	.0	.0	.0	.0	.0
-145.0	-44.20	.0	.0	.0	.0	.0
-140.0	-42.67	.0	.0	.0	.0	.0
-135.0	-41.15	.0	.0	.0	.0	.0
-130.0	-39.62	.0	.0	.0	.0	.0
-125.0	-38.10	.0	.0	.0	.0	.0
-120.0	-36.58	.0	.0	.0	.0	.0
-115.0	-35.05	.0	.0	.0	.0	.0
-110.0	-33.53	.0	.0	.0	.0	.0
-105.0	-32.00	.0	.0	.0	.0	.0
-100.0	-30.48	.0	.0	.0	.0	.0
-95.0	-28.96	.0	.0	.0	.0	.0
-90.0	-27.43	.0	.0	.0	.0	.0
-85.0	-25.91	.0	.0	.0	.0	.0
-80.0	-24.38	.0	.0	.0	.0	.0
-75.0	-22.86	.0	.0	.0	.0	.0
-70.0	-21.34	.0	.0	.0	.0	.0
-65.0	-19.81	.0	.0	.0	.0	.0
-60.0	-18.29	.0	.0	.0	.0	.0
-55.0	-16.76	.0	.0	.0	.0	.0
-50.0	-15.24	.0	.0	.0	.0	.0
-45.0	-13.72	.0	.0	.0	.0	.0
-40.0	-12.19	.0	.0	.0	.0	.0
-35.0	-10.67	.0	.0	.0	.0	.0
-30.0	-9.14	.0	.0	.0	.0	.0
-25.0	-7.62	.0	.0	.0	.0	.0
-20.0	-6.10	.0	.0	.0	.0	.0
-15.0	-4.57	.0	.0	.0	.0	.0
-10.0	-3.05	.0	.0	.0	.0	.0
-5.0	-1.52	.0	.0	.0	.0	.0
.0	.00	.0	.0	.0	.0	.0
5.0	1.52	.0	.0	.0	.0	.0
10.0	3.05	.0	.0	.0	.0	.0

15.0	4.57	.0	.0	.0	.0	.0
20.0	6.10	.0	.0	.0	.0	.0
25.0	7.62	.0	.0	.0	.0	.0
30.0	9.14	.0	.0	.0	.0	.0
35.0	10.67	.0	.0	.0	.0	.0
40.0	12.19	.0	.0	.0	.0	.0
45.0	13.72	.0	.0	.0	.0	.0
50.0	15.24	.0	.0	.0	.0	.0
55.0	16.76	.0	.0	.0	.0	.0
60.0	18.29	.0	.0	.0	.0	.0
65.0	19.81	.0	.0	.0	.0	.0
70.0	21.34	.0	.0	.0	.0	.0
75.0	22.86	.0	.0	.0	.0	.0
80.0	24.38	.0	.0	.0	.0	.0
85.0	25.91	.0	.0	.0	.0	.0
90.0	27.43	.0	.0	.0	.0	.0
95.0	28.96	.0	.0	.0	.0	.0
100.0	30.48	.0	.0	.0	.0	.0
105.0	32.00	.0	.0	.0	.0	.0
110.0	33.53	.0	.0	.0	.0	.0
115.0	35.05	.0	.0	.0	.0	.0
120.0	36.58	.0	.0	.0	.0	.0
125.0	38.10	.0	.0	.0	.0	.0
130.0	39.62	.0	.0	.0	.0	.0
135.0	41.15	.0	.0	.0	.0	.0
140.0	42.67	.0	.0	.0	.0	.0
145.0	44.20	.0	.0	.0	.0	.0
150.0	45.72	.0	.0	.0	.0	.0
155.0	47.24	.0	.0	.0	.0	.0
160.0	48.77	.0	.0	.0	.0	.0
165.0	50.29	.0	.0	.0	.0	.0
170.0	51.82	.0	.0	.0	.0	.0
175.0	53.34	.0	.0	.0	.0	.0
180.0	54.86	.0	.0	.0	.0	.0
185.0	56.39	.0	.0	.0	.0	.0
190.0	57.91	.0	.0	.0	.0	.0
195.0	59.44	.0	.0	.0	.0	.0
200.0	60.96	.0	.0	.0	.0	.0

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                 ************************
                 *                      *
                 *     AUDIBLE NOISE    *
                 *    (other methods)   *
                 *                      *
                 * Altitude     1000. ft *
                 *                      *
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LATERAL DISTANCE (feet)	(meters)	<------ BPA METHOD -------> FAIR WEATHER dB(A)	L5 RAIN dB(A)	L50 RAIN dB(A)	Ldn dB(A)	<- CRIEPI --> AVERAGE FAIR dB(A)	L5 RAIN dB(A)	EdF L5 RAIN dB(A)	ENEL L5 RAIN dB(A)	IREQ L5 RAIN dB(A)
-200.0	-60.96	.0	.0	.0	.0	.0	.0	.0	.0	.0
-195.0	-59.44	.0	.0	.0	.0	.0	.0	.0	.0	.0
-190.0	-57.91	.0	.0	.0	.0	.0	.0	.0	.0	.0
-185.0	-56.39	.0	.0	.0	.0	.0	.0	.0	.0	.0

-180.0	-54.86	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-175.0	-53.34	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-170.0	-51.82	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-165.0	-50.29	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-160.0	-48.77	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-155.0	-47.24	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-150.0	-45.72	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-145.0	-44.20	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-140.0	-42.67	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-135.0	-41.15	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-130.0	-39.62	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-125.0	-38.10	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-120.0	-36.58	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-115.0	-35.05	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-110.0	-33.53	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-105.0	-32.00	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-100.0	-30.48	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-95.0	-28.96	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-90.0	-27.43	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-85.0	-25.91	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-80.0	-24.38	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-75.0	-22.86	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-70.0	-21.34	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-65.0	-19.81	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-60.0	-18.29	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-55.0	-16.76	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-50.0	-15.24	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-45.0	-13.72	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-40.0	-12.19	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-35.0	-10.67	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-30.0	-9.14	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-25.0	-7.62	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-20.0	-6.10	.0	.0	.0	.0	.0	.0	.0	.0
.0									

-15.0	-4.57	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-10.0	-3.05	.0	.0	.0	.0	.0	.0	.0	.0
.0									
-5.0	-1.52	.0	.0	.0	.0	.0	.0	.0	.0
.0									
.0	.00	.0	.0	.0	.0	.0	.0	.0	.0
.0									
5.0	1.52	.0	.0	.0	.0	.0	.0	.0	.0
.0									
10.0	3.05	.0	.0	.0	.0	.0	.0	.0	.0
.0									
15.0	4.57	.0	.0	.0	.0	.0	.0	.0	.0
.0									
20.0	6.10	.0	.0	.0	.0	.0	.0	.0	.0
.0									
25.0	7.62	.0	.0	.0	.0	.0	.0	.0	.0
.0									
30.0	9.14	.0	.0	.0	.0	.0	.0	.0	.0
.0									
35.0	10.67	.0	.0	.0	.0	.0	.0	.0	.0
.0									
40.0	12.19	.0	.0	.0	.0	.0	.0	.0	.0
.0									
45.0	13.72	.0	.0	.0	.0	.0	.0	.0	.0
.0									
50.0	15.24	.0	.0	.0	.0	.0	.0	.0	.0
.0									
55.0	16.76	.0	.0	.0	.0	.0	.0	.0	.0
.0									
60.0	18.29	.0	.0	.0	.0	.0	.0	.0	.0
.0									
65.0	19.81	.0	.0	.0	.0	.0	.0	.0	.0
.0									
70.0	21.34	.0	.0	.0	.0	.0	.0	.0	.0
.0									
75.0	22.86	.0	.0	.0	.0	.0	.0	.0	.0
.0									
80.0	24.38	.0	.0	.0	.0	.0	.0	.0	.0
.0									
85.0	25.91	.0	.0	.0	.0	.0	.0	.0	.0
.0									
90.0	27.43	.0	.0	.0	.0	.0	.0	.0	.0
.0									
95.0	28.96	.0	.0	.0	.0	.0	.0	.0	.0
.0									
100.0	30.48	.0	.0	.0	.0	.0	.0	.0	.0
.0									
105.0	32.00	.0	.0	.0	.0	.0	.0	.0	.0
.0									
110.0	33.53	.0	.0	.0	.0	.0	.0	.0	.0
.0									
115.0	35.05	.0	.0	.0	.0	.0	.0	.0	.0
.0									
120.0	36.58	.0	.0	.0	.0	.0	.0	.0	.0
.0									
125.0	38.10	.0	.0	.0	.0	.0	.0	.0	.0
.0									
130.0	39.62	.0	.0	.0	.0	.0	.0	.0	.0
.0									
135.0	41.15	.0	.0	.0	.0	.0	.0	.0	.0
.0									
140.0	42.67	.0	.0	.0	.0	.0	.0	.0	.0
.0									
145.0	44.20	.0	.0	.0	.0	.0	.0	.0	.0
.0									

150.0	45.72	.0	.0	.0	.0	.0	.0	.0	.0
155.0	47.24	.0	.0	.0	.0	.0	.0	.0	.0
160.0	48.77	.0	.0	.0	.0	.0	.0	.0	.0
165.0	50.29	.0	.0	.0	.0	.0	.0	.0	.0
170.0	51.82	.0	.0	.0	.0	.0	.0	.0	.0
175.0	53.34	.0	.0	.0	.0	.0	.0	.0	.0
180.0	54.86	.0	.0	.0	.0	.0	.0	.0	.0
185.0	56.39	.0	.0	.0	.0	.0	.0	.0	.0
190.0	57.91	.0	.0	.0	.0	.0	.0	.0	.0
195.0	59.44	.0	.0	.0	.0	.0	.0	.0	.0
200.0	60.96	.0	.0	.0	.0	.0	.0	.0	.0

Audible noise prediction methods do not apply to all line geometries, voltages, or weather conditions. If a prediction method does not apply, the appropriate output data column will be zeros.

RESULTS OF ENVIRO PROGRAM

STUDY FILE NAME: C:\PROGRA~1\EPRI\EMFW_251\ENVIRO\345DCCOH.I01

DATE: 11/23/2009 TIME: 10:56

34.5-kV DC Collector System H-

BUNDLE INFORMATION

BNDL #	CIRC #	VOLTAGE (kV)	VOLTAGE ANGLE (DEG)	LOAD (AMPS)	CURRENT ANGLE (DEG)	# OF COND	COORDINATES X (FT)	COORDINATES Y (FT)	PHASE
1	1	34.5	.0	1004.0	.0	1	-3.3	30.0	A
2	2	34.5	240.0	1004.0	120.0	1	3.3	30.0	B
3	3	34.5	120.0	1004.0	240.0	1	9.8	30.0	C
4	4	34.5	120.0	1004.0	240.0	1	-6.5	20.0	C
5	5	34.5	240.0	1004.0	120.0	1	.0	20.0	B
6	6	34.5	.0	1004.0	.0	1	6.5	20.0	A
7	7	.0	.0	.0	.0	1	-9.8	12.0	GND

MINIMUM GROUND CLEARANCE = 12.000 FT.

SUBCONDUCTOR INFORMATION - REGULAR BUNDLES

BNDL #	DIAMETER (IN)	SPACING (IN)	DC RESIST. (OHMS/MI)	AC RESIST. (OHMS/MI)	AC REACT. (OHMS/MI)
1	1.545	.000	.05810	.06110	.358000
2	1.545	.000	.05810	.06110	.358000
3	1.545	.000	.05810	.06110	.358000
4	1.545	.000	.05810	.06110	.358000
5	1.545	.000	.05810	.06110	.358000
6	1.545	.000	.05810	.06110	.358000
7	1.545	.000	.05810	.06110	.358000

MAXIMUM SURFACE GRADIENT (kV/cm)

BNDL #	Type	ACrms	PEAK(+)	PEAK(-)
1	AC	2.17	3.07	-3.07
2	AC	2.25	3.19	-3.19
3	AC	2.16	3.05	-3.05
4	AC	2.19	3.10	-3.10
5	AC	2.25	3.18	-3.18
6	AC	2.18	3.09	-3.09
7	Ground Wire	.16	.22	-.22

AC ELECTRIC FIELD PROFILE at 3.28 feet above ground

* *
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LATERAL DISTANCE (feet)	(meters)	MAXIMUM FIELD (kV/m)	MINOR/MAJOR ELLIPSE AXES (ratio)	VERTICAL (kV/m)	HORIZONTAL (kV/m)	SPACE POTENTIAL (kV)
-200.0	-60.96	.002	.003	.002	.000	.002
-195.0	-59.44	.002	.004	.002	.000	.002
-190.0	-57.91	.003	.004	.003	.000	.003
-185.0	-56.39	.003	.004	.003	.000	.003
-180.0	-54.86	.003	.004	.003	.000	.003
-175.0	-53.34	.003	.004	.003	.000	.003
-170.0	-51.82	.003	.004	.003	.000	.003
-165.0	-50.29	.003	.004	.003	.000	.003
-160.0	-48.77	.004	.004	.004	.000	.004
-155.0	-47.24	.004	.004	.004	.000	.004
-150.0	-45.72	.004	.004	.004	.000	.004
-145.0	-44.20	.004	.004	.004	.000	.004
-140.0	-42.67	.005	.004	.005	.000	.005
-135.0	-41.15	.005	.004	.005	.000	.005
-130.0	-39.62	.006	.004	.006	.000	.006
-125.0	-38.10	.006	.003	.006	.000	.006
-120.0	-36.58	.007	.003	.007	.000	.007
-115.0	-35.05	.007	.003	.007	.000	.007
-110.0	-33.53	.008	.002	.008	.000	.008
-105.0	-32.00	.009	.001	.009	.001	.009
-100.0	-30.48	.010	.000	.010	.001	.010
-95.0	-28.96	.011	.001	.011	.001	.011
-90.0	-27.43	.012	.003	.012	.001	.012
-85.0	-25.91	.014	.005	.013	.001	.014
-80.0	-24.38	.015	.008	.015	.001	.015
-75.0	-22.86	.018	.012	.017	.002	.017
-70.0	-21.34	.020	.016	.020	.002	.020
-65.0	-19.81	.023	.022	.023	.002	.023
-60.0	-18.29	.028	.030	.027	.003	.028
-55.0	-16.76	.033	.039	.033	.004	.033
-50.0	-15.24	.040	.050	.040	.006	.040
-45.0	-13.72	.050	.062	.049	.008	.050
-40.0	-12.19	.063	.074	.062	.011	.063
-35.0	-10.67	.082	.083	.081	.016	.082
-30.0	-9.14	.110	.087	.108	.023	.109
-25.0	-7.62	.147	.087	.144	.029	.144
-20.0	-6.10	.187	.089	.186	.028	.183
-15.0	-4.57	.210	.113	.210	.024	.202
-10.0	-3.05	.191	.190	.189	.048	.179
-5.0	-1.52	.140	.372	.120	.089	.105
.0	.00	.139	.472	.093	.122	.083
5.0	1.52	.253	.219	.241	.096	.224
10.0	3.05	.306	.156	.306	.048	.288
15.0	4.57	.266	.159	.263	.059	.256
20.0	6.10	.193	.200	.188	.058	.188
25.0	7.62	.135	.233	.133	.041	.134
30.0	9.14	.104	.207	.103	.026	.103
35.0	10.67	.086	.148	.086	.016	.086
40.0	12.19	.074	.097	.074	.010	.074
45.0	13.72	.064	.064	.063	.007	.063
50.0	15.24	.055	.042	.054	.006	.054
55.0	16.76	.047	.028	.046	.005	.047
60.0	18.29	.040	.019	.040	.004	.040
65.0	19.81	.035	.013	.034	.003	.034
70.0	21.34	.030	.008	.030	.003	.030
75.0	22.86	.026	.005	.026	.002	.026
80.0	24.38	.023	.003	.023	.002	.023
85.0	25.91	.020	.001	.020	.002	.020
90.0	27.43	.018	.000	.018	.001	.018

95.0	28.96	.016	.001	.016	.001	.016
100.0	30.48	.014	.002	.014	.001	.014
105.0	32.00	.012	.002	.012	.001	.012
110.0	33.53	.011	.003	.011	.001	.011
115.0	35.05	.010	.003	.010	.001	.010
120.0	36.58	.009	.003	.009	.001	.009
125.0	38.10	.008	.003	.008	.001	.008
130.0	39.62	.008	.004	.008	.000	.008
135.0	41.15	.007	.004	.007	.000	.007
140.0	42.67	.007	.004	.007	.000	.007
145.0	44.20	.006	.004	.006	.000	.006
150.0	45.72	.006	.004	.006	.000	.006
155.0	47.24	.005	.004	.005	.000	.005
160.0	48.77	.005	.003	.005	.000	.005
165.0	50.29	.005	.003	.005	.000	.005
170.0	51.82	.004	.003	.004	.000	.004
175.0	53.34	.004	.003	.004	.000	.004
180.0	54.86	.004	.003	.004	.000	.004
185.0	56.39	.004	.003	.004	.000	.004
190.0	57.91	.003	.003	.003	.000	.003
195.0	59.44	.003	.003	.003	.000	.003
200.0	60.96	.003	.003	.003	.000	.003

AC CURRENTS IN EACH BUNDLE:

BNDL #	----- AC CURRENTS (Amperes) ----- REAL	IMAGINARY	TOTAL	BUNDLE POSITION X-COORD	Y-COORD
1	1004.00	.00	1004.00	-3.25	30.00
2	-502.00	869.49	1004.00	3.25	30.00
3	-502.00	-869.49	1004.00	9.75	30.00
4	-502.00	-869.49	1004.00	-6.50	20.00
5	-502.00	869.49	1004.00	.00	20.00
6	1004.00	.00	1004.00	6.50	20.00
7	26.67	19.15	32.83	-9.75	12.00

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*
* MAGNETIC FIELD PROFILE
* at 3.28 feet above ground
*
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LATERAL DISTANCE (feet)	(meters)	<---------- AC MAGNETIC FIELD ----------> MAJOR AXIS (mG)	MINOR/ MAJOR (RATIO)	VERTICAL COMP (mG)	HORIZONTAL COMP (mG)	RMS RESULTANT (mG)
-200.0	-60.96	1.05	.044	1.01	.27	1.05
-195.0	-59.44	1.07	.041	1.04	.28	1.07
-190.0	-57.91	1.10	.039	1.06	.29	1.10
-185.0	-56.39	1.12	.036	1.08	.31	1.12
-180.0	-54.86	1.15	.033	1.10	.33	1.15
-175.0	-53.34	1.17	.030	1.12	.35	1.17
-170.0	-51.82	1.20	.027	1.14	.37	1.20
-165.0	-50.29	1.23	.023	1.16	.39	1.23
-160.0	-48.77	1.26	.020	1.19	.41	1.26
-155.0	-47.24	1.29	.016	1.21	.44	1.29
-150.0	-45.72	1.32	.013	1.23	.47	1.32
-145.0	-44.20	1.35	.009	1.25	.51	1.35

-140.0	-42.67	1.38	.005	1.27	.55	1.38
-135.0	-41.15	1.42	.001	1.29	.59	1.42
-130.0	-39.62	1.45	.003	1.30	.64	1.45
-125.0	-38.10	1.49	.007	1.31	.70	1.49
-120.0	-36.58	1.52	.011	1.31	.77	1.52
-115.0	-35.05	1.56	.014	1.31	.84	1.56
-110.0	-33.53	1.59	.017	1.30	.92	1.59
-105.0	-32.00	1.63	.018	1.28	1.01	1.63
-100.0	-30.48	1.67	.016	1.23	1.12	1.67
-95.0	-28.96	1.71	.010	1.17	1.24	1.71
-90.0	-27.43	1.75	.003	1.08	1.38	1.75
-85.0	-25.91	1.81	.027	.95	1.54	1.81
-80.0	-24.38	1.88	.068	.78	1.71	1.88
-75.0	-22.86	1.98	.131	.59	1.91	2.00
-70.0	-21.34	2.14	.222	.52	2.13	2.19
-65.0	-19.81	2.37	.339	.83	2.36	2.50
-60.0	-18.29	2.73	.472	1.52	2.61	3.02
-55.0	-16.76	3.31	.591	2.55	2.88	3.85
-50.0	-15.24	4.30	.648	4.00	3.21	5.13
-45.0	-13.72	6.00	.627	5.98	3.80	7.09
-40.0	-12.19	8.74	.570	8.61	5.20	10.05
-35.0	-10.67	12.97	.512	11.87	8.45	14.57
-30.0	-9.14	19.47	.463	15.35	14.99	21.46
-25.0	-7.62	29.41	.427	17.79	26.57	31.98
-20.0	-6.10	44.16	.405	18.62	43.86	47.65
-15.0	-4.57	64.22	.406	31.66	61.66	69.31
-10.0	-3.05	88.10	.435	68.77	67.09	96.08
-5.0	-1.52	113.48	.465	111.18	57.47	125.15
.0	.00	130.26	.472	123.96	73.40	144.06
5.0	1.52	131.02	.443	90.05	111.48	143.30
10.0	3.05	116.72	.390	45.92	116.56	125.28
15.0	4.57	94.13	.342	50.44	85.74	99.48
20.0	6.10	71.44	.309	56.71	48.73	74.77
25.0	7.62	52.87	.288	49.76	23.47	55.02
30.0	9.14	39.02	.276	38.83	11.43	40.47
35.0	10.67	29.07	.267	28.96	8.18	30.09
40.0	12.19	21.99	.260	21.41	7.63	22.73
45.0	13.72	16.94	.254	15.98	7.06	17.47
50.0	15.24	13.29	.247	12.16	6.27	13.68
55.0	16.76	10.61	.239	9.47	5.41	10.91
60.0	18.29	8.62	.230	7.56	4.60	8.85
65.0	19.81	7.12	.219	6.17	3.89	7.29
70.0	21.34	5.98	.207	5.15	3.28	6.11
75.0	22.86	5.09	.194	4.38	2.77	5.19
80.0	24.38	4.39	.179	3.80	2.35	4.46
85.0	25.91	3.84	.164	3.35	1.99	3.89
90.0	27.43	3.40	.148	2.99	1.70	3.44
95.0	28.96	3.04	.132	2.70	1.45	3.07
100.0	30.48	2.75	.116	2.47	1.25	2.76
105.0	32.00	2.50	.100	2.27	1.08	2.52
110.0	33.53	2.30	.085	2.11	.93	2.31
115.0	35.05	2.13	.071	1.97	.81	2.13
120.0	36.58	1.98	.057	1.86	.71	1.99
125.0	38.10	1.86	.045	1.75	.62	1.86
130.0	39.62	1.75	.033	1.66	.54	1.75
135.0	41.15	1.66	.022	1.59	.48	1.66
140.0	42.67	1.57	.012	1.52	.42	1.57
145.0	44.20	1.50	.003	1.45	.37	1.50
150.0	45.72	1.43	.005	1.40	.33	1.43
155.0	47.24	1.38	.012	1.34	.29	1.38
160.0	48.77	1.32	.019	1.30	.26	1.32
165.0	50.29	1.27	.025	1.25	.23	1.27
170.0	51.82	1.23	.031	1.21	.21	1.23
175.0	53.34	1.19	.036	1.18	.18	1.19
180.0	54.86	1.15	.041	1.14	.16	1.15
185.0	56.39	1.12	.045	1.11	.15	1.12

190.0	57.91	1.09	.050	1.08	.13	1.09
195.0	59.44	1.06	.053	1.05	.12	1.06
200.0	60.96	1.03	.057	1.02	.11	1.03

****
* *
* AUDIBLE NOISE *
* GENERATED ACOUSTIC POWER *
* (dB above 1uW/m) *
* *
****

BNDL #	Type	Summer Fair	L5 RAIN	L50 RAIN
1	AC	******	******	******
2	AC	******	******	******
3	AC	******	******	******
4	AC	******	******	******
5	AC	******	******	******
6	AC	******	******	******
7	Ground Wire	******	******	******

****
* *
* AUDIBLE NOISE *
* *
* Microphone is 5.00 feet above ground *
* Altitude 1000. ft *
* *
****

<---------- HVTRC CALCULATION METHOD ---------->

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	L50 FAIR (dB(A))	L5 RAIN (dB(A))	L50 RAIN (dB(A))	Leq(24) (dB(A))	Ldn (dB(A))
-200.0	-60.96	.0	.0	.0	.0	.0
-195.0	-59.44	.0	.0	.0	.0	.0
-190.0	-57.91	.0	.0	.0	.0	.0
-185.0	-56.39	.0	.0	.0	.0	.0
-180.0	-54.86	.0	.0	.0	.0	.0
-175.0	-53.34	.0	.0	.0	.0	.0
-170.0	-51.82	.0	.0	.0	.0	.0
-165.0	-50.29	.0	.0	.0	.0	.0
-160.0	-48.77	.0	.0	.0	.0	.0
-155.0	-47.24	.0	.0	.0	.0	.0
-150.0	-45.72	.0	.0	.0	.0	.0
-145.0	-44.20	.0	.0	.0	.0	.0
-140.0	-42.67	.0	.0	.0	.0	.0
-135.0	-41.15	.0	.0	.0	.0	.0
-130.0	-39.62	.0	.0	.0	.0	.0
-125.0	-38.10	.0	.0	.0	.0	.0
-120.0	-36.58	.0	.0	.0	.0	.0
-115.0	-35.05	.0	.0	.0	.0	.0
-110.0	-33.53	.0	.0	.0	.0	.0
-105.0	-32.00	.0	.0	.0	.0	.0
-100.0	-30.48	.0	.0	.0	.0	.0
-95.0	-28.96	.0	.0	.0	.0	.0
-90.0	-27.43	.0	.0	.0	.0	.0
-85.0	-25.91	.0	.0	.0	.0	.0
-80.0	-24.38	.0	.0	.0	.0	.0
-75.0	-22.86	.0	.0	.0	.0	.0
-70.0	-21.34	.0	.0	.0	.0	.0
-65.0	-19.81	.0	.0	.0	.0	.0

-60.0	-18.29	.0	.0	.0	.0	.0
-55.0	-16.76	.0	.0	.0	.0	.0
-50.0	-15.24	.0	.0	.0	.0	.0
-45.0	-13.72	.0	.0	.0	.0	.0
-40.0	-12.19	.0	.0	.0	.0	.0
-35.0	-10.67	.0	.0	.0	.0	.0
-30.0	-9.14	.0	.0	.0	.0	.0
-25.0	-7.62	.0	.0	.0	.0	.0
-20.0	-6.10	.0	.0	.0	.0	.0
-15.0	-4.57	.0	.0	.0	.0	.0
-10.0	-3.05	.0	.0	.0	.0	.0
-5.0	-1.52	.0	.0	.0	.0	.0
.0	.00	.0	.0	.0	.0	.0
5.0	1.52	.0	.0	.0	.0	.0
10.0	3.05	.0	.0	.0	.0	.0
15.0	4.57	.0	.0	.0	.0	.0
20.0	6.10	.0	.0	.0	.0	.0
25.0	7.62	.0	.0	.0	.0	.0
30.0	9.14	.0	.0	.0	.0	.0
35.0	10.67	.0	.0	.0	.0	.0
40.0	12.19	.0	.0	.0	.0	.0
45.0	13.72	.0	.0	.0	.0	.0
50.0	15.24	.0	.0	.0	.0	.0
55.0	16.76	.0	.0	.0	.0	.0
60.0	18.29	.0	.0	.0	.0	.0
65.0	19.81	.0	.0	.0	.0	.0
70.0	21.34	.0	.0	.0	.0	.0
75.0	22.86	.0	.0	.0	.0	.0
80.0	24.38	.0	.0	.0	.0	.0
85.0	25.91	.0	.0	.0	.0	.0
90.0	27.43	.0	.0	.0	.0	.0
95.0	28.96	.0	.0	.0	.0	.0
100.0	30.48	.0	.0	.0	.0	.0
105.0	32.00	.0	.0	.0	.0	.0
110.0	33.53	.0	.0	.0	.0	.0
115.0	35.05	.0	.0	.0	.0	.0
120.0	36.58	.0	.0	.0	.0	.0
125.0	38.10	.0	.0	.0	.0	.0
130.0	39.62	.0	.0	.0	.0	.0
135.0	41.15	.0	.0	.0	.0	.0
140.0	42.67	.0	.0	.0	.0	.0
145.0	44.20	.0	.0	.0	.0	.0
150.0	45.72	.0	.0	.0	.0	.0
155.0	47.24	.0	.0	.0	.0	.0
160.0	48.77	.0	.0	.0	.0	.0
165.0	50.29	.0	.0	.0	.0	.0
170.0	51.82	.0	.0	.0	.0	.0
175.0	53.34	.0	.0	.0	.0	.0
180.0	54.86	.0	.0	.0	.0	.0
185.0	56.39	.0	.0	.0	.0	.0
190.0	57.91	.0	.0	.0	.0	.0
195.0	59.44	.0	.0	.0	.0	.0
200.0	60.96	.0	.0	.0	.0	.0

```
          ************************
          *                      *
          *     AUDIBLE NOISE    *
          *    (other methods)   *
          *                      *
          * Altitude    1000. ft *
          *                      *
          ************************
```

	<------ BPA METHOD ------->			<- CRIEPI -->	EdF	ENEL
IREQ						
LATERAL	FAIR	L5	L50	AVERAGE	L5	L5	L5

L5

DISTANCE (feet)	DISTANCE (meters)	WEATHER dB(A)	RAIN dB(A)	RAIN dB(A)	Ldn dB(A)	FAIR dB(A)	RAIN dB(A)	RAIN dB(A)	RAIN dB(A)
-200.0	-60.96	.0	.0	.0	.0	.0	.0	.0	.0
-195.0	-59.44	.0	.0	.0	.0	.0	.0	.0	.0
-190.0	-57.91	.0	.0	.0	.0	.0	.0	.0	.0
-185.0	-56.39	.0	.0	.0	.0	.0	.0	.0	.0
-180.0	-54.86	.0	.0	.0	.0	.0	.0	.0	.0
-175.0	-53.34	.0	.0	.0	.0	.0	.0	.0	.0
-170.0	-51.82	.0	.0	.0	.0	.0	.0	.0	.0
-165.0	-50.29	.0	.0	.0	.0	.0	.0	.0	.0
-160.0	-48.77	.0	.0	.0	.0	.0	.0	.0	.0
-155.0	-47.24	.0	.0	.0	.0	.0	.0	.0	.0
-150.0	-45.72	.0	.0	.0	.0	.0	.0	.0	.0
-145.0	-44.20	.0	.0	.0	.0	.0	.0	.0	.0
-140.0	-42.67	.0	.0	.0	.0	.0	.0	.0	.0
-135.0	-41.15	.0	.0	.0	.0	.0	.0	.0	.0
-130.0	-39.62	.0	.0	.0	.0	.0	.0	.0	.0
-125.0	-38.10	.0	.0	.0	.0	.0	.0	.0	.0
-120.0	-36.58	.0	.0	.0	.0	.0	.0	.0	.0
-115.0	-35.05	.0	.0	.0	.0	.0	.0	.0	.0
-110.0	-33.53	.0	.0	.0	.0	.0	.0	.0	.0
-105.0	-32.00	.0	.0	.0	.0	.0	.0	.0	.0
-100.0	-30.48	.0	.0	.0	.0	.0	.0	.0	.0
-95.0	-28.96	.0	.0	.0	.0	.0	.0	.0	.0
-90.0	-27.43	.0	.0	.0	.0	.0	.0	.0	.0
-85.0	-25.91	.0	.0	.0	.0	.0	.0	.0	.0
-80.0	-24.38	.0	.0	.0	.0	.0	.0	.0	.0
-75.0	-22.86	.0	.0	.0	.0	.0	.0	.0	.0
-70.0	-21.34	.0	.0	.0	.0	.0	.0	.0	.0
-65.0	-19.81	.0	.0	.0	.0	.0	.0	.0	.0
-60.0	-18.29	.0	.0	.0	.0	.0	.0	.0	.0
-55.0	-16.76	.0	.0	.0	.0	.0	.0	.0	.0

-50.0	-15.24	.0	.0	.0	.0	.0	.0	.0	.0
-45.0	-13.72	.0	.0	.0	.0	.0	.0	.0	.0
-40.0	-12.19	.0	.0	.0	.0	.0	.0	.0	.0
-35.0	-10.67	.0	.0	.0	.0	.0	.0	.0	.0
-30.0	-9.14	.0	.0	.0	.0	.0	.0	.0	.0
-25.0	-7.62	.0	.0	.0	.0	.0	.0	.0	.0
-20.0	-6.10	.0	.0	.0	.0	.0	.0	.0	.0
-15.0	-4.57	.0	.0	.0	.0	.0	.0	.0	.0
-10.0	-3.05	.0	.0	.0	.0	.0	.0	.0	.0
-5.0	-1.52	.0	.0	.0	.0	.0	.0	.0	.0
.0	.00	.0	.0	.0	.0	.0	.0	.0	.0
5.0	1.52	.0	.0	.0	.0	.0	.0	.0	.0
10.0	3.05	.0	.0	.0	.0	.0	.0	.0	.0
15.0	4.57	.0	.0	.0	.0	.0	.0	.0	.0
20.0	6.10	.0	.0	.0	.0	.0	.0	.0	.0
25.0	7.62	.0	.0	.0	.0	.0	.0	.0	.0
30.0	9.14	.0	.0	.0	.0	.0	.0	.0	.0
35.0	10.67	.0	.0	.0	.0	.0	.0	.0	.0
40.0	12.19	.0	.0	.0	.0	.0	.0	.0	.0
45.0	13.72	.0	.0	.0	.0	.0	.0	.0	.0
50.0	15.24	.0	.0	.0	.0	.0	.0	.0	.0
55.0	16.76	.0	.0	.0	.0	.0	.0	.0	.0
60.0	18.29	.0	.0	.0	.0	.0	.0	.0	.0
65.0	19.81	.0	.0	.0	.0	.0	.0	.0	.0
70.0	21.34	.0	.0	.0	.0	.0	.0	.0	.0
75.0	22.86	.0	.0	.0	.0	.0	.0	.0	.0
80.0	24.38	.0	.0	.0	.0	.0	.0	.0	.0
85.0	25.91	.0	.0	.0	.0	.0	.0	.0	.0
90.0	27.43	.0	.0	.0	.0	.0	.0	.0	.0
95.0	28.96	.0	.0	.0	.0	.0	.0	.0	.0
100.0	30.48	.0	.0	.0	.0	.0	.0	.0	.0
105.0	32.00	.0	.0	.0	.0	.0	.0	.0	.0
110.0	33.53	.0	.0	.0	.0	.0	.0	.0	.0

115.0	35.05	.0	.0	.0	.0	.0	.0	.0	.0
120.0	36.58	.0	.0	.0	.0	.0	.0	.0	.0
125.0	38.10	.0	.0	.0	.0	.0	.0	.0	.0
130.0	39.62	.0	.0	.0	.0	.0	.0	.0	.0
135.0	41.15	.0	.0	.0	.0	.0	.0	.0	.0
140.0	42.67	.0	.0	.0	.0	.0	.0	.0	.0
145.0	44.20	.0	.0	.0	.0	.0	.0	.0	.0
150.0	45.72	.0	.0	.0	.0	.0	.0	.0	.0
155.0	47.24	.0	.0	.0	.0	.0	.0	.0	.0
160.0	48.77	.0	.0	.0	.0	.0	.0	.0	.0
165.0	50.29	.0	.0	.0	.0	.0	.0	.0	.0
170.0	51.82	.0	.0	.0	.0	.0	.0	.0	.0
175.0	53.34	.0	.0	.0	.0	.0	.0	.0	.0
180.0	54.86	.0	.0	.0	.0	.0	.0	.0	.0
185.0	56.39	.0	.0	.0	.0	.0	.0	.0	.0
190.0	57.91	.0	.0	.0	.0	.0	.0	.0	.0
195.0	59.44	.0	.0	.0	.0	.0	.0	.0	.0
200.0	60.96	.0	.0	.0	.0	.0	.0	.0	.0

Audible noise prediction methods do not apply to all line geometries, voltages, or weather conditions. If a prediction method does not apply, the appropriate output data column will be zeros.

RESULTS OF ENVIRO PROGRAM

STUDY FILE NAME: Z:\EMF\IBR-MO~1\230MON~1\230CBPAM.I01

DATE: 11/20/2009 TIME: 10:29

230-kV SC Monopole Central Col

BUNDLE INFORMATION

BNDL #	CIRC #	VOLTAGE (kV)	VOLTAGE ANGLE (DEG)	LOAD (AMPS)	CURRENT ANGLE (DEG)	# OF COND	COORDINATES X (FT)	COORDINATES Y (FT)	PHASE
1	1	230.0	.0	1014.0	.0	1	10.0	48.0	A
2	2	230.0	240.0	1014.0	120.0	1	-10.0	39.0	B
3	3	230.0	120.0	1014.0	240.0	1	12.0	30.0	C
4	4	.0	.0	.0	.0	1	.0	67.9	GND

MINIMUM GROUND CLEARANCE = 30.000 FT.

SUBCONDUCTOR INFORMATION - REGULAR BUNDLES

BNDL #	DIAMETER (IN)	SPACING (IN)	DC RESIST. (OHMS/MI)	AC RESIST. (OHMS/MI)	AC REACT. (OHMS/MI)
1	1.165	.000	.09720	.09940	.395000
2	1.165	.000	.09720	.09940	.395000
3	1.165	.000	.09720	.09940	.395000
4	1.165	.000	.09720	.09940	.395000

MAXIMUM SURFACE GRADIENT (kV/cm)

BNDL #	Type	ACrms	PEAK(+)	PEAK(-)
1	AC	14.99	21.21	-21.21
2	AC	14.61	20.66	-20.66
3	AC	15.18	21.47	-21.47
4	Ground Wire	1.15	1.63	-1.63

AC ELECTRIC FIELD PROFILE at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	MAXIMUM FIELD (kV/m)	MINOR/MAJOR ELLIPSE AXES (ratio)	VERTICAL (kV/m)	HORIZONTAL (kV/m)	SPACE POTENTIAL (kV)
-200.0	-60.96	.040	.009	.040	.002	.040
-195.0	-59.44	.042	.010	.042	.002	.042

-190.0	-57.91	.045	.010	.045	.002	.045
-185.0	-56.39	.047	.010	.047	.002	.047
-180.0	-54.86	.051	.010	.050	.002	.050
-175.0	-53.34	.054	.011	.054	.002	.054
-170.0	-51.82	.058	.011	.058	.003	.058
-165.0	-50.29	.062	.011	.062	.003	.062
-160.0	-48.77	.066	.012	.066	.003	.066
-155.0	-47.24	.072	.012	.072	.004	.072
-150.0	-45.72	.077	.012	.077	.004	.077
-145.0	-44.20	.084	.013	.084	.005	.084
-140.0	-42.67	.091	.013	.091	.005	.091
-135.0	-41.15	.099	.013	.099	.006	.099
-130.0	-39.62	.108	.014	.108	.007	.108
-125.0	-38.10	.119	.014	.119	.008	.119
-120.0	-36.58	.131	.014	.131	.009	.131
-115.0	-35.05	.145	.015	.144	.010	.145
-110.0	-33.53	.160	.015	.160	.011	.160
-105.0	-32.00	.179	.015	.178	.013	.179
-100.0	-30.48	.200	.016	.199	.015	.200
-95.0	-28.96	.225	.016	.224	.018	.224
-90.0	-27.43	.253	.016	.253	.021	.253
-85.0	-25.91	.287	.017	.286	.025	.287
-80.0	-24.38	.327	.017	.326	.029	.327
-75.0	-22.86	.375	.017	.373	.034	.374
-70.0	-21.34	.430	.018	.429	.040	.430
-65.0	-19.81	.496	.018	.494	.048	.496
-60.0	-18.29	.574	.019	.571	.056	.573
-55.0	-16.76	.665	.020	.662	.065	.663
-50.0	-15.24	.769	.021	.766	.074	.767
-45.0	-13.72	.886	.023	.883	.082	.883
-40.0	-12.19	1.012	.026	1.009	.087	1.008
-35.0	-10.67	1.139	.031	1.136	.087	1.134
-30.0	-9.14	1.252	.040	1.251	.081	1.244
-25.0	-7.62	1.330	.057	1.330	.081	1.319
-20.0	-6.10	1.348	.087	1.348	.118	1.334
-15.0	-4.57	1.296	.144	1.295	.195	1.280
-10.0	-3.05	1.209	.235	1.208	.287	1.198
-5.0	-1.52	1.215	.294	1.213	.365	1.210
.0	.00	1.453	.228	1.437	.393	1.431
5.0	1.52	1.822	.139	1.806	.348	1.786
10.0	3.05	2.131	.087	2.126	.239	2.093
15.0	4.57	2.253	.063	2.253	.142	2.218
20.0	6.10	2.162	.055	2.159	.165	2.135
25.0	7.62	1.921	.056	1.912	.213	1.901
30.0	9.14	1.619	.061	1.606	.222	1.605
35.0	10.67	1.323	.067	1.310	.201	1.314
40.0	12.19	1.068	.072	1.058	.167	1.063
45.0	13.72	.863	.074	.855	.133	.860
50.0	15.24	.705	.074	.699	.104	.703
55.0	16.76	.583	.071	.579	.081	.582
60.0	18.29	.489	.067	.487	.063	.489
65.0	19.81	.417	.061	.415	.049	.416
70.0	21.34	.359	.056	.357	.039	.359
75.0	22.86	.313	.050	.312	.031	.312
80.0	24.38	.275	.045	.274	.026	.274
85.0	25.91	.243	.040	.242	.021	.243
90.0	27.43	.217	.036	.216	.018	.217
95.0	28.96	.194	.033	.194	.015	.194
100.0	30.48	.175	.030	.174	.013	.175
105.0	32.00	.158	.027	.158	.011	.158
110.0	33.53	.144	.025	.143	.010	.143
115.0	35.05	.131	.023	.131	.008	.131
120.0	36.58	.120	.021	.119	.007	.120
125.0	38.10	.110	.020	.110	.006	.110
130.0	39.62	.101	.018	.101	.006	.101
135.0	41.15	.093	.017	.093	.005	.093

140.0	42.67	.086	.016	.086	.005	.086
145.0	44.20	.080	.015	.080	.004	.080
150.0	45.72	.074	.014	.074	.004	.074
155.0	47.24	.069	.014	.069	.003	.069
160.0	48.77	.065	.013	.065	.003	.065
165.0	50.29	.061	.012	.060	.003	.060
170.0	51.82	.057	.012	.057	.002	.057
175.0	53.34	.053	.011	.053	.002	.053
180.0	54.86	.050	.011	.050	.002	.050
185.0	56.39	.047	.010	.047	.002	.047
190.0	57.91	.045	.010	.045	.002	.045
195.0	59.44	.042	.009	.042	.002	.042
200.0	60.96	.040	.009	.040	.001	.040

AC CURRENTS IN EACH BUNDLE:

BNDL #	----- AC CURRENTS (Amperes) ----- REAL	IMAGINARY	TOTAL	BUNDLE POSITION X-COORD	Y-COORD
1	1014.00	.00	1014.00	10.00	48.00
2	-507.00	878.15	1014.00	-10.00	39.00
3	-507.00	-878.15	1014.00	12.00	30.00
4	-37.01	-26.24	45.37	.00	67.90

MAGNETIC FIELD PROFILE
at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	<---------- AC MAGNETIC FIELD ----------> MAJOR AXIS (mG)	MINOR/ MAJOR (RATIO)	VERTICAL COMP (mG)	HORIZONTAL COMP (mG)	RMS RESULTANT (mG)
-200.0	-60.96	3.63	.544	3.63	1.97	4.13
-195.0	-59.44	3.79	.550	3.79	2.09	4.33
-190.0	-57.91	3.97	.557	3.97	2.22	4.54
-185.0	-56.39	4.16	.563	4.15	2.35	4.77
-180.0	-54.86	4.37	.568	4.36	2.50	5.02
-175.0	-53.34	4.59	.574	4.57	2.67	5.29
-170.0	-51.82	4.84	.579	4.81	2.85	5.59
-165.0	-50.29	5.10	.584	5.06	3.04	5.91
-160.0	-48.77	5.39	.589	5.34	3.26	6.25
-155.0	-47.24	5.70	.594	5.63	3.50	6.63
-150.0	-45.72	6.05	.598	5.95	3.77	7.05
-145.0	-44.20	6.43	.601	6.30	4.07	7.51
-140.0	-42.67	6.85	.605	6.68	4.41	8.01
-135.0	-41.15	7.32	.608	7.10	4.79	8.56
-130.0	-39.62	7.83	.610	7.55	5.22	9.17
-125.0	-38.10	8.41	.612	8.04	5.70	9.85
-120.0	-36.58	9.05	.613	8.57	6.25	10.61
-115.0	-35.05	9.77	.613	9.16	6.89	11.46
-110.0	-33.53	10.57	.613	9.79	7.61	12.41
-105.0	-32.00	11.49	.613	10.49	8.46	13.47
-100.0	-30.48	12.53	.611	11.25	9.43	14.68
-95.0	-28.96	13.72	.609	12.08	10.58	16.06
-90.0	-27.43	15.08	.605	12.98	11.92	17.62
-85.0	-25.91	16.64	.601	13.95	13.51	19.42

-80.0	-24.38	18.45	.596	14.98	15.40	21.48
-75.0	-22.86	20.56	.590	16.08	17.64	23.87
-70.0	-21.34	23.03	.583	17.23	20.33	26.65
-65.0	-19.81	25.92	.574	18.42	23.54	29.89
-60.0	-18.29	29.33	.565	19.61	27.39	33.69
-55.0	-16.76	33.37	.554	20.81	31.98	38.15
-50.0	-15.24	38.16	.542	22.08	37.37	43.41
-45.0	-13.72	43.83	.529	23.62	43.60	49.59
-40.0	-12.19	50.53	.515	26.02	50.53	56.83
-35.0	-10.67	58.37	.499	30.36	57.74	65.24
-30.0	-9.14	67.39	.483	38.12	64.41	74.84
-25.0	-7.62	77.53	.466	50.44	69.10	85.55
-20.0	-6.10	88.51	.450	67.34	69.92	97.07
-15.0	-4.57	99.81	.436	87.17	65.22	108.87
-10.0	-3.05	110.66	.424	106.41	55.85	120.18
-5.0	-1.52	120.06	.416	120.03	50.07	130.06
.0	.00	126.86	.415	122.83	61.49	137.36
5.0	1.52	129.81	.421	111.95	85.50	140.87
10.0	3.05	127.93	.435	89.93	106.65	139.50
15.0	4.57	121.09	.454	66.26	115.33	133.01
20.0	6.10	110.38	.479	53.12	110.24	122.37
25.0	7.62	97.68	.505	52.18	96.19	109.43
30.0	9.14	84.77	.532	54.09	79.33	96.02
35.0	10.67	72.83	.558	53.71	63.78	83.39
40.0	12.19	62.37	.581	50.88	51.14	72.14
45.0	13.72	53.49	.602	46.66	41.48	62.43
50.0	15.24	46.07	.620	42.00	34.25	54.19
55.0	16.76	39.90	.634	37.46	28.81	47.25
60.0	18.29	34.79	.646	33.30	24.63	41.42
65.0	19.81	30.54	.655	29.61	21.34	36.50
70.0	21.34	26.98	.661	26.39	18.69	32.34
75.0	22.86	23.99	.665	23.61	16.51	28.81
80.0	24.38	21.47	.667	21.22	14.68	25.80
85.0	25.91	19.31	.667	19.15	13.13	23.22
90.0	27.43	17.47	.666	17.36	11.80	20.99
95.0	28.96	15.87	.664	15.80	10.65	19.06
100.0	30.48	14.49	.661	14.45	9.66	17.38
105.0	32.00	13.29	.658	13.26	8.78	15.90
110.0	33.53	12.23	.653	12.21	8.02	14.60
115.0	35.05	11.29	.649	11.28	7.34	13.46
120.0	36.58	10.46	.643	10.46	6.74	12.44
125.0	38.10	9.72	.638	9.72	6.21	11.53
130.0	39.62	9.06	.632	9.06	5.73	10.72
135.0	41.15	8.47	.626	8.47	5.31	9.99
140.0	42.67	7.93	.620	7.93	4.92	9.34
145.0	44.20	7.45	.614	7.45	4.58	8.74
150.0	45.72	7.01	.608	7.01	4.27	8.21
155.0	47.24	6.61	.602	6.61	3.98	7.72
160.0	48.77	6.25	.596	6.24	3.73	7.27
165.0	50.29	5.91	.590	5.91	3.49	6.86
170.0	51.82	5.60	.584	5.60	3.28	6.49
175.0	53.34	5.32	.578	5.32	3.08	6.14
180.0	54.86	5.06	.572	5.05	2.90	5.83
185.0	56.39	4.82	.566	4.81	2.74	5.54
190.0	57.91	4.60	.560	4.59	2.59	5.27
195.0	59.44	4.39	.554	4.38	2.45	5.02
200.0	60.96	4.20	.548	4.19	2.32	4.78

****
*
*
* AUDIBLE NOISE
* GENERATED ACOUSTIC POWER
* (dB above 1uW/m)
*
*
****

BNDL #	Type	Summer Fair	L5 RAIN	L50 RAIN
1	AC	-74.30	-55.22	-64.83
2	AC	-76.19	-56.39	-66.47
3	AC	-73.41	-54.67	-64.06
4	Ground Wire	******	******	******

****
*
* AUDIBLE NOISE *
*
* Microphone is 5.00 feet above ground *
* Altitude 1000. ft *
*
****

<---------- HVTRC CALCULATION METHOD ---------->

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	L50 FAIR (dB(A))	L5 RAIN (dB(A))	L50 RAIN (dB(A))	Leq(24) (dB(A))	Ldn (dB(A))
-200.0	-60.96	25.3	44.4	34.8	33.0	40.7
-195.0	-59.44	25.4	44.6	34.9	33.2	40.9
-190.0	-57.91	25.5	44.7	35.0	33.3	41.0
-185.0	-56.39	25.7	44.8	35.2	33.5	41.1
-180.0	-54.86	25.8	45.0	35.3	33.6	41.3
-175.0	-53.34	26.0	45.1	35.5	33.7	41.4
-170.0	-51.82	26.1	45.3	35.6	33.9	41.6
-165.0	-50.29	26.3	45.4	35.8	34.0	41.7
-160.0	-48.77	26.4	45.6	35.9	34.2	41.9
-155.0	-47.24	26.6	45.7	36.1	34.4	42.0
-150.0	-45.72	26.7	45.9	36.2	34.5	42.2
-145.0	-44.20	26.9	46.1	36.4	34.7	42.4
-140.0	-42.67	27.1	46.2	36.6	34.8	42.5
-135.0	-41.15	27.3	46.4	36.7	35.0	42.7
-130.0	-39.62	27.4	46.6	36.9	35.2	42.9
-125.0	-38.10	27.6	46.8	37.1	35.4	43.1
-120.0	-36.58	27.8	47.0	37.3	35.6	43.3
-115.0	-35.05	28.0	47.1	37.5	35.8	43.5
-110.0	-33.53	28.2	47.3	37.7	36.0	43.7
-105.0	-32.00	28.4	47.6	37.9	36.2	43.9
-100.0	-30.48	28.6	47.8	38.1	36.4	44.1
-95.0	-28.96	28.8	48.0	38.3	36.6	44.3
-90.0	-27.43	29.1	48.2	38.6	36.8	44.5
-85.0	-25.91	29.3	48.5	38.8	37.1	44.8
-80.0	-24.38	29.5	48.7	39.0	37.3	45.0
-75.0	-22.86	29.8	49.0	39.3	37.6	45.3
-70.0	-21.34	30.1	49.2	39.6	37.8	45.5
-65.0	-19.81	30.3	49.5	39.8	38.1	45.8
-60.0	-18.29	30.6	49.8	40.1	38.4	46.1
-55.0	-16.76	30.9	50.1	40.4	38.7	46.4
-50.0	-15.24	31.2	50.4	40.7	39.0	46.7
-45.0	-13.72	31.5	50.7	41.0	39.3	47.0
-40.0	-12.19	31.9	51.0	41.4	39.6	47.3
-35.0	-10.67	32.2	51.4	41.7	40.0	47.7
-30.0	-9.14	32.5	51.7	42.0	40.3	48.0
-25.0	-7.62	32.9	52.0	42.4	40.6	48.3
-20.0	-6.10	33.2	52.3	42.7	41.0	48.7
-15.0	-4.57	33.5	52.6	43.0	41.3	49.0
-10.0	-3.05	33.8	52.9	43.3	41.6	49.3
-5.0	-1.52	34.1	53.1	43.5	41.8	49.5
.0	.00	34.3	53.3	43.7	42.0	49.7
5.0	1.52	34.4	53.5	43.9	42.1	49.8
10.0	3.05	34.4	53.5	43.9	42.2	49.9

15.0	4.57	34.4	53.4	43.8	42.1	49.8
20.0	6.10	34.2	53.2	43.6	41.9	49.6
25.0	7.62	33.9	52.9	43.4	41.6	49.3
30.0	9.14	33.6	52.6	43.0	41.3	49.0
35.0	10.67	33.2	52.2	42.7	40.9	48.6
40.0	12.19	32.8	51.9	42.3	40.6	48.3
45.0	13.72	32.5	51.5	41.9	40.2	47.9
50.0	15.24	32.1	51.2	41.6	39.8	47.5
55.0	16.76	31.8	50.8	41.2	39.5	47.2
60.0	18.29	31.4	50.5	40.9	39.2	46.9
65.0	19.81	31.1	50.2	40.6	38.8	46.5
70.0	21.34	30.8	49.9	40.3	38.5	46.2
75.0	22.86	30.5	49.6	40.0	38.2	45.9
80.0	24.38	30.2	49.3	39.7	38.0	45.7
85.0	25.91	29.9	49.0	39.4	37.7	45.4
90.0	27.43	29.7	48.8	39.1	37.4	45.1
95.0	28.96	29.4	48.5	38.9	37.2	44.9
100.0	30.48	29.2	48.3	38.7	36.9	44.6
105.0	32.00	29.0	48.0	38.4	36.7	44.4
110.0	33.53	28.7	47.8	38.2	36.5	44.2
115.0	35.05	28.5	47.6	38.0	36.3	44.0
120.0	36.58	28.3	47.4	37.8	36.1	43.7
125.0	38.10	28.1	47.2	37.6	35.9	43.5
130.0	39.62	27.9	47.0	37.4	35.7	43.3
135.0	41.15	27.7	46.8	37.2	35.5	43.2
140.0	42.67	27.5	46.6	37.0	35.3	43.0
145.0	44.20	27.3	46.4	36.8	35.1	42.8
150.0	45.72	27.2	46.3	36.6	34.9	42.6
155.0	47.24	27.0	46.1	36.5	34.8	42.4
160.0	48.77	26.8	45.9	36.3	34.6	42.3
165.0	50.29	26.7	45.8	36.1	34.4	42.1
170.0	51.82	26.5	45.6	36.0	34.3	42.0
175.0	53.34	26.4	45.4	35.8	34.1	41.8
180.0	54.86	26.2	45.3	35.7	34.0	41.6
185.0	56.39	26.1	45.1	35.5	33.8	41.5
190.0	57.91	25.9	45.0	35.4	33.7	41.4
195.0	59.44	25.8	44.9	35.2	33.5	41.2
200.0	60.96	25.6	44.7	35.1	33.4	41.1

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**************************
*                        *
*     AUDIBLE NOISE      *
*    (other methods)     *
*                        *
* Altitude     1000. ft *
*                        *
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		<------ BPA METHOD ------->				<- CRIEPI -->	EdF	ENEL	IREQ
LATERAL DISTANCE		FAIR WEATHER	L5 RAIN	L50 RAIN	Ldn	AVERAGE FAIR	L5 RAIN	L5 RAIN	L5 RAIN
(feet)	(meters)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
-200.0	-60.96	11.7	40.2	36.7	.0	.0	.0	.0	.0
-195.0	-59.44	11.8	40.3	36.8	.0	.0	.0	.0	.0
-190.0	-57.91	11.9	40.4	36.9	.0	.0	.0	.0	.0
-185.0	-56.39	12.1	40.6	37.1	.0	.0	.0	.0	.0

-180.0	-54.86	12.2	40.7	37.2	.0	.0	.0	.0	.0
.0									
-175.0	-53.34	12.3	40.8	37.3	.0	.0	.0	.0	.0
.0									
-170.0	-51.82	12.5	41.0	37.5	.0	.0	.0	.0	.0
.0									
-165.0	-50.29	12.6	41.1	37.6	.0	.0	.0	.0	.0
.0									
-160.0	-48.77	12.7	41.2	37.7	.0	.0	.0	.0	.0
.0									
-155.0	-47.24	12.9	41.4	37.9	.0	.0	.0	.0	.0
.0									
-150.0	-45.72	13.0	41.5	38.0	.0	.0	.0	.0	.0
.0									
-145.0	-44.20	13.2	41.7	38.2	.0	.0	.0	.0	.0
.0									
-140.0	-42.67	13.4	41.9	38.4	.0	.0	.0	.0	.0
.0									
-135.0	-41.15	13.5	42.0	38.5	.0	.0	.0	.0	.0
.0									
-130.0	-39.62	13.7	42.2	38.7	.0	.0	.0	.0	.0
.0									
-125.0	-38.10	13.9	42.4	38.9	.0	.0	.0	.0	.0
.0									
-120.0	-36.58	14.1	42.6	39.1	.0	.0	.0	.0	.0
.0									
-115.0	-35.05	14.2	42.7	39.2	.0	.0	.0	.0	.0
.0									
-110.0	-33.53	14.4	42.9	39.4	.0	.0	.0	.0	.0
.0									
-105.0	-32.00	14.6	43.1	39.6	.0	.0	.0	.0	.0
.0									
-100.0	-30.48	14.8	43.3	39.8	.0	.0	.0	.0	.0
.0									
-95.0	-28.96	15.1	43.6	40.1	.0	.0	.0	.0	.0
.0									
-90.0	-27.43	15.3	43.8	40.3	.0	.0	.0	.0	.0
.0									
-85.0	-25.91	15.5	44.0	40.5	.0	.0	.0	.0	.0
.0									
-80.0	-24.38	15.8	44.3	40.8	.0	.0	.0	.0	.0
.0									
-75.0	-22.86	16.0	44.5	41.0	.0	.0	.0	.0	.0
.0									
-70.0	-21.34	16.3	44.8	41.3	.0	.0	.0	.0	.0
.0									
-65.0	-19.81	16.6	45.1	41.6	.0	.0	.0	.0	.0
.0									
-60.0	-18.29	16.9	45.4	41.9	.0	.0	.0	.0	.0
.0									
-55.0	-16.76	17.2	45.7	42.2	.0	.0	.0	.0	.0
.0									
-50.0	-15.24	17.5	46.0	42.5	.0	.0	.0	.0	.0
.0									
-45.0	-13.72	17.8	46.3	42.8	.0	.0	.0	.0	.0
.0									
-40.0	-12.19	18.2	46.7	43.2	.0	.0	.0	.0	.0
.0									
-35.0	-10.67	18.5	47.0	43.5	.0	.0	.0	.0	.0
.0									
-30.0	-9.14	18.9	47.4	43.9	.0	.0	.0	.0	.0
.0									
-25.0	-7.62	19.3	47.8	44.3	.0	.0	.0	.0	.0
.0									
-20.0	-6.10	19.6	48.1	44.6	.0	.0	.0	.0	.0
.0									

-15.0	-4.57	19.9	48.4	44.9	.0	.0	.0	.0	.0
.0									
-10.0	-3.05	20.2	48.7	45.2	.0	.0	.0	.0	.0
.0									
-5.0	-1.52	20.5	49.0	45.5	.0	.0	.0	.0	.0
.0									
.0	.00	20.7	49.2	45.7	.0	.0	.0	.0	.0
.0									
5.0	1.52	20.8	49.3	45.8	.0	.0	.0	.0	.0
.0									
10.0	3.05	20.9	49.4	45.9	.0	.0	.0	.0	.0
.0									
15.0	4.57	20.8	49.3	45.8	.0	.0	.0	.0	.0
.0									
20.0	6.10	20.6	49.1	45.6	.0	.0	.0	.0	.0
.0									
25.0	7.62	20.3	48.8	45.3	.0	.0	.0	.0	.0
.0									
30.0	9.14	19.9	48.4	44.9	.0	.0	.0	.0	.0
.0									
35.0	10.67	19.5	48.0	44.5	.0	.0	.0	.0	.0
.0									
40.0	12.19	19.1	47.6	44.1	.0	.0	.0	.0	.0
.0									
45.0	13.72	18.7	47.2	43.7	.0	.0	.0	.0	.0
.0									
50.0	15.24	18.4	46.9	43.4	.0	.0	.0	.0	.0
.0									
55.0	16.76	18.0	46.5	43.0	.0	.0	.0	.0	.0
.0									
60.0	18.29	17.6	46.1	42.6	.0	.0	.0	.0	.0
.0									
65.0	19.81	17.3	45.8	42.3	.0	.0	.0	.0	.0
.0									
70.0	21.34	17.0	45.5	42.0	.0	.0	.0	.0	.0
.0									
75.0	22.86	16.7	45.2	41.7	.0	.0	.0	.0	.0
.0									
80.0	24.38	16.4	44.9	41.4	.0	.0	.0	.0	.0
.0									
85.0	25.91	16.1	44.6	41.1	.0	.0	.0	.0	.0
.0									
90.0	27.43	15.9	44.4	40.9	.0	.0	.0	.0	.0
.0									
95.0	28.96	15.6	44.1	40.6	.0	.0	.0	.0	.0
.0									
100.0	30.48	15.4	43.9	40.4	.0	.0	.0	.0	.0
.0									
105.0	32.00	15.1	43.6	40.1	.0	.0	.0	.0	.0
.0									
110.0	33.53	14.9	43.4	39.9	.0	.0	.0	.0	.0
.0									
115.0	35.05	14.7	43.2	39.7	.0	.0	.0	.0	.0
.0									
120.0	36.58	14.5	43.0	39.5	.0	.0	.0	.0	.0
.0									
125.0	38.10	14.3	42.8	39.3	.0	.0	.0	.0	.0
.0									
130.0	39.62	14.1	42.6	39.1	.0	.0	.0	.0	.0
.0									
135.0	41.15	13.9	42.4	38.9	.0	.0	.0	.0	.0
.0									
140.0	42.67	13.7	42.2	38.7	.0	.0	.0	.0	.0
.0									
145.0	44.20	13.6	42.1	38.6	.0	.0	.0	.0	.0
.0									

150.0	45.72	13.4	41.9	38.4	.0	.0	.0	.0	.0
.0									
155.0	47.24	13.2	41.7	38.2	.0	.0	.0	.0	.0
.0									
160.0	48.77	13.1	41.6	38.1	.0	.0	.0	.0	.0
.0									
165.0	50.29	12.9	41.4	37.9	.0	.0	.0	.0	.0
.0									
170.0	51.82	12.8	41.3	37.8	.0	.0	.0	.0	.0
.0									
175.0	53.34	12.6	41.1	37.6	.0	.0	.0	.0	.0
.0									
180.0	54.86	12.5	41.0	37.5	.0	.0	.0	.0	.0
.0									
185.0	56.39	12.4	40.9	37.4	.0	.0	.0	.0	.0
.0									
190.0	57.91	12.2	40.7	37.2	.0	.0	.0	.0	.0
.0									
195.0	59.44	12.1	40.6	37.1	.0	.0	.0	.0	.0
.0									
200.0	60.96	12.0	40.5	37.0	.0	.0	.0	.0	.0
.0									

Audible noise prediction methods do not apply to all line geometries, voltages, or weather conditions. If a prediction method does not apply, the appropriate output data column will be zeros.

RESULTS OF ENVIRO PROGRAM

STUDY FILE NAME: C:\PROGRA~1\EPRI\EMFW_251\ENVIRO\230CBPAH.I01

DATE: 11/20/2009 TIME: 10:57

230-kV SC H-Frame Central Coll

BUNDLE INFORMATION

BNDL #	CIRC #	VOLTAGE (kV)	VOLTAGE ANGLE (DEG)	LOAD (AMPS)	CURRENT ANGLE (DEG)	# OF COND	COORDINATES X (FT)	COORDINATES Y (FT)	PHASE
1	1	230.0	.0	1014.0	.0	1	-20.0	30.0	A
2	2	230.0	240.0	1014.0	120.0	1	.0	30.0	B
3	3	230.0	120.0	1014.0	240.0	1	20.0	30.0	C
4	4	.0	.0	.0	.0	1	-10.0	47.0	GND
5	5	.0	.0	.0	.0	1	10.0	47.0	GND

MINIMUM GROUND CLEARANCE = 30.000 FT.

SUBCONDUCTOR INFORMATION - REGULAR BUNDLES

BNDL #	DIAMETER (IN)	SPACING (IN)	DC RESIST. (OHMS/MI)	AC RESIST. (OHMS/MI)	AC REACT. (OHMS/MI)
1	1.165	.000	.09720	.09940	.395000
2	1.165	.000	.09720	.09940	.395000
3	1.165	.000	.09720	.09940	.395000
4	1.165	.000	.09720	.09940	.395000
5	1.165	.000	.09720	.09940	.395000

MAXIMUM SURFACE GRADIENT (kV/cm)

BNDL #	Type	ACrms	PEAK(+)	PEAK(-)
1	AC	14.41	20.38	-20.38
2	AC	15.32	21.67	-21.67
3	AC	14.41	20.38	-20.38
4	Ground Wire	1.04	1.48	-1.48
5	Ground Wire	1.04	1.48	-1.48

AC ELECTRIC FIELD PROFILE at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	MAXIMUM FIELD (kV/m)	MINOR/MAJOR ELLIPSE AXES (ratio)	VERTICAL (kV/m)	HORIZONTAL (kV/m)	SPACE POTENTIAL (kV)

-200.0	-60.96	.035	.004	.035	.002	.035
-195.0	-59.44	.038	.004	.038	.002	.038
-190.0	-57.91	.041	.004	.041	.002	.041
-185.0	-56.39	.044	.004	.044	.002	.044
-180.0	-54.86	.048	.004	.048	.002	.048
-175.0	-53.34	.052	.004	.052	.003	.052
-170.0	-51.82	.056	.004	.056	.003	.056
-165.0	-50.29	.061	.004	.061	.003	.061
-160.0	-48.77	.067	.004	.067	.004	.067
-155.0	-47.24	.073	.003	.073	.004	.073
-150.0	-45.72	.081	.003	.080	.005	.081
-145.0	-44.20	.089	.003	.089	.006	.089
-140.0	-42.67	.098	.003	.098	.007	.098
-135.0	-41.15	.109	.003	.109	.008	.109
-130.0	-39.62	.121	.003	.121	.009	.121
-125.0	-38.10	.135	.003	.135	.010	.135
-120.0	-36.58	.152	.003	.151	.012	.152
-115.0	-35.05	.171	.002	.171	.014	.171
-110.0	-33.53	.194	.002	.193	.016	.194
-105.0	-32.00	.221	.002	.220	.019	.221
-100.0	-30.48	.253	.002	.252	.023	.253
-95.0	-28.96	.291	.002	.290	.028	.291
-90.0	-27.43	.338	.001	.336	.033	.337
-85.0	-25.91	.394	.001	.392	.040	.393
-80.0	-24.38	.462	.001	.460	.050	.462
-75.0	-22.86	.546	.001	.543	.061	.546
-70.0	-21.34	.650	.001	.646	.076	.649
-65.0	-19.81	.779	.001	.773	.094	.778
-60.0	-18.29	.939	.001	.931	.116	.936
-55.0	-16.76	1.135	.002	1.126	.141	1.132
-50.0	-15.24	1.374	.003	1.363	.170	1.369
-45.0	-13.72	1.655	.006	1.643	.195	1.647
-40.0	-12.19	1.967	.010	1.956	.208	1.956
-35.0	-10.67	2.279	.018	2.271	.192	2.261
-30.0	-9.14	2.528	.031	2.525	.141	2.502
-25.0	-7.62	2.626	.053	2.626	.139	2.590
-20.0	-6.10	2.503	.092	2.497	.284	2.458
-15.0	-4.57	2.165	.160	2.147	.444	2.114
-10.0	-3.05	1.736	.264	1.715	.534	1.688
-5.0	-1.52	1.411	.372	1.403	.545	1.368
.0	.00	1.305	.409	1.305	.534	1.260
5.0	1.52	1.411	.372	1.403	.545	1.368
10.0	3.05	1.736	.264	1.715	.534	1.688
15.0	4.57	2.165	.160	2.147	.444	2.114
20.0	6.10	2.503	.092	2.497	.284	2.458
25.0	7.62	2.626	.053	2.626	.139	2.590
30.0	9.14	2.528	.031	2.525	.141	2.502
35.0	10.67	2.279	.018	2.271	.192	2.261
40.0	12.19	1.967	.010	1.956	.208	1.956
45.0	13.72	1.655	.006	1.643	.195	1.647
50.0	15.24	1.374	.003	1.363	.170	1.369
55.0	16.76	1.135	.002	1.126	.141	1.132
60.0	18.29	.939	.001	.931	.116	.936
65.0	19.81	.779	.001	.773	.094	.778
70.0	21.34	.650	.001	.646	.076	.649
75.0	22.86	.546	.001	.543	.061	.546
80.0	24.38	.462	.001	.460	.050	.462
85.0	25.91	.394	.001	.392	.040	.393
90.0	27.43	.338	.001	.336	.033	.337
95.0	28.96	.291	.002	.290	.028	.291
100.0	30.48	.253	.002	.252	.023	.253
105.0	32.00	.221	.002	.220	.019	.221
110.0	33.53	.194	.002	.193	.016	.194
115.0	35.05	.171	.002	.171	.014	.171
120.0	36.58	.152	.003	.151	.012	.152

125.0	38.10	.135	.003	.135	.010	.135
130.0	39.62	.121	.003	.121	.009	.121
135.0	41.15	.109	.003	.109	.008	.109
140.0	42.67	.098	.003	.098	.007	.098
145.0	44.20	.089	.003	.089	.006	.089
150.0	45.72	.081	.003	.080	.005	.081
155.0	47.24	.073	.003	.073	.004	.073
160.0	48.77	.067	.004	.067	.004	.067
165.0	50.29	.061	.004	.061	.003	.061
170.0	51.82	.056	.004	.056	.003	.056
175.0	53.34	.052	.004	.052	.003	.052
180.0	54.86	.048	.004	.048	.002	.048
185.0	56.39	.044	.004	.044	.002	.044
190.0	57.91	.041	.004	.041	.002	.041
195.0	59.44	.038	.004	.038	.002	.038
200.0	60.96	.035	.004	.035	.002	.035

AC CURRENTS IN EACH BUNDLE:

BNDL #	AC CURRENTS (Amperes) REAL	IMAGINARY	TOTAL	BUNDLE POSITION X-COORD	Y-COORD
1	1014.00	.00	1014.00	-20.00	30.00
2	-507.00	878.15	1014.00	.00	30.00
3	-507.00	-878.15	1014.00	20.00	30.00
4	-51.04	-60.94	79.49	-10.00	47.00
5	72.48	33.70	79.93	10.00	47.00

MAGNETIC FIELD PROFILE
at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	AC MAGNETIC FIELD MAJOR AXIS (mG)	MINOR/MAJOR (RATIO)	VERTICAL COMP (mG)	HORIZONTAL COMP (mG)	RMS RESULTANT (mG)
-200.0	-60.96	5.83	.008	5.61	1.59	5.83
-195.0	-59.44	6.12	.008	5.88	1.71	6.12
-190.0	-57.91	6.44	.008	6.17	1.84	6.44
-185.0	-56.39	6.78	.008	6.48	1.98	6.78
-180.0	-54.86	7.15	.008	6.82	2.14	7.15
-175.0	-53.34	7.55	.008	7.18	2.31	7.55
-170.0	-51.82	7.98	.009	7.58	2.51	7.98
-165.0	-50.29	8.46	.009	8.00	2.73	8.46
-160.0	-48.77	8.97	.010	8.47	2.97	8.97
-155.0	-47.24	9.54	.010	8.97	3.25	9.54
-150.0	-45.72	10.17	.011	9.52	3.57	10.17
-145.0	-44.20	10.86	.011	10.12	3.94	10.86
-140.0	-42.67	11.62	.012	10.78	4.35	11.62
-135.0	-41.15	12.47	.013	11.50	4.83	12.47
-130.0	-39.62	13.41	.014	12.29	5.38	13.41
-125.0	-38.10	14.47	.015	13.16	6.02	14.47
-120.0	-36.58	15.65	.016	14.12	6.76	15.65
-115.0	-35.05	16.99	.017	15.18	7.64	16.99
-110.0	-33.53	18.51	.019	16.36	8.67	18.51
-105.0	-32.00	20.24	.021	17.66	9.90	20.24

-100.0	-30.48	22.22	.023	19.10	11.37	22.23
-95.0	-28.96	24.50	.026	20.69	13.15	24.51
-90.0	-27.43	27.15	.029	22.44	15.30	27.16
-85.0	-25.91	30.25	.032	24.36	17.95	30.26
-80.0	-24.38	33.88	.036	26.44	21.22	33.90
-75.0	-22.86	38.18	.041	28.65	25.29	38.22
-70.0	-21.34	43.32	.046	30.92	30.40	43.36
-65.0	-19.81	49.48	.053	33.11	36.86	49.55
-60.0	-18.29	56.92	.061	34.96	45.05	57.03
-55.0	-16.76	65.95	.071	35.99	55.46	66.12
-50.0	-15.24	76.92	.083	35.44	68.57	77.18
-45.0	-13.72	90.17	.098	32.12	84.72	90.60
-40.0	-12.19	105.94	.117	24.90	103.71	106.65
-35.0	-10.67	124.10	.140	17.87	124.02	125.30
-30.0	-9.14	143.84	.169	33.69	141.94	145.88
-25.0	-7.62	163.42	.205	69.96	151.45	166.82
-20.0	-6.10	180.36	.250	113.92	146.89	185.89
-15.0	-4.57	192.49	.301	154.79	128.29	201.04
-10.0	-3.05	199.16	.356	183.60	104.74	211.38
-5.0	-1.52	201.57	.400	198.04	88.99	217.12
.0	.00	201.88	.418	201.88	84.47	218.84
5.0	1.52	201.26	.400	197.95	88.39	216.78
10.0	3.05	198.57	.355	183.47	103.65	210.73
15.0	4.57	191.65	.301	154.70	126.95	200.12
20.0	6.10	179.32	.249	113.92	145.47	184.77
25.0	7.62	162.25	.204	70.02	150.04	165.58
30.0	9.14	142.60	.167	33.66	140.60	144.57
35.0	10.67	122.83	.138	17.32	122.77	123.99
40.0	12.19	104.69	.114	24.17	102.56	105.37
45.0	13.72	88.96	.095	31.39	83.67	89.37
50.0	15.24	75.76	.080	34.72	67.61	76.01
55.0	16.76	64.85	.068	35.28	54.59	65.00
60.0	18.29	55.88	.058	34.26	44.26	55.97
65.0	19.81	48.49	.050	32.43	36.13	48.55
70.0	21.34	42.38	.043	30.25	29.73	42.42
75.0	22.86	37.30	.037	28.00	24.68	37.32
80.0	24.38	33.04	.033	25.81	20.65	33.06
85.0	25.91	29.45	.029	23.75	17.42	29.46
90.0	27.43	26.39	.025	21.85	14.81	26.40
95.0	28.96	23.78	.022	20.12	12.69	23.79
100.0	30.48	21.53	.020	18.55	10.94	21.53
105.0	32.00	19.58	.018	17.13	9.49	19.58
110.0	33.53	17.88	.016	15.85	8.28	17.88
115.0	35.05	16.39	.015	14.69	7.26	16.39
120.0	36.58	15.07	.013	13.64	6.40	15.07
125.0	38.10	13.91	.012	12.70	5.67	13.91
130.0	39.62	12.87	.011	11.84	5.05	12.87
135.0	41.15	11.95	.010	11.07	4.51	11.95
140.0	42.67	11.12	.010	10.36	4.04	11.12
145.0	44.20	10.38	.009	9.72	3.64	10.38
150.0	45.72	9.70	.009	9.13	3.28	9.70
155.0	47.24	9.10	.009	8.60	2.97	9.10
160.0	48.77	8.54	.008	8.10	2.70	8.54
165.0	50.29	8.04	.008	7.65	2.46	8.04
170.0	51.82	7.58	.008	7.24	2.25	7.58
175.0	53.34	7.15	.008	6.85	2.06	7.15
180.0	54.86	6.77	.008	6.50	1.89	6.77
185.0	56.39	6.41	.008	6.17	1.73	6.41
190.0	57.91	6.08	.008	5.87	1.60	6.08
195.0	59.44	5.78	.008	5.59	1.47	5.78
200.0	60.96	5.49	.009	5.32	1.36	5.49

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*
* AUDIBLE NOISE
* GENERATED ACOUSTIC POWER
*

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*       (dB above 1uW/m)        *
*                               *
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BNDL #	Type	Summer Fair	L5 RAIN	L50 RAIN
1	AC	-77.20	-57.01	-67.34
2	AC	-72.76	-54.26	-63.49
3	AC	-77.20	-57.01	-67.34
4	Ground Wire	******	******	******
5	Ground Wire	******	******	******

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*****************************************
*                                       *
*              AUDIBLE NOISE            *
*                                       *
* Microphone is   5.00 feet  above ground *
*          Altitude     1000. ft        *
*                                       *
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<-------------- HVTRC CALCULATION METHOD ---------->

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	L50 FAIR (dB(A))	L5 RAIN (dB(A))	L50 RAIN (dB(A))	Leq(24) (dB(A))	Ldn (dB(A))
-200.0	-60.96	24.8	44.1	34.3	32.6	40.3
-195.0	-59.44	24.9	44.2	34.5	32.8	40.5
-190.0	-57.91	25.1	44.4	34.6	32.9	40.6
-185.0	-56.39	25.2	44.5	34.8	33.0	40.7
-180.0	-54.86	25.4	44.7	34.9	33.2	40.9
-175.0	-53.34	25.5	44.8	35.1	33.3	41.0
-170.0	-51.82	25.7	45.0	35.2	33.5	41.2
-165.0	-50.29	25.8	45.1	35.4	33.7	41.4
-160.0	-48.77	26.0	45.3	35.5	33.8	41.5
-155.0	-47.24	26.2	45.5	35.7	34.0	41.7
-150.0	-45.72	26.3	45.6	35.9	34.2	41.9
-145.0	-44.20	26.5	45.8	36.0	34.3	42.0
-140.0	-42.67	26.7	46.0	36.2	34.5	42.2
-135.0	-41.15	26.9	46.2	36.4	34.7	42.4
-130.0	-39.62	27.1	46.4	36.6	34.9	42.6
-125.0	-38.10	27.3	46.6	36.8	35.1	42.8
-120.0	-36.58	27.5	46.8	37.0	35.3	43.0
-115.0	-35.05	27.7	47.0	37.2	35.5	43.2
-110.0	-33.53	27.9	47.2	37.4	35.7	43.4
-105.0	-32.00	28.1	47.4	37.7	35.9	43.6
-100.0	-30.48	28.4	47.7	37.9	36.2	43.9
-95.0	-28.96	28.6	47.9	38.1	36.4	44.1
-90.0	-27.43	28.9	48.2	38.4	36.7	44.4
-85.0	-25.91	29.1	48.4	38.7	37.0	44.6
-80.0	-24.38	29.4	48.7	38.9	37.2	44.9
-75.0	-22.86	29.7	49.0	39.2	37.5	45.2
-70.0	-21.34	30.0	49.3	39.5	37.8	45.5
-65.0	-19.81	30.3	49.7	39.9	38.2	45.9
-60.0	-18.29	30.7	50.0	40.2	38.5	46.2
-55.0	-16.76	31.0	50.4	40.6	38.9	46.6
-50.0	-15.24	31.4	50.7	41.0	39.2	46.9
-45.0	-13.72	31.8	51.1	41.3	39.6	47.3
-40.0	-12.19	32.2	51.5	41.8	40.0	47.7
-35.0	-10.67	32.6	52.0	42.2	40.5	48.2
-30.0	-9.14	33.0	52.4	42.6	40.9	48.6
-25.0	-7.62	33.4	52.7	43.0	41.2	48.9
-20.0	-6.10	33.8	53.0	43.3	41.6	49.3
-15.0	-4.57	34.1	53.3	43.6	41.9	49.5

-10.0	-3.05	34.3	53.5	43.8	42.1	49.8
-5.0	-1.52	34.4	53.6	43.9	42.2	49.9
.0	.00	34.5	53.7	44.0	42.3	50.0
5.0	1.52	34.4	53.6	43.9	42.2	49.9
10.0	3.05	34.3	53.5	43.8	42.1	49.8
15.0	4.57	34.1	53.3	43.6	41.9	49.5
20.0	6.10	33.8	53.0	43.3	41.6	49.3
25.0	7.62	33.4	52.7	43.0	41.2	48.9
30.0	9.14	33.0	52.4	42.6	40.9	48.6
35.0	10.67	32.6	52.0	42.2	40.5	48.2
40.0	12.19	32.2	51.5	41.8	40.0	47.7
45.0	13.72	31.8	51.1	41.3	39.6	47.3
50.0	15.24	31.4	50.7	41.0	39.2	46.9
55.0	16.76	31.0	50.4	40.6	38.9	46.6
60.0	18.29	30.7	50.0	40.2	38.5	46.2
65.0	19.81	30.3	49.7	39.9	38.2	45.9
70.0	21.34	30.0	49.3	39.5	37.8	45.5
75.0	22.86	29.7	49.0	39.2	37.5	45.2
80.0	24.38	29.4	48.7	38.9	37.2	44.9
85.0	25.91	29.1	48.4	38.7	37.0	44.6
90.0	27.43	28.9	48.2	38.4	36.7	44.4
95.0	28.96	28.6	47.9	38.1	36.4	44.1
100.0	30.48	28.4	47.7	37.9	36.2	43.9
105.0	32.00	28.1	47.4	37.7	35.9	43.6
110.0	33.53	27.9	47.2	37.4	35.7	43.4
115.0	35.05	27.7	47.0	37.2	35.5	43.2
120.0	36.58	27.5	46.8	37.0	35.3	43.0
125.0	38.10	27.3	46.6	36.8	35.1	42.8
130.0	39.62	27.1	46.4	36.6	34.9	42.6
135.0	41.15	26.9	46.2	36.4	34.7	42.4
140.0	42.67	26.7	46.0	36.2	34.5	42.2
145.0	44.20	26.5	45.8	36.0	34.3	42.0
150.0	45.72	26.3	45.6	35.9	34.2	41.9
155.0	47.24	26.2	45.5	35.7	34.0	41.7
160.0	48.77	26.0	45.3	35.5	33.8	41.5
165.0	50.29	25.8	45.1	35.4	33.7	41.4
170.0	51.82	25.7	45.0	35.2	33.5	41.2
175.0	53.34	25.5	44.8	35.1	33.3	41.0
180.0	54.86	25.4	44.7	34.9	33.2	40.9
185.0	56.39	25.2	44.5	34.8	33.0	40.7
190.0	57.91	25.1	44.4	34.6	32.9	40.6
195.0	59.44	24.9	44.2	34.5	32.8	40.5
200.0	60.96	24.8	44.1	34.3	32.6	40.3

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*                        *
*     AUDIBLE NOISE      *
*    (other methods)     *
*                        *
* Altitude     1000. ft *
*                        *
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		<------ BPA METHOD ------->			<- CRIEPI -->	EdF	ENEL	IREQ
LATERAL DISTANCE		FAIR WEATHER	L5 RAIN	L50 RAIN	Ldn	AVERAGE FAIR	L5 RAIN	L5 RAIN	L5 RAIN	L5 RAIN
(feet)	(meters)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
-200.0	-60.96	11.3	39.8	36.3	.0	.0	.0	.0	.0	.0
-195.0	-59.44	11.5	40.0	36.5	.0	.0	.0	.0	.0	

-190.0	-57.91	11.6	40.1	36.6	.0	.0	.0	.0	.0
-185.0	-56.39	11.7	40.2	36.7	.0	.0	.0	.0	.0
-180.0	-54.86	11.8	40.3	36.8	.0	.0	.0	.0	.0
-175.0	-53.34	12.0	40.5	37.0	.0	.0	.0	.0	.0
-170.0	-51.82	12.1	40.6	37.1	.0	.0	.0	.0	.0
-165.0	-50.29	12.3	40.8	37.3	.0	.0	.0	.0	.0
-160.0	-48.77	12.4	40.9	37.4	.0	.0	.0	.0	.0
-155.0	-47.24	12.6	41.1	37.6	.0	.0	.0	.0	.0
-150.0	-45.72	12.7	41.2	37.7	.0	.0	.0	.0	.0
-145.0	-44.20	12.9	41.4	37.9	.0	.0	.0	.0	.0
-140.0	-42.67	13.1	41.6	38.1	.0	.0	.0	.0	.0
-135.0	-41.15	13.3	41.8	38.3	.0	.0	.0	.0	.0
-130.0	-39.62	13.4	41.9	38.4	.0	.0	.0	.0	.0
-125.0	-38.10	13.6	42.1	38.6	.0	.0	.0	.0	.0
-120.0	-36.58	13.8	42.3	38.8	.0	.0	.0	.0	.0
-115.0	-35.05	14.0	42.5	39.0	.0	.0	.0	.0	.0
-110.0	-33.53	14.3	42.8	39.3	.0	.0	.0	.0	.0
-105.0	-32.00	14.5	43.0	39.5	.0	.0	.0	.0	.0
-100.0	-30.48	14.7	43.2	39.7	.0	.0	.0	.0	.0
-95.0	-28.96	15.0	43.5	40.0	.0	.0	.0	.0	.0
-90.0	-27.43	15.2	43.7	40.2	.0	.0	.0	.0	.0
-85.0	-25.91	15.5	44.0	40.5	.0	.0	.0	.0	.0
-80.0	-24.38	15.8	44.3	40.8	.0	.0	.0	.0	.0
-75.0	-22.86	16.1	44.6	41.1	.0	.0	.0	.0	.0
-70.0	-21.34	16.4	44.9	41.4	.0	.0	.0	.0	.0
-65.0	-19.81	16.7	45.2	41.7	.0	.0	.0	.0	.0
-60.0	-18.29	17.1	45.6	42.1	.0	.0	.0	.0	.0
-55.0	-16.76	17.5	46.0	42.5	.0	.0	.0	.0	.0
-50.0	-15.24	17.9	46.4	42.9	.0	.0	.0	.0	.0
-45.0	-13.72	18.3	46.8	43.3	.0	.0	.0	.0	.0
-40.0	-12.19	18.8	47.3	43.8	.0	.0	.0	.0	.0
-35.0	-10.67	19.2	47.7	44.2	.0	.0	.0	.0	.0
-30.0	-9.14	19.6	48.1	44.6	.0	.0	.0	.0	.0

-25.0	-7.62	20.0	48.5	45.0	.0	.0	.0	.0	.0
-20.0	-6.10	20.4	48.9	45.4	.0	.0	.0	.0	.0
-15.0	-4.57	20.7	49.2	45.7	.0	.0	.0	.0	.0
-10.0	-3.05	20.9	49.4	45.9	.0	.0	.0	.0	.0
-5.0	-1.52	21.0	49.5	46.0	.0	.0	.0	.0	.0
.0	.00	21.1	49.6	46.1	.0	.0	.0	.0	.0
5.0	1.52	21.0	49.5	46.0	.0	.0	.0	.0	.0
10.0	3.05	20.9	49.4	45.9	.0	.0	.0	.0	.0
15.0	4.57	20.7	49.2	45.7	.0	.0	.0	.0	.0
20.0	6.10	20.4	48.9	45.4	.0	.0	.0	.0	.0
25.0	7.62	20.0	48.5	45.0	.0	.0	.0	.0	.0
30.0	9.14	19.6	48.1	44.6	.0	.0	.0	.0	.0
35.0	10.67	19.2	47.7	44.2	.0	.0	.0	.0	.0
40.0	12.19	18.8	47.3	43.8	.0	.0	.0	.0	.0
45.0	13.72	18.3	46.8	43.3	.0	.0	.0	.0	.0
50.0	15.24	17.9	46.4	42.9	.0	.0	.0	.0	.0
55.0	16.76	17.5	46.0	42.5	.0	.0	.0	.0	.0
60.0	18.29	17.1	45.6	42.1	.0	.0	.0	.0	.0
65.0	19.81	16.7	45.2	41.7	.0	.0	.0	.0	.0
70.0	21.34	16.4	44.9	41.4	.0	.0	.0	.0	.0
75.0	22.86	16.1	44.6	41.1	.0	.0	.0	.0	.0
80.0	24.38	15.8	44.3	40.8	.0	.0	.0	.0	.0
85.0	25.91	15.5	44.0	40.5	.0	.0	.0	.0	.0
90.0	27.43	15.2	43.7	40.2	.0	.0	.0	.0	.0
95.0	28.96	15.0	43.5	40.0	.0	.0	.0	.0	.0
100.0	30.48	14.7	43.2	39.7	.0	.0	.0	.0	.0
105.0	32.00	14.5	43.0	39.5	.0	.0	.0	.0	.0
110.0	33.53	14.3	42.8	39.3	.0	.0	.0	.0	.0
115.0	35.05	14.0	42.5	39.0	.0	.0	.0	.0	.0
120.0	36.58	13.8	42.3	38.8	.0	.0	.0	.0	.0
125.0	38.10	13.6	42.1	38.6	.0	.0	.0	.0	.0
130.0	39.62	13.4	41.9	38.4	.0	.0	.0	.0	.0
135.0	41.15	13.3	41.8	38.3	.0	.0	.0	.0	.0

140.0	42.67	13.1	41.6	38.1	.0	.0	.0	.0	.0
145.0	44.20	12.9	41.4	37.9	.0	.0	.0	.0	.0
150.0	45.72	12.7	41.2	37.7	.0	.0	.0	.0	.0
155.0	47.24	12.6	41.1	37.6	.0	.0	.0	.0	.0
160.0	48.77	12.4	40.9	37.4	.0	.0	.0	.0	.0
165.0	50.29	12.3	40.8	37.3	.0	.0	.0	.0	.0
170.0	51.82	12.1	40.6	37.1	.0	.0	.0	.0	.0
175.0	53.34	12.0	40.5	37.0	.0	.0	.0	.0	.0
180.0	54.86	11.8	40.3	36.8	.0	.0	.0	.0	.0
185.0	56.39	11.7	40.2	36.7	.0	.0	.0	.0	.0
190.0	57.91	11.6	40.1	36.6	.0	.0	.0	.0	.0
195.0	59.44	11.5	40.0	36.5	.0	.0	.0	.0	.0
200.0	60.96	11.3	39.8	36.3	.0	.0	.0	.0	.0

Audible noise prediction methods do not apply to all line geometries, voltages, or weather conditions. If a prediction method does not apply, the appropriate output data column will be zeros.

RESULTS OF ENVIRO PROGRAM

STUDY FILE NAME: C:\PROGRA~1\EPRI\EMFW_251\ENVIRO\230WTOCM.I01

DATE: 11/20/2009 TIME: 11:35

230-kV SC Monopole W Collector

BUNDLE INFORMATION

BNDL #	CIRC #	VOLTAGE (kV)	VOLTAGE ANGLE (DEG)	LOAD (AMPS)	CURRENT ANGLE (DEG)	# OF COND	COORDINATES X (FT)	COORDINATES Y (FT)	PHASE
1	1	230.0	.0	301.0	.0	1	10.0	48.0	A
2	2	230.0	240.0	301.0	120.0	1	-10.0	39.0	B
3	3	230.0	120.0	301.0	240.0	1	12.0	30.0	C
4	4	.0	.0	.0	.0	1	.0	67.9	GND

MINIMUM GROUND CLEARANCE = 30.000 FT.

SUBCONDUCTOR INFORMATION - REGULAR BUNDLES

BNDL #	DIAMETER (IN)	SPACING (IN)	DC RESIST. (OHMS/MI)	AC RESIST. (OHMS/MI)	AC REACT. (OHMS/MI)
1	1.165	.000	.09720	.09940	.395000
2	1.165	.000	.09720	.09940	.395000
3	1.165	.000	.09720	.09940	.395000
4	1.165	.000	.09720	.09940	.395000

MAXIMUM SURFACE GRADIENT (kV/cm)

BNDL #	Type	ACrms	PEAK(+)	PEAK(-)
1	AC	14.99	21.21	-21.21
2	AC	14.61	20.66	-20.66
3	AC	15.18	21.47	-21.47
4	Ground Wire	1.15	1.63	-1.63

AC ELECTRIC FIELD PROFILE at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	MAXIMUM FIELD (kV/m)	MINOR/MAJOR ELLIPSE AXES (ratio)	VERTICAL (kV/m)	HORIZONTAL (kV/m)	SPACE POTENTIAL (kV)
-200.0	-60.96	.040	.009	.040	.002	.040
-195.0	-59.44	.042	.010	.042	.002	.042

-190.0	-57.91	.045	.010	.045	.002	.045
-185.0	-56.39	.047	.010	.047	.002	.047
-180.0	-54.86	.051	.010	.050	.002	.050
-175.0	-53.34	.054	.011	.054	.002	.054
-170.0	-51.82	.058	.011	.058	.003	.058
-165.0	-50.29	.062	.011	.062	.003	.062
-160.0	-48.77	.066	.012	.066	.003	.066
-155.0	-47.24	.072	.012	.072	.004	.072
-150.0	-45.72	.077	.012	.077	.004	.077
-145.0	-44.20	.084	.013	.084	.005	.084
-140.0	-42.67	.091	.013	.091	.005	.091
-135.0	-41.15	.099	.013	.099	.006	.099
-130.0	-39.62	.108	.014	.108	.007	.108
-125.0	-38.10	.119	.014	.119	.008	.119
-120.0	-36.58	.131	.014	.131	.009	.131
-115.0	-35.05	.145	.015	.144	.010	.145
-110.0	-33.53	.160	.015	.160	.011	.160
-105.0	-32.00	.179	.015	.178	.013	.179
-100.0	-30.48	.200	.016	.199	.015	.200
-95.0	-28.96	.225	.016	.224	.018	.224
-90.0	-27.43	.253	.016	.253	.021	.253
-85.0	-25.91	.287	.017	.286	.025	.287
-80.0	-24.38	.327	.017	.326	.029	.327
-75.0	-22.86	.375	.017	.373	.034	.374
-70.0	-21.34	.430	.018	.429	.040	.430
-65.0	-19.81	.496	.018	.494	.048	.496
-60.0	-18.29	.574	.019	.571	.056	.573
-55.0	-16.76	.665	.020	.662	.065	.663
-50.0	-15.24	.769	.021	.766	.074	.767
-45.0	-13.72	.886	.023	.883	.082	.883
-40.0	-12.19	1.012	.026	1.009	.087	1.008
-35.0	-10.67	1.139	.031	1.136	.087	1.134
-30.0	-9.14	1.252	.040	1.251	.081	1.244
-25.0	-7.62	1.330	.057	1.330	.081	1.319
-20.0	-6.10	1.348	.087	1.348	.118	1.334
-15.0	-4.57	1.296	.144	1.295	.195	1.280
-10.0	-3.05	1.209	.235	1.208	.287	1.198
-5.0	-1.52	1.215	.294	1.213	.365	1.210
.0	.00	1.453	.228	1.437	.393	1.431
5.0	1.52	1.822	.139	1.806	.348	1.786
10.0	3.05	2.131	.087	2.126	.239	2.093
15.0	4.57	2.253	.063	2.253	.142	2.218
20.0	6.10	2.162	.055	2.159	.165	2.135
25.0	7.62	1.921	.056	1.912	.213	1.901
30.0	9.14	1.619	.061	1.606	.222	1.605
35.0	10.67	1.323	.067	1.310	.201	1.314
40.0	12.19	1.068	.072	1.058	.167	1.063
45.0	13.72	.863	.074	.855	.133	.860
50.0	15.24	.705	.074	.699	.104	.703
55.0	16.76	.583	.071	.579	.081	.582
60.0	18.29	.489	.067	.487	.063	.489
65.0	19.81	.417	.061	.415	.049	.416
70.0	21.34	.359	.056	.357	.039	.359
75.0	22.86	.313	.050	.312	.031	.312
80.0	24.38	.275	.045	.274	.026	.274
85.0	25.91	.243	.040	.242	.021	.243
90.0	27.43	.217	.036	.216	.018	.217
95.0	28.96	.194	.033	.194	.015	.194
100.0	30.48	.175	.030	.174	.013	.175
105.0	32.00	.158	.027	.158	.011	.158
110.0	33.53	.144	.025	.143	.010	.143
115.0	35.05	.131	.023	.131	.008	.131
120.0	36.58	.120	.021	.119	.007	.120
125.0	38.10	.110	.020	.110	.006	.110
130.0	39.62	.101	.018	.101	.006	.101
135.0	41.15	.093	.017	.093	.005	.093

140.0	42.67	.086	.016	.086	.005	.086
145.0	44.20	.080	.015	.080	.004	.080
150.0	45.72	.074	.014	.074	.004	.074
155.0	47.24	.069	.014	.069	.003	.069
160.0	48.77	.065	.013	.065	.003	.065
165.0	50.29	.061	.012	.060	.003	.060
170.0	51.82	.057	.012	.057	.002	.057
175.0	53.34	.053	.011	.053	.002	.053
180.0	54.86	.050	.011	.050	.002	.050
185.0	56.39	.047	.010	.047	.002	.047
190.0	57.91	.045	.010	.045	.002	.045
195.0	59.44	.042	.009	.042	.002	.042
200.0	60.96	.040	.009	.040	.001	.040

AC CURRENTS IN EACH BUNDLE:

BNDL #	AC CURRENTS (Amperes) REAL	IMAGINARY	TOTAL	BUNDLE POSITION X-COORD	Y-COORD
1	301.00	.00	301.00	10.00	48.00
2	-150.50	260.67	301.00	-10.00	39.00
3	-150.50	-260.67	301.00	12.00	30.00
4	-10.99	-7.79	13.47	.00	67.90

MAGNETIC FIELD PROFILE
at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	AC MAGNETIC FIELD MAJOR AXIS (mG)	MINOR/MAJOR (RATIO)	VERTICAL COMP (mG)	HORIZONTAL COMP (mG)	RMS RESULTANT (mG)
-200.0	-60.96	1.08	.544	1.08	.59	1.23
-195.0	-59.44	1.13	.550	1.12	.62	1.28
-190.0	-57.91	1.18	.557	1.18	.66	1.35
-185.0	-56.39	1.23	.563	1.23	.70	1.42
-180.0	-54.86	1.30	.568	1.29	.74	1.49
-175.0	-53.34	1.36	.574	1.36	.79	1.57
-170.0	-51.82	1.44	.579	1.43	.84	1.66
-165.0	-50.29	1.51	.584	1.50	.90	1.75
-160.0	-48.77	1.60	.589	1.58	.97	1.86
-155.0	-47.24	1.69	.594	1.67	1.04	1.97
-150.0	-45.72	1.80	.598	1.77	1.12	2.09
-145.0	-44.20	1.91	.601	1.87	1.21	2.23
-140.0	-42.67	2.03	.605	1.98	1.31	2.38
-135.0	-41.15	2.17	.608	2.11	1.42	2.54
-130.0	-39.62	2.32	.610	2.24	1.55	2.72
-125.0	-38.10	2.49	.612	2.39	1.69	2.92
-120.0	-36.58	2.69	.613	2.54	1.86	3.15
-115.0	-35.05	2.90	.613	2.72	2.04	3.40
-110.0	-33.53	3.14	.613	2.91	2.26	3.68
-105.0	-32.00	3.41	.613	3.11	2.51	4.00
-100.0	-30.48	3.72	.611	3.34	2.80	4.36
-95.0	-28.96	4.07	.609	3.59	3.14	4.77
-90.0	-27.43	4.48	.605	3.85	3.54	5.23
-85.0	-25.91	4.94	.601	4.14	4.01	5.76

-80.0	-24.38	5.48	.596	4.45	4.57	6.38
-75.0	-22.86	6.10	.590	4.77	5.24	7.09
-70.0	-21.34	6.84	.583	5.12	6.03	7.91
-65.0	-19.81	7.69	.574	5.47	6.99	8.87
-60.0	-18.29	8.71	.565	5.82	8.13	10.00
-55.0	-16.76	9.91	.554	6.18	9.49	11.33
-50.0	-15.24	11.33	.542	6.55	11.09	12.89
-45.0	-13.72	13.01	.529	7.01	12.94	14.72
-40.0	-12.19	15.00	.515	7.72	15.00	16.87
-35.0	-10.67	17.33	.499	9.01	17.14	19.36
-30.0	-9.14	20.01	.483	11.32	19.12	22.22
-25.0	-7.62	23.01	.466	14.97	20.51	25.40
-20.0	-6.10	26.27	.450	19.99	20.75	28.81
-15.0	-4.57	29.63	.436	25.88	19.36	32.32
-10.0	-3.05	32.85	.424	31.59	16.58	35.67
-5.0	-1.52	35.64	.416	35.63	14.86	38.61
.0	.00	37.66	.415	36.46	18.25	40.78
5.0	1.52	38.53	.421	33.23	25.38	41.82
10.0	3.05	37.97	.435	26.69	31.66	41.41
15.0	4.57	35.94	.454	19.67	34.24	39.48
20.0	6.10	32.77	.479	15.77	32.72	36.33
25.0	7.62	29.00	.505	15.49	28.55	32.48
30.0	9.14	25.16	.532	16.06	23.55	28.50
35.0	10.67	21.62	.558	15.94	18.93	24.75
40.0	12.19	18.51	.581	15.10	15.18	21.41
45.0	13.72	15.88	.602	13.85	12.31	18.53
50.0	15.24	13.67	.620	12.47	10.17	16.09
55.0	16.76	11.85	.634	11.12	8.55	14.03
60.0	18.29	10.33	.646	9.88	7.31	12.29
65.0	19.81	9.06	.655	8.79	6.34	10.83
70.0	21.34	8.01	.661	7.83	5.55	9.60
75.0	22.86	7.12	.665	7.01	4.90	8.55
80.0	24.38	6.37	.667	6.30	4.36	7.66
85.0	25.91	5.73	.667	5.68	3.90	6.89
90.0	27.43	5.18	.666	5.15	3.50	6.23
95.0	28.96	4.71	.664	4.69	3.16	5.66
100.0	30.48	4.30	.661	4.29	2.87	5.16
105.0	32.00	3.94	.658	3.93	2.61	4.72
110.0	33.53	3.63	.653	3.62	2.38	4.34
115.0	35.05	3.35	.649	3.35	2.18	4.00
120.0	36.58	3.11	.643	3.10	2.00	3.69
125.0	38.10	2.89	.638	2.89	1.84	3.42
130.0	39.62	2.69	.632	2.69	1.70	3.18
135.0	41.15	2.51	.626	2.51	1.57	2.97
140.0	42.67	2.36	.620	2.36	1.46	2.77
145.0	44.20	2.21	.614	2.21	1.36	2.60
150.0	45.72	2.08	.608	2.08	1.27	2.44
155.0	47.24	1.96	.602	1.96	1.18	2.29
160.0	48.77	1.85	.596	1.85	1.11	2.16
165.0	50.29	1.75	.590	1.75	1.04	2.04
170.0	51.82	1.66	.584	1.66	.97	1.93
175.0	53.34	1.58	.578	1.58	.92	1.82
180.0	54.86	1.50	.572	1.50	.86	1.73
185.0	56.39	1.43	.566	1.43	.81	1.64
190.0	57.91	1.36	.560	1.36	.77	1.56
195.0	59.44	1.30	.554	1.30	.73	1.49
200.0	60.96	1.25	.548	1.24	.69	1.42

****
*
*
* AUDIBLE NOISE
* GENERATED ACOUSTIC POWER
* (dB above 1uW/m)
*
*
****

BNDL #	Type	Summer Fair	L5 RAIN	L50 RAIN
1	AC	-74.30	-55.22	-64.83
2	AC	-76.19	-56.39	-66.47
3	AC	-73.41	-54.67	-64.06
4	Ground Wire	******	******	******

****
*
* AUDIBLE NOISE *
*
* Microphone is 5.00 feet above ground *
* Altitude 1000. ft *
*
****

<---------- HVTRC CALCULATION METHOD ---------->

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	L50 FAIR (dB(A))	L5 RAIN (dB(A))	L50 RAIN (dB(A))	Leq(24) (dB(A))	Ldn (dB(A))
-200.0	-60.96	25.3	44.4	34.8	33.0	40.7
-195.0	-59.44	25.4	44.6	34.9	33.2	40.9
-190.0	-57.91	25.5	44.7	35.0	33.3	41.0
-185.0	-56.39	25.7	44.8	35.2	33.5	41.1
-180.0	-54.86	25.8	45.0	35.3	33.6	41.3
-175.0	-53.34	26.0	45.1	35.5	33.7	41.4
-170.0	-51.82	26.1	45.3	35.6	33.9	41.6
-165.0	-50.29	26.3	45.4	35.8	34.0	41.7
-160.0	-48.77	26.4	45.6	35.9	34.2	41.9
-155.0	-47.24	26.6	45.7	36.1	34.4	42.0
-150.0	-45.72	26.7	45.9	36.2	34.5	42.2
-145.0	-44.20	26.9	46.1	36.4	34.7	42.4
-140.0	-42.67	27.1	46.2	36.6	34.8	42.5
-135.0	-41.15	27.3	46.4	36.7	35.0	42.7
-130.0	-39.62	27.4	46.6	36.9	35.2	42.9
-125.0	-38.10	27.6	46.8	37.1	35.4	43.1
-120.0	-36.58	27.8	47.0	37.3	35.6	43.3
-115.0	-35.05	28.0	47.1	37.5	35.8	43.5
-110.0	-33.53	28.2	47.3	37.7	36.0	43.7
-105.0	-32.00	28.4	47.6	37.9	36.2	43.9
-100.0	-30.48	28.6	47.8	38.1	36.4	44.1
-95.0	-28.96	28.8	48.0	38.3	36.6	44.3
-90.0	-27.43	29.1	48.2	38.6	36.8	44.5
-85.0	-25.91	29.3	48.5	38.8	37.1	44.8
-80.0	-24.38	29.5	48.7	39.0	37.3	45.0
-75.0	-22.86	29.8	49.0	39.3	37.6	45.3
-70.0	-21.34	30.1	49.2	39.6	37.8	45.5
-65.0	-19.81	30.3	49.5	39.8	38.1	45.8
-60.0	-18.29	30.6	49.8	40.1	38.4	46.1
-55.0	-16.76	30.9	50.1	40.4	38.7	46.4
-50.0	-15.24	31.2	50.4	40.7	39.0	46.7
-45.0	-13.72	31.5	50.7	41.0	39.3	47.0
-40.0	-12.19	31.9	51.0	41.4	39.6	47.3
-35.0	-10.67	32.2	51.4	41.7	40.0	47.7
-30.0	-9.14	32.5	51.7	42.0	40.3	48.0
-25.0	-7.62	32.9	52.0	42.4	40.6	48.3
-20.0	-6.10	33.2	52.3	42.7	41.0	48.7
-15.0	-4.57	33.5	52.6	43.0	41.3	49.0
-10.0	-3.05	33.8	52.9	43.3	41.6	49.3
-5.0	-1.52	34.1	53.1	43.5	41.8	49.5
.0	.00	34.3	53.3	43.7	42.0	49.7
5.0	1.52	34.4	53.5	43.9	42.1	49.8
10.0	3.05	34.4	53.5	43.9	42.2	49.9

15.0	4.57	34.4	53.4	43.8	42.1	49.8
20.0	6.10	34.2	53.2	43.6	41.9	49.6
25.0	7.62	33.9	52.9	43.4	41.6	49.3
30.0	9.14	33.6	52.6	43.0	41.3	49.0
35.0	10.67	33.2	52.2	42.7	40.9	48.6
40.0	12.19	32.8	51.9	42.3	40.6	48.3
45.0	13.72	32.5	51.5	41.9	40.2	47.9
50.0	15.24	32.1	51.2	41.6	39.8	47.5
55.0	16.76	31.8	50.8	41.2	39.5	47.2
60.0	18.29	31.4	50.5	40.9	39.2	46.9
65.0	19.81	31.1	50.2	40.6	38.8	46.5
70.0	21.34	30.8	49.9	40.3	38.5	46.2
75.0	22.86	30.5	49.6	40.0	38.2	45.9
80.0	24.38	30.2	49.3	39.7	38.0	45.7
85.0	25.91	29.9	49.0	39.4	37.7	45.4
90.0	27.43	29.7	48.8	39.1	37.4	45.1
95.0	28.96	29.4	48.5	38.9	37.2	44.9
100.0	30.48	29.2	48.3	38.7	36.9	44.6
105.0	32.00	29.0	48.0	38.4	36.7	44.4
110.0	33.53	28.7	47.8	38.2	36.5	44.2
115.0	35.05	28.5	47.6	38.0	36.3	44.0
120.0	36.58	28.3	47.4	37.8	36.1	43.7
125.0	38.10	28.1	47.2	37.6	35.9	43.5
130.0	39.62	27.9	47.0	37.4	35.7	43.3
135.0	41.15	27.7	46.8	37.2	35.5	43.2
140.0	42.67	27.5	46.6	37.0	35.3	43.0
145.0	44.20	27.3	46.4	36.8	35.1	42.8
150.0	45.72	27.2	46.3	36.6	34.9	42.6
155.0	47.24	27.0	46.1	36.5	34.8	42.4
160.0	48.77	26.8	45.9	36.3	34.6	42.3
165.0	50.29	26.7	45.8	36.1	34.4	42.1
170.0	51.82	26.5	45.6	36.0	34.3	42.0
175.0	53.34	26.4	45.4	35.8	34.1	41.8
180.0	54.86	26.2	45.3	35.7	34.0	41.6
185.0	56.39	26.1	45.1	35.5	33.8	41.5
190.0	57.91	25.9	45.0	35.4	33.7	41.4
195.0	59.44	25.8	44.9	35.2	33.5	41.2
200.0	60.96	25.6	44.7	35.1	33.4	41.1

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                 ************************
                 *                      *
                 *     AUDIBLE NOISE    *
                 *    (other methods)   *
                 *                      *
                 * Altitude     1000. ft *
                 *                      *
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LATERAL DISTANCE (feet)	(meters)	<------ BPA METHOD -------> FAIR WEATHER dB(A)	L5 RAIN dB(A)	L50 RAIN dB(A)	Ldn dB(A)	<- CRIEPI --> AVERAGE FAIR dB(A)	L5 RAIN dB(A)	EdF L5 RAIN dB(A)	ENEL L5 RAIN dB(A)	IREQ L5 RAIN dB(A)
-200.0	-60.96	11.7	40.2	36.7	.0	.0	.0	.0	.0	.0
-195.0	-59.44	11.8	40.3	36.8	.0	.0	.0	.0	.0	.0
-190.0	-57.91	11.9	40.4	36.9	.0	.0	.0	.0	.0	.0
-185.0	-56.39	12.1	40.6	37.1	.0	.0	.0	.0	.0	.0

-180.0	-54.86	12.2	40.7	37.2	.0	.0	.0	.0	.0
.0									
-175.0	-53.34	12.3	40.8	37.3	.0	.0	.0	.0	.0
.0									
-170.0	-51.82	12.5	41.0	37.5	.0	.0	.0	.0	.0
.0									
-165.0	-50.29	12.6	41.1	37.6	.0	.0	.0	.0	.0
.0									
-160.0	-48.77	12.7	41.2	37.7	.0	.0	.0	.0	.0
.0									
-155.0	-47.24	12.9	41.4	37.9	.0	.0	.0	.0	.0
.0									
-150.0	-45.72	13.0	41.5	38.0	.0	.0	.0	.0	.0
.0									
-145.0	-44.20	13.2	41.7	38.2	.0	.0	.0	.0	.0
.0									
-140.0	-42.67	13.4	41.9	38.4	.0	.0	.0	.0	.0
.0									
-135.0	-41.15	13.5	42.0	38.5	.0	.0	.0	.0	.0
.0									
-130.0	-39.62	13.7	42.2	38.7	.0	.0	.0	.0	.0
.0									
-125.0	-38.10	13.9	42.4	38.9	.0	.0	.0	.0	.0
.0									
-120.0	-36.58	14.1	42.6	39.1	.0	.0	.0	.0	.0
.0									
-115.0	-35.05	14.2	42.7	39.2	.0	.0	.0	.0	.0
.0									
-110.0	-33.53	14.4	42.9	39.4	.0	.0	.0	.0	.0
.0									
-105.0	-32.00	14.6	43.1	39.6	.0	.0	.0	.0	.0
.0									
-100.0	-30.48	14.8	43.3	39.8	.0	.0	.0	.0	.0
.0									
-95.0	-28.96	15.1	43.6	40.1	.0	.0	.0	.0	.0
.0									
-90.0	-27.43	15.3	43.8	40.3	.0	.0	.0	.0	.0
.0									
-85.0	-25.91	15.5	44.0	40.5	.0	.0	.0	.0	.0
.0									
-80.0	-24.38	15.8	44.3	40.8	.0	.0	.0	.0	.0
.0									
-75.0	-22.86	16.0	44.5	41.0	.0	.0	.0	.0	.0
.0									
-70.0	-21.34	16.3	44.8	41.3	.0	.0	.0	.0	.0
.0									
-65.0	-19.81	16.6	45.1	41.6	.0	.0	.0	.0	.0
.0									
-60.0	-18.29	16.9	45.4	41.9	.0	.0	.0	.0	.0
.0									
-55.0	-16.76	17.2	45.7	42.2	.0	.0	.0	.0	.0
.0									
-50.0	-15.24	17.5	46.0	42.5	.0	.0	.0	.0	.0
.0									
-45.0	-13.72	17.8	46.3	42.8	.0	.0	.0	.0	.0
.0									
-40.0	-12.19	18.2	46.7	43.2	.0	.0	.0	.0	.0
.0									
-35.0	-10.67	18.5	47.0	43.5	.0	.0	.0	.0	.0
.0									
-30.0	-9.14	18.9	47.4	43.9	.0	.0	.0	.0	.0
.0									
-25.0	-7.62	19.3	47.8	44.3	.0	.0	.0	.0	.0
.0									
-20.0	-6.10	19.6	48.1	44.6	.0	.0	.0	.0	.0
.0									

-15.0	-4.57	19.9	48.4	44.9	.0	.0	.0	.0	.0
.0									
-10.0	-3.05	20.2	48.7	45.2	.0	.0	.0	.0	.0
.0									
-5.0	-1.52	20.5	49.0	45.5	.0	.0	.0	.0	.0
.0									
.0	.00	20.7	49.2	45.7	.0	.0	.0	.0	.0
.0									
5.0	1.52	20.8	49.3	45.8	.0	.0	.0	.0	.0
.0									
10.0	3.05	20.9	49.4	45.9	.0	.0	.0	.0	.0
.0									
15.0	4.57	20.8	49.3	45.8	.0	.0	.0	.0	.0
.0									
20.0	6.10	20.6	49.1	45.6	.0	.0	.0	.0	.0
.0									
25.0	7.62	20.3	48.8	45.3	.0	.0	.0	.0	.0
.0									
30.0	9.14	19.9	48.4	44.9	.0	.0	.0	.0	.0
.0									
35.0	10.67	19.5	48.0	44.5	.0	.0	.0	.0	.0
.0									
40.0	12.19	19.1	47.6	44.1	.0	.0	.0	.0	.0
.0									
45.0	13.72	18.7	47.2	43.7	.0	.0	.0	.0	.0
.0									
50.0	15.24	18.4	46.9	43.4	.0	.0	.0	.0	.0
.0									
55.0	16.76	18.0	46.5	43.0	.0	.0	.0	.0	.0
.0									
60.0	18.29	17.6	46.1	42.6	.0	.0	.0	.0	.0
.0									
65.0	19.81	17.3	45.8	42.3	.0	.0	.0	.0	.0
.0									
70.0	21.34	17.0	45.5	42.0	.0	.0	.0	.0	.0
.0									
75.0	22.86	16.7	45.2	41.7	.0	.0	.0	.0	.0
.0									
80.0	24.38	16.4	44.9	41.4	.0	.0	.0	.0	.0
.0									
85.0	25.91	16.1	44.6	41.1	.0	.0	.0	.0	.0
.0									
90.0	27.43	15.9	44.4	40.9	.0	.0	.0	.0	.0
.0									
95.0	28.96	15.6	44.1	40.6	.0	.0	.0	.0	.0
.0									
100.0	30.48	15.4	43.9	40.4	.0	.0	.0	.0	.0
.0									
105.0	32.00	15.1	43.6	40.1	.0	.0	.0	.0	.0
.0									
110.0	33.53	14.9	43.4	39.9	.0	.0	.0	.0	.0
.0									
115.0	35.05	14.7	43.2	39.7	.0	.0	.0	.0	.0
.0									
120.0	36.58	14.5	43.0	39.5	.0	.0	.0	.0	.0
.0									
125.0	38.10	14.3	42.8	39.3	.0	.0	.0	.0	.0
.0									
130.0	39.62	14.1	42.6	39.1	.0	.0	.0	.0	.0
.0									
135.0	41.15	13.9	42.4	38.9	.0	.0	.0	.0	.0
.0									
140.0	42.67	13.7	42.2	38.7	.0	.0	.0	.0	.0
.0									
145.0	44.20	13.6	42.1	38.6	.0	.0	.0	.0	.0
.0									

150.0	45.72	13.4	41.9	38.4	.0	.0	.0	.0	.0
.0									
155.0	47.24	13.2	41.7	38.2	.0	.0	.0	.0	.0
.0									
160.0	48.77	13.1	41.6	38.1	.0	.0	.0	.0	.0
.0									
165.0	50.29	12.9	41.4	37.9	.0	.0	.0	.0	.0
.0									
170.0	51.82	12.8	41.3	37.8	.0	.0	.0	.0	.0
.0									
175.0	53.34	12.6	41.1	37.6	.0	.0	.0	.0	.0
.0									
180.0	54.86	12.5	41.0	37.5	.0	.0	.0	.0	.0
.0									
185.0	56.39	12.4	40.9	37.4	.0	.0	.0	.0	.0
.0									
190.0	57.91	12.2	40.7	37.2	.0	.0	.0	.0	.0
.0									
195.0	59.44	12.1	40.6	37.1	.0	.0	.0	.0	.0
.0									
200.0	60.96	12.0	40.5	37.0	.0	.0	.0	.0	.0
.0									

Audible noise prediction methods do not apply to all line geometries, voltages, or weather conditions. If a prediction method does not apply, the appropriate output data column will be zeros.

RESULTS OF ENVIRO PROGRAM

STUDY FILE NAME: C:\PROGRA~1\EPRI\EMFW_251\ENVIRO\230WTOCH.I01

DATE: 11/20/2009 TIME: 11:33

230-kV SC H-Frame W substation

BUNDLE INFORMATION

BNDL #	CIRC #	VOLTAGE (kV)	VOLTAGE ANGLE (DEG)	LOAD (AMPS)	CURRENT ANGLE (DEG)	# OF COND	COORDINATES X (FT)	COORDINATES Y (FT)	PHASE
1	1	230.0	.0	301.0	.0	1	-20.0	30.0	A
2	2	230.0	240.0	301.0	120.0	1	.0	30.0	B
3	3	230.0	120.0	301.0	240.0	1	20.0	30.0	C
4	4	.0	.0	.0	.0	1	-10.0	47.0	GND
5	5	.0	.0	.0	.0	1	10.0	47.0	GND

MINIMUM GROUND CLEARANCE = 30.000 FT.

SUBCONDUCTOR INFORMATION - REGULAR BUNDLES

BNDL #	DIAMETER (IN)	SPACING (IN)	DC RESIST. (OHMS/MI)	AC RESIST. (OHMS/MI)	AC REACT. (OHMS/MI)
1	1.165	.000	.09720	.09940	.395000
2	1.165	.000	.09720	.09940	.395000
3	1.165	.000	.09720	.09940	.395000
4	1.165	.000	.09720	.09940	.395000
5	1.165	.000	.09720	.09940	.395000

MAXIMUM SURFACE GRADIENT (kV/cm)

BNDL #	Type	ACrms	PEAK(+)	PEAK(-)
1	AC	14.41	20.38	-20.38
2	AC	15.32	21.67	-21.67
3	AC	14.41	20.38	-20.38
4	Ground Wire	1.04	1.48	-1.48
5	Ground Wire	1.04	1.48	-1.48

AC ELECTRIC FIELD PROFILE at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	MAXIMUM FIELD (kV/m)	MINOR/MAJOR ELLIPSE AXES (ratio)	VERTICAL (kV/m)	HORIZONTAL (kV/m)	SPACE POTENTIAL (kV)

-200.0	-60.96	.035	.004	.035	.002	.035
-195.0	-59.44	.038	.004	.038	.002	.038
-190.0	-57.91	.041	.004	.041	.002	.041
-185.0	-56.39	.044	.004	.044	.002	.044
-180.0	-54.86	.048	.004	.048	.002	.048
-175.0	-53.34	.052	.004	.052	.003	.052
-170.0	-51.82	.056	.004	.056	.003	.056
-165.0	-50.29	.061	.004	.061	.003	.061
-160.0	-48.77	.067	.004	.067	.004	.067
-155.0	-47.24	.073	.003	.073	.004	.073
-150.0	-45.72	.081	.003	.080	.005	.081
-145.0	-44.20	.089	.003	.089	.006	.089
-140.0	-42.67	.098	.003	.098	.007	.098
-135.0	-41.15	.109	.003	.109	.008	.109
-130.0	-39.62	.121	.003	.121	.009	.121
-125.0	-38.10	.135	.003	.135	.010	.135
-120.0	-36.58	.152	.003	.151	.012	.152
-115.0	-35.05	.171	.002	.171	.014	.171
-110.0	-33.53	.194	.002	.193	.016	.194
-105.0	-32.00	.221	.002	.220	.019	.221
-100.0	-30.48	.253	.002	.252	.023	.253
-95.0	-28.96	.291	.002	.290	.028	.291
-90.0	-27.43	.338	.001	.336	.033	.337
-85.0	-25.91	.394	.001	.392	.040	.393
-80.0	-24.38	.462	.001	.460	.050	.462
-75.0	-22.86	.546	.001	.543	.061	.546
-70.0	-21.34	.650	.001	.646	.076	.649
-65.0	-19.81	.779	.001	.773	.094	.778
-60.0	-18.29	.939	.001	.931	.116	.936
-55.0	-16.76	1.135	.002	1.126	.141	1.132
-50.0	-15.24	1.374	.003	1.363	.170	1.369
-45.0	-13.72	1.655	.006	1.643	.195	1.647
-40.0	-12.19	1.967	.010	1.956	.208	1.956
-35.0	-10.67	2.279	.018	2.271	.192	2.261
-30.0	-9.14	2.528	.031	2.525	.141	2.502
-25.0	-7.62	2.626	.053	2.626	.139	2.590
-20.0	-6.10	2.503	.092	2.497	.284	2.458
-15.0	-4.57	2.165	.160	2.147	.444	2.114
-10.0	-3.05	1.736	.264	1.715	.534	1.688
-5.0	-1.52	1.411	.372	1.403	.545	1.368
.0	.00	1.305	.409	1.305	.534	1.260
5.0	1.52	1.411	.372	1.403	.545	1.368
10.0	3.05	1.736	.264	1.715	.534	1.688
15.0	4.57	2.165	.160	2.147	.444	2.114
20.0	6.10	2.503	.092	2.497	.284	2.458
25.0	7.62	2.626	.053	2.626	.139	2.590
30.0	9.14	2.528	.031	2.525	.141	2.502
35.0	10.67	2.279	.018	2.271	.192	2.261
40.0	12.19	1.967	.010	1.956	.208	1.956
45.0	13.72	1.655	.006	1.643	.195	1.647
50.0	15.24	1.374	.003	1.363	.170	1.369
55.0	16.76	1.135	.002	1.126	.141	1.132
60.0	18.29	.939	.001	.931	.116	.936
65.0	19.81	.779	.001	.773	.094	.778
70.0	21.34	.650	.001	.646	.076	.649
75.0	22.86	.546	.001	.543	.061	.546
80.0	24.38	.462	.001	.460	.050	.462
85.0	25.91	.394	.001	.392	.040	.393
90.0	27.43	.338	.001	.336	.033	.337
95.0	28.96	.291	.002	.290	.028	.291
100.0	30.48	.253	.002	.252	.023	.253
105.0	32.00	.221	.002	.220	.019	.221
110.0	33.53	.194	.002	.193	.016	.194
115.0	35.05	.171	.002	.171	.014	.171
120.0	36.58	.152	.003	.151	.012	.152

125.0	38.10	.135	.003	.135	.010	.135
130.0	39.62	.121	.003	.121	.009	.121
135.0	41.15	.109	.003	.109	.008	.109
140.0	42.67	.098	.003	.098	.007	.098
145.0	44.20	.089	.003	.089	.006	.089
150.0	45.72	.081	.003	.080	.005	.081
155.0	47.24	.073	.003	.073	.004	.073
160.0	48.77	.067	.004	.067	.004	.067
165.0	50.29	.061	.004	.061	.003	.061
170.0	51.82	.056	.004	.056	.003	.056
175.0	53.34	.052	.004	.052	.003	.052
180.0	54.86	.048	.004	.048	.002	.048
185.0	56.39	.044	.004	.044	.002	.044
190.0	57.91	.041	.004	.041	.002	.041
195.0	59.44	.038	.004	.038	.002	.038
200.0	60.96	.035	.004	.035	.002	.035

AC CURRENTS IN EACH BUNDLE:

BNDL #	AC CURRENTS (Amperes) REAL	IMAGINARY	TOTAL	BUNDLE POSITION X-COORD	Y-COORD
1	301.00	.00	301.00	-20.00	30.00
2	-150.50	260.67	301.00	.00	30.00
3	-150.50	-260.67	301.00	20.00	30.00
4	-15.15	-18.09	23.60	-10.00	47.00
5	21.51	10.00	23.73	10.00	47.00

MAGNETIC FIELD PROFILE
at 3.28 feet above ground

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	AC MAGNETIC FIELD MAJOR AXIS (mG)	MINOR/MAJOR (RATIO)	VERTICAL COMP (mG)	HORIZONTAL COMP (mG)	RMS RESULTANT (mG)
-200.0	-60.96	1.73	.008	1.67	.47	1.73
-195.0	-59.44	1.82	.008	1.75	.51	1.82
-190.0	-57.91	1.91	.008	1.83	.55	1.91
-185.0	-56.39	2.01	.008	1.92	.59	2.01
-180.0	-54.86	2.12	.008	2.02	.63	2.12
-175.0	-53.34	2.24	.008	2.13	.69	2.24
-170.0	-51.82	2.37	.009	2.25	.74	2.37
-165.0	-50.29	2.51	.009	2.38	.81	2.51
-160.0	-48.77	2.66	.010	2.51	.88	2.66
-155.0	-47.24	2.83	.010	2.66	.97	2.83
-150.0	-45.72	3.02	.011	2.83	1.06	3.02
-145.0	-44.20	3.22	.011	3.00	1.17	3.22
-140.0	-42.67	3.45	.012	3.20	1.29	3.45
-135.0	-41.15	3.70	.013	3.41	1.43	3.70
-130.0	-39.62	3.98	.014	3.65	1.60	3.98
-125.0	-38.10	4.29	.015	3.91	1.79	4.29
-120.0	-36.58	4.65	.016	4.19	2.01	4.65
-115.0	-35.05	5.04	.017	4.51	2.27	5.04
-110.0	-33.53	5.49	.019	4.86	2.57	5.50
-105.0	-32.00	6.01	.021	5.24	2.94	6.01

-100.0	-30.48	6.60	.023	5.67	3.38	6.60
-95.0	-28.96	7.27	.026	6.14	3.90	7.28
-90.0	-27.43	8.06	.029	6.66	4.54	8.06
-85.0	-25.91	8.98	.032	7.23	5.33	8.98
-80.0	-24.38	10.06	.036	7.85	6.30	10.06
-75.0	-22.86	11.33	.041	8.51	7.51	11.34
-70.0	-21.34	12.86	.046	9.18	9.02	12.87
-65.0	-19.81	14.69	.053	9.83	10.94	14.71
-60.0	-18.29	16.90	.061	10.38	13.37	16.93
-55.0	-16.76	19.58	.071	10.68	16.46	19.63
-50.0	-15.24	22.83	.083	10.52	20.35	22.91
-45.0	-13.72	26.77	.098	9.53	25.15	26.89
-40.0	-12.19	31.45	.117	7.39	30.78	31.66
-35.0	-10.67	36.84	.140	5.31	36.81	37.19
-30.0	-9.14	42.70	.169	10.00	42.13	43.30
-25.0	-7.62	48.51	.205	20.77	44.96	49.52
-20.0	-6.10	53.54	.250	33.82	43.60	55.18
-15.0	-4.57	57.14	.301	45.95	38.08	59.68
-10.0	-3.05	59.12	.356	54.50	31.09	62.75
-5.0	-1.52	59.83	.400	58.79	26.42	64.45
.0	.00	59.93	.418	59.93	25.07	64.96
5.0	1.52	59.74	.400	58.76	26.24	64.35
10.0	3.05	58.94	.355	54.46	30.77	62.55
15.0	4.57	56.89	.301	45.92	37.68	59.41
20.0	6.10	53.23	.249	33.82	43.18	54.85
25.0	7.62	48.16	.204	20.78	44.54	49.15
30.0	9.14	42.33	.167	9.99	41.74	42.92
35.0	10.67	36.46	.138	5.14	36.44	36.80
40.0	12.19	31.08	.114	7.18	30.44	31.28
45.0	13.72	26.41	.095	9.32	24.84	26.53
50.0	15.24	22.49	.080	10.31	20.07	22.56
55.0	16.76	19.25	.068	10.47	16.21	19.30
60.0	18.29	16.59	.058	10.17	13.14	16.62
65.0	19.81	14.39	.050	9.63	10.73	14.41
70.0	21.34	12.58	.043	8.98	8.83	12.59
75.0	22.86	11.07	.037	8.31	7.33	11.08
80.0	24.38	9.81	.033	7.66	6.13	9.81
85.0	25.91	8.74	.029	7.05	5.17	8.74
90.0	27.43	7.83	.025	6.49	4.40	7.84
95.0	28.96	7.06	.022	5.97	3.77	7.06
100.0	30.48	6.39	.020	5.51	3.25	6.39
105.0	32.00	5.81	.018	5.08	2.82	5.81
110.0	33.53	5.31	.016	4.70	2.46	5.31
115.0	35.05	4.86	.015	4.36	2.16	4.86
120.0	36.58	4.47	.013	4.05	1.90	4.47
125.0	38.10	4.13	.012	3.77	1.68	4.13
130.0	39.62	3.82	.011	3.52	1.50	3.82
135.0	41.15	3.55	.010	3.29	1.34	3.55
140.0	42.67	3.30	.010	3.08	1.20	3.30
145.0	44.20	3.08	.009	2.88	1.08	3.08
150.0	45.72	2.88	.009	2.71	.98	2.88
155.0	47.24	2.70	.009	2.55	.88	2.70
160.0	48.77	2.54	.008	2.41	.80	2.54
165.0	50.29	2.39	.008	2.27	.73	2.39
170.0	51.82	2.25	.008	2.15	.67	2.25
175.0	53.34	2.12	.008	2.03	.61	2.12
180.0	54.86	2.01	.008	1.93	.56	2.01
185.0	56.39	1.90	.008	1.83	.51	1.90
190.0	57.91	1.80	.008	1.74	.47	1.81
195.0	59.44	1.71	.008	1.66	.44	1.71
200.0	60.96	1.63	.009	1.58	.40	1.63

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*
* AUDIBLE NOISE
* GENERATED ACOUSTIC POWER
*

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*       (dB above 1uW/m)        *
*                               *
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BNDL #	Type	Summer Fair	L5 RAIN	L50 RAIN
1	AC	-77.20	-57.01	-67.34
2	AC	-72.76	-54.26	-63.49
3	AC	-77.20	-57.01	-67.34
4	Ground Wire	******	******	******
5	Ground Wire	******	******	******

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*****************************************
*                                       *
*              AUDIBLE NOISE            *
*                                       *
* Microphone is   5.00 feet  above ground *
*          Altitude     1000. ft        *
*                                       *
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<-------------- HVTRC CALCULATION METHOD ---------->

LATERAL DISTANCE (feet)	LATERAL DISTANCE (meters)	L50 FAIR (dB(A))	L5 RAIN (dB(A))	L50 RAIN (dB(A))	Leq(24) (dB(A))	Ldn (dB(A))
-200.0	-60.96	24.8	44.1	34.3	32.6	40.3
-195.0	-59.44	24.9	44.2	34.5	32.8	40.5
-190.0	-57.91	25.1	44.4	34.6	32.9	40.6
-185.0	-56.39	25.2	44.5	34.8	33.0	40.7
-180.0	-54.86	25.4	44.7	34.9	33.2	40.9
-175.0	-53.34	25.5	44.8	35.1	33.3	41.0
-170.0	-51.82	25.7	45.0	35.2	33.5	41.2
-165.0	-50.29	25.8	45.1	35.4	33.7	41.4
-160.0	-48.77	26.0	45.3	35.5	33.8	41.5
-155.0	-47.24	26.2	45.5	35.7	34.0	41.7
-150.0	-45.72	26.3	45.6	35.9	34.2	41.9
-145.0	-44.20	26.5	45.8	36.0	34.3	42.0
-140.0	-42.67	26.7	46.0	36.2	34.5	42.2
-135.0	-41.15	26.9	46.2	36.4	34.7	42.4
-130.0	-39.62	27.1	46.4	36.6	34.9	42.6
-125.0	-38.10	27.3	46.6	36.8	35.1	42.8
-120.0	-36.58	27.5	46.8	37.0	35.3	43.0
-115.0	-35.05	27.7	47.0	37.2	35.5	43.2
-110.0	-33.53	27.9	47.2	37.4	35.7	43.4
-105.0	-32.00	28.1	47.4	37.7	35.9	43.6
-100.0	-30.48	28.4	47.7	37.9	36.2	43.9
-95.0	-28.96	28.6	47.9	38.1	36.4	44.1
-90.0	-27.43	28.9	48.2	38.4	36.7	44.4
-85.0	-25.91	29.1	48.4	38.7	37.0	44.6
-80.0	-24.38	29.4	48.7	38.9	37.2	44.9
-75.0	-22.86	29.7	49.0	39.2	37.5	45.2
-70.0	-21.34	30.0	49.3	39.5	37.8	45.5
-65.0	-19.81	30.3	49.7	39.9	38.2	45.9
-60.0	-18.29	30.7	50.0	40.2	38.5	46.2
-55.0	-16.76	31.0	50.4	40.6	38.9	46.6
-50.0	-15.24	31.4	50.7	41.0	39.2	46.9
-45.0	-13.72	31.8	51.1	41.3	39.6	47.3
-40.0	-12.19	32.2	51.5	41.8	40.0	47.7
-35.0	-10.67	32.6	52.0	42.2	40.5	48.2
-30.0	-9.14	33.0	52.4	42.6	40.9	48.6
-25.0	-7.62	33.4	52.7	43.0	41.2	48.9
-20.0	-6.10	33.8	53.0	43.3	41.6	49.3
-15.0	-4.57	34.1	53.3	43.6	41.9	49.5

-10.0	-3.05	34.3	53.5	43.8	42.1	49.8
-5.0	-1.52	34.4	53.6	43.9	42.2	49.9
.0	.00	34.5	53.7	44.0	42.3	50.0
5.0	1.52	34.4	53.6	43.9	42.2	49.9
10.0	3.05	34.3	53.5	43.8	42.1	49.8
15.0	4.57	34.1	53.3	43.6	41.9	49.5
20.0	6.10	33.8	53.0	43.3	41.6	49.3
25.0	7.62	33.4	52.7	43.0	41.2	48.9
30.0	9.14	33.0	52.4	42.6	40.9	48.6
35.0	10.67	32.6	52.0	42.2	40.5	48.2
40.0	12.19	32.2	51.5	41.8	40.0	47.7
45.0	13.72	31.8	51.1	41.3	39.6	47.3
50.0	15.24	31.4	50.7	41.0	39.2	46.9
55.0	16.76	31.0	50.4	40.6	38.9	46.6
60.0	18.29	30.7	50.0	40.2	38.5	46.2
65.0	19.81	30.3	49.7	39.9	38.2	45.9
70.0	21.34	30.0	49.3	39.5	37.8	45.5
75.0	22.86	29.7	49.0	39.2	37.5	45.2
80.0	24.38	29.4	48.7	38.9	37.2	44.9
85.0	25.91	29.1	48.4	38.7	37.0	44.6
90.0	27.43	28.9	48.2	38.4	36.7	44.4
95.0	28.96	28.6	47.9	38.1	36.4	44.1
100.0	30.48	28.4	47.7	37.9	36.2	43.9
105.0	32.00	28.1	47.4	37.7	35.9	43.6
110.0	33.53	27.9	47.2	37.4	35.7	43.4
115.0	35.05	27.7	47.0	37.2	35.5	43.2
120.0	36.58	27.5	46.8	37.0	35.3	43.0
125.0	38.10	27.3	46.6	36.8	35.1	42.8
130.0	39.62	27.1	46.4	36.6	34.9	42.6
135.0	41.15	26.9	46.2	36.4	34.7	42.4
140.0	42.67	26.7	46.0	36.2	34.5	42.2
145.0	44.20	26.5	45.8	36.0	34.3	42.0
150.0	45.72	26.3	45.6	35.9	34.2	41.9
155.0	47.24	26.2	45.5	35.7	34.0	41.7
160.0	48.77	26.0	45.3	35.5	33.8	41.5
165.0	50.29	25.8	45.1	35.4	33.7	41.4
170.0	51.82	25.7	45.0	35.2	33.5	41.2
175.0	53.34	25.5	44.8	35.1	33.3	41.0
180.0	54.86	25.4	44.7	34.9	33.2	40.9
185.0	56.39	25.2	44.5	34.8	33.0	40.7
190.0	57.91	25.1	44.4	34.6	32.9	40.6
195.0	59.44	24.9	44.2	34.5	32.8	40.5
200.0	60.96	24.8	44.1	34.3	32.6	40.3

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*                        *
*     AUDIBLE NOISE      *
*    (other methods)     *
*                        *
* Altitude     1000. ft *
*                        *
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		<------ BPA METHOD ------->			<- CRIEPI -->	EdF	ENEL	IREQ
LATERAL DISTANCE		FAIR WEATHER	L5 RAIN	L50 RAIN	Ldn	AVERAGE FAIR	L5 RAIN	L5 RAIN	L5 RAIN	L5 RAIN
(feet)	(meters)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
-200.0	-60.96	11.3	39.8	36.3	.0	.0	.0	.0	.0	.0
-195.0	-59.44	11.5	40.0	36.5	.0	.0	.0	.0	.0	

-190.0	-57.91	11.6	40.1	36.6	.0	.0	.0	.0	.0
-185.0	-56.39	11.7	40.2	36.7	.0	.0	.0	.0	.0
-180.0	-54.86	11.8	40.3	36.8	.0	.0	.0	.0	.0
-175.0	-53.34	12.0	40.5	37.0	.0	.0	.0	.0	.0
-170.0	-51.82	12.1	40.6	37.1	.0	.0	.0	.0	.0
-165.0	-50.29	12.3	40.8	37.3	.0	.0	.0	.0	.0
-160.0	-48.77	12.4	40.9	37.4	.0	.0	.0	.0	.0
-155.0	-47.24	12.6	41.1	37.6	.0	.0	.0	.0	.0
-150.0	-45.72	12.7	41.2	37.7	.0	.0	.0	.0	.0
-145.0	-44.20	12.9	41.4	37.9	.0	.0	.0	.0	.0
-140.0	-42.67	13.1	41.6	38.1	.0	.0	.0	.0	.0
-135.0	-41.15	13.3	41.8	38.3	.0	.0	.0	.0	.0
-130.0	-39.62	13.4	41.9	38.4	.0	.0	.0	.0	.0
-125.0	-38.10	13.6	42.1	38.6	.0	.0	.0	.0	.0
-120.0	-36.58	13.8	42.3	38.8	.0	.0	.0	.0	.0
-115.0	-35.05	14.0	42.5	39.0	.0	.0	.0	.0	.0
-110.0	-33.53	14.3	42.8	39.3	.0	.0	.0	.0	.0
-105.0	-32.00	14.5	43.0	39.5	.0	.0	.0	.0	.0
-100.0	-30.48	14.7	43.2	39.7	.0	.0	.0	.0	.0
-95.0	-28.96	15.0	43.5	40.0	.0	.0	.0	.0	.0
-90.0	-27.43	15.2	43.7	40.2	.0	.0	.0	.0	.0
-85.0	-25.91	15.5	44.0	40.5	.0	.0	.0	.0	.0
-80.0	-24.38	15.8	44.3	40.8	.0	.0	.0	.0	.0
-75.0	-22.86	16.1	44.6	41.1	.0	.0	.0	.0	.0
-70.0	-21.34	16.4	44.9	41.4	.0	.0	.0	.0	.0
-65.0	-19.81	16.7	45.2	41.7	.0	.0	.0	.0	.0
-60.0	-18.29	17.1	45.6	42.1	.0	.0	.0	.0	.0
-55.0	-16.76	17.5	46.0	42.5	.0	.0	.0	.0	.0
-50.0	-15.24	17.9	46.4	42.9	.0	.0	.0	.0	.0
-45.0	-13.72	18.3	46.8	43.3	.0	.0	.0	.0	.0
-40.0	-12.19	18.8	47.3	43.8	.0	.0	.0	.0	.0
-35.0	-10.67	19.2	47.7	44.2	.0	.0	.0	.0	.0
-30.0	-9.14	19.6	48.1	44.6	.0	.0	.0	.0	.0

-25.0	-7.62	20.0	48.5	45.0	.0	.0	.0	.0	.0
-20.0	-6.10	20.4	48.9	45.4	.0	.0	.0	.0	.0
-15.0	-4.57	20.7	49.2	45.7	.0	.0	.0	.0	.0
-10.0	-3.05	20.9	49.4	45.9	.0	.0	.0	.0	.0
-5.0	-1.52	21.0	49.5	46.0	.0	.0	.0	.0	.0
.0	.00	21.1	49.6	46.1	.0	.0	.0	.0	.0
5.0	1.52	21.0	49.5	46.0	.0	.0	.0	.0	.0
10.0	3.05	20.9	49.4	45.9	.0	.0	.0	.0	.0
15.0	4.57	20.7	49.2	45.7	.0	.0	.0	.0	.0
20.0	6.10	20.4	48.9	45.4	.0	.0	.0	.0	.0
25.0	7.62	20.0	48.5	45.0	.0	.0	.0	.0	.0
30.0	9.14	19.6	48.1	44.6	.0	.0	.0	.0	.0
35.0	10.67	19.2	47.7	44.2	.0	.0	.0	.0	.0
40.0	12.19	18.8	47.3	43.8	.0	.0	.0	.0	.0
45.0	13.72	18.3	46.8	43.3	.0	.0	.0	.0	.0
50.0	15.24	17.9	46.4	42.9	.0	.0	.0	.0	.0
55.0	16.76	17.5	46.0	42.5	.0	.0	.0	.0	.0
60.0	18.29	17.1	45.6	42.1	.0	.0	.0	.0	.0
65.0	19.81	16.7	45.2	41.7	.0	.0	.0	.0	.0
70.0	21.34	16.4	44.9	41.4	.0	.0	.0	.0	.0
75.0	22.86	16.1	44.6	41.1	.0	.0	.0	.0	.0
80.0	24.38	15.8	44.3	40.8	.0	.0	.0	.0	.0
85.0	25.91	15.5	44.0	40.5	.0	.0	.0	.0	.0
90.0	27.43	15.2	43.7	40.2	.0	.0	.0	.0	.0
95.0	28.96	15.0	43.5	40.0	.0	.0	.0	.0	.0
100.0	30.48	14.7	43.2	39.7	.0	.0	.0	.0	.0
105.0	32.00	14.5	43.0	39.5	.0	.0	.0	.0	.0
110.0	33.53	14.3	42.8	39.3	.0	.0	.0	.0	.0
115.0	35.05	14.0	42.5	39.0	.0	.0	.0	.0	.0
120.0	36.58	13.8	42.3	38.8	.0	.0	.0	.0	.0
125.0	38.10	13.6	42.1	38.6	.0	.0	.0	.0	.0
130.0	39.62	13.4	41.9	38.4	.0	.0	.0	.0	.0
135.0	41.15	13.3	41.8	38.3	.0	.0	.0	.0	.0

.0									
140.0	42.67	13.1	41.6	38.1	.0	.0	.0	.0	.0
.0									
145.0	44.20	12.9	41.4	37.9	.0	.0	.0	.0	.0
.0									
150.0	45.72	12.7	41.2	37.7	.0	.0	.0	.0	.0
.0									
155.0	47.24	12.6	41.1	37.6	.0	.0	.0	.0	.0
.0									
160.0	48.77	12.4	40.9	37.4	.0	.0	.0	.0	.0
.0									
165.0	50.29	12.3	40.8	37.3	.0	.0	.0	.0	.0
.0									
170.0	51.82	12.1	40.6	37.1	.0	.0	.0	.0	.0
.0									
175.0	53.34	12.0	40.5	37.0	.0	.0	.0	.0	.0
.0									
180.0	54.86	11.8	40.3	36.8	.0	.0	.0	.0	.0
.0									
185.0	56.39	11.7	40.2	36.7	.0	.0	.0	.0	.0
.0									
190.0	57.91	11.6	40.1	36.6	.0	.0	.0	.0	.0
.0									
195.0	59.44	11.5	40.0	36.5	.0	.0	.0	.0	.0
.0									
200.0	60.96	11.3	39.8	36.3	.0	.0	.0	.0	.0
.0									

Audible noise prediction methods do not apply to all line geometries, voltages, or weather conditions. If a prediction method does not apply, the appropriate output data column will be zeros.

EXHIBIT BB

OTHER INFORMATION
OAR 345-021-0010(1)(bb)

OAR 345-021-0010(1)(bb) *Any other information that the Department requests in the project order or in a notification regarding expedited review;*

Response: Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW). The proposed Facility is not eligible for expedited review under the definition established in ORS 469.370(10) and documented in OAR 345-015-0300. The Applicant filed a Notice of Intent (NOI) with the Oregon Department of Energy (Department) on November 9, 2009, the Department held a public informational meeting on December 9, 2009, and a project order was issued on January 5, 2010.

The project order establishes the following:

(a) All state statutes and administrative rules containing standards or criteria that must be met for the Council to issue a site certificate for the proposed facility, including applicable standards of OAR Chapter 345, Divisions 22, 23 and 24.

(b) All local government ordinances applicable to the Council's decision on the proposed facility.

(c) All application requirements in OAR 345-021-0010 applicable to the proposed facility.

(d) All state and local permits necessary to the construction and operation of the proposed facility and the name of each agency with the authority to issue such permits.

(e) Any other data and information that must be included in the application for a site certificate to allow the Council to determine whether the proposed facility will comply with applicable statutes, administrative rules and local government ordinances.

(f) The analysis areas for the proposed facility.

(g) Public concerns that address matters within the jurisdiction of the Council that the applicant shall consider and discuss in the application for a site certificate, based on comments from the public and reviewing agencies.

(h) If the applicant has identified one or more proposed corridors in Exhibit D of the notice of intent as required by OAR 345-020-0011(1)(d), any adjustments to the corridor(s) that the applicant shall evaluate in the corridor selection assessment described in OAR 345-021-0010(1)(b).

(i) The expiration date of the notice of intent.

The project order also includes comments received on the NOI from agencies and members of the public. The issues raised in the comments are provided in Table BB-1, along with a response or direction on where the response can be found in the ASC.

Table BB-1

Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
1	Steve Cherry, Oregon Department of Fish and Wildlife Date of Letter: December 14, 2009	Page 15; Lines 14, 15	The application should include a map that shows the different vegetation classifications for the project area.	Figures P-7 through P-10 in Exhibit P of the Montague Wind Power Facility (Facility) Application for Site Certificate (ASC) show vegetation classifications (labeled "habitat types") for the Facility site boundary.
2	Steve Cherry, Oregon Department of Fish and Wildlife Date of Letter: December 14, 2009	Page 15; Lines 16, 17	The applicant should conduct Washington ground squirrel surveys in suitable habitat within 1,000 feet of all ground-disturbing activities.	Iberdrola Renewables, Inc. (Applicant) conducted special-status species surveys, focused primarily on the Washington ground squirrel (WGS), in March 2008 in a portion of the site boundary (see ASC Exhibit P, Section P.3; and Exhibit Q, Figure Q-2). In addition, the Applicant reviewed personal field notes from Karen Kronner (Northwest Wildlife Consultants [NWC]) for WGS locations within the Facility vicinity. Some areas within the site boundary were previously surveyed for the Pebble Springs Wind Project (Pebble Springs) in spring 2006 and for Leaning Juniper IIB (LJIIB) in the spring of 2009. For those areas not surveyed in 2009, the Applicant will conduct additional wildlife surveys in the spring of 2010 within 1,000 feet of all ground disturbing activities.
3	Steve Cherry, Oregon Department of Fish and Wildlife Date of Letter: December 14, 2009	Page 15; Lines 18, 19, 20	The applicant should conduct raptor nest surveys within a 2 mile radius of the project area. ODFW recommends that no construction occur within a half mile of active raptor nests during the nesting season.	The Applicant has established a raptor nest survey radius of 0.5 mile from the preferred transmission line route and alternates and 2-mile raptor nest survey radius from the proposed Facility site boundary south of the transmission line corridors (i.e., for the majority of the site boundary). NWC has already surveyed approximately 50 percent of the Facility site boundary for nesting raptors (as shown in ASC Exhibit P, Figure P-4) during studies conducted for Pebble Springs and LJII. In addition, in 2009 NWC surveyed approximately 35 percent of the 2-mile Facility raptor survey radius for nesting raptors in adjacent wind facilities.

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
				NWC reviewed data from several adjacent wind projects surveyed for raptor nests in 2009, including LJI, LJIIA and LJIIB, and Pebble Springs. The Applicant plans to conduct surveys of the remaining area within the Facility 2-mile raptor survey radius in 2010. Within the 2009-surveyed portion of the Facility raptor nest survey area, the Applicant will also check known nests of Swainson's and ferruginous hawks for 2010 status. The Applicant will comply with the seasonal restrictions documented in site certificate conditions for the LJII and Helix projects. If any active sensitive raptor nests such as Swainson's hawks or ferruginous hawks are identified within 1,300 feet of transmission line poles or other Facility components, the nests will be flagged and avoided. The Applicant would not engage in high-impact construction activities (activities that involve blasting, grading, or other major ground disturbance) or allow high levels of construction traffic within 1,300 feet of these nest sites.
4	Steve Cherry, Oregon Department of Fish and Wildlife Date of Letter: December 14, 2009	Page 15; Lines 21, 22, 23, 24	The applicant should conduct surveys for any Sensitive species (burrowing owls, loggerhead shrikes, long-billed curlews, white-tailed jack rabbits, grasshopper sparrows and sage sparrows) within the project area and provide a map showing the locations of the different species in respect to the proposed activities.	The Applicant conducted ground-based surveys for non-listed special-status species in March 2008 for a portion of the proposed Facility, as described in Exhibit P and Attachment P-7 (Biological Investigations Report) to the ASC. In addition, the Applicant had already surveyed some areas within the Facility site boundary for Pebble Springs and LJIIB. Surveys will be conducted in 2010 for the portions of the wildlife survey corridors that were not previously studied. Figure P-3 in ASC Exhibit P shows the locations of sensitive species.
5	Steve Cherry, Oregon Department of Fish and	Page 15; Lines 25 through 29	The application should include a detailed monitoring plan for the project. ODFW recommends that the certificate holder monitor all known raptor nest sites in the project area	The Applicant will implement a Wildlife Monitoring and Monitoring Plan (WMMP) for the Facility similar to the WMMP developed for nearby facilities, such as Leaning Juniper II and Shepherd's Flat. Like the WMMPs for these facilities, the

Table BB-1

Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	Wildlife Date of Letter: December 14, 2009		for the life of the project. ODFW requests permission to conduct wildlife surveys on the project area that might help ODFW better understand the long-term effects of the wind farm on the native wildlife.	Montague Facility WMMP will include long term raptor nest monitoring. Under the site certificate, ODOE has the authority to inspect the Facility. In addition, the Applicant is willing to talk to the private landowners about access once ODFW has better defined their proposed wildlife studies.
6	Steve Cherry, Oregon Department of Fish and Wildlife Date of Letter: December 14, 2009	Page 15; Lines 30 through 34 Page 16; Lines 1, 2	The application should include a mitigation package that addresses the loss of habitat as a result of the construction of the proposed facility. ODFW recommends that the certificate holder acquire a "conservation easement" to protect and enhance habitat that is similar to the habitat that is altered or degraded by the proposed project. The "conservation easement" should include provisions for monitoring as well as management activities including habitat improvement as well as potential wildlife surveys or research activities.	For the impacts that cannot be avoided, the Applicant will develop mitigation by means of reliable methods and consistent with ODFW habitat mitigation goals (OAR 635-415-0025). The Applicant will implement a Habitat Mitigation Plan (HMP) for the Facility similar to the HMP developed for LJII. The HMP will describe the preservation and enhancement of a conservation area to mitigate for the impacts of the Facility on wildlife habitat, as well as monitoring procedures including wildlife surveys. The mitigation property will be protected under a conservation easement for the life of the Facility (see ASC Exhibit P, Figure P-14). For additional information, see ASC Exhibit P.
7	Steve Cherry, Oregon Department of Fish and Wildlife Date of Letter: December 14, 2009	Page 16; Lines 3 through 5	The application should include a revegetation plan. The plan should outline how the areas that are temporarily disturbed will be rehabilitated and returned to their pre-construction functionality.	The Applicant will implement a Revegetation Plan for the Facility similar to the Plans implemented for nearby Facilities such as LJII and Shepherd's Flat. The Revegetation Plan will outline how temporarily disturbed areas will be rehabilitated to their preconstruction condition or better.
8	Susie Anderson, Gilliam County Date of Letter: December 17, 2009	Page 16; Lines 7, 8	The Gilliam County Planning Director identified the applicable substantive criteria. Copies of appropriate ordinances and plans were attached.	The Applicant addresses the applicable substantive criteria provided by Gilliam County in ASC Exhibit K.

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
9	Susie Anderson, Gilliam County Date of Letter: December 17, 2009	Page 16; Line 9	The applicant should address the criteria in OAR 660-033-0130(37).	The Applicant addresses OAR 660-033-0130(37) criteria in ASC Exhibit K.
10	Susie Anderson, Gilliam County Date of Letter: December 17, 2009	Page 16; Lines 10 and 11	The application should show the location of the facility entirely within Gilliam County, including appropriate maps and identification of landowners.	The Facility will be located entirely within Gilliam County, as shown in ASC Exhibit C, Figure C-2. Landowners are identified in ASC Exhibit F.
11	Wendell Baskins, State Historic Preservation Office, Oregon Historic Trails Advisory Council Date of Letter: December 18, 2009	Page 16; Lines 14, 15	The applicant should apply the processes and protections for a trail eligible for the National Register of Historic Places and named a National Historic Trail.	The treatment and protection of the Oregon National Historic Trail (ONHT) is consistent with a Section 106-eligible historic resource.
12	Wendell Baskins, State Historic Preservation Office, Oregon Historic Trails Advisory	Page 16; Lines 16, 17	The certificate holder should avoid any intrusion upon the Oregon Trail route or remains.	The Applicant will avoid construction of Facility components on visually intact remnants of the ONHT.

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	Council Date of Letter: December 18, 2009			
13	Wendell Baskins, State Historic Preservation Office, Oregon Historic Trails Advisory Council Date of Letter: December 18, 2009	Page 16; Line 18	The certificate holder should minimize impact on the viewshed.	The Applicant evaluates potential visual impacts within 10 miles of Facility components in ASC Exhibit R. On the basis of the initial visual impact analysis, the Applicant adjusted the locations of Facility components to reduce potential visual impacts to the ONHT.
14	Wendell Baskins, State Historic Preservation Office, Oregon Historic Trails Advisory Council Date of Letter: December 18, 2009	Page 16; Lines 19, 20	The applicant should involve the Oregon Historic Trails Advisory Council (or its designee) in mitigation for any intrusion upon the Oregon Trail route or remains.	The Applicant has offered to give the Oregon Historic Trails Advisory Council (OHTAC) a tour of the proposed Facility to review the proximity of Facility components to the Oregon Trail. The Applicant understands that ODOE, through its issuance of a site certificate, will determine whether mitigation is needed and if so, what will be required. ODOE will consider OHTAC's recommendations in determining any necessary mitigation requirements, following its review of the ASC. If ODOE determines that mitigation is required, the Applicant will involve OHTAC in developing this mitigation. The Applicant notes that no mitigation for impacts to the ONHT was required as a condition of construction of the nearby Shepherds Flat and LJII facilities.
15	Gail Shibley, Oregon Department of Human	Page 16	The Public Health Division notes its concerns regarding health effects and disturbance from noise generated by wind turbines, including potential generation of low-frequency sound or	The ASC evaluates health effects in accordance with Oregon statute and administrative rules. Among the health effects evaluated are noise, electromagnetic fields, and environmental pollution. As discussed thoroughly in the ASC (see Exhibits U,

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	Services, Public Health Division Date of Letter: December 21, 2009		infrasound, health effects and disturbance from shadow flicker from turbine blades, health effects from electromagnetic fields generated by transmission lines, and effects of environmental pollution during construction.	X, and AA), the Facility complies with Energy Facility Siting Council (EFSC) standards for protection of human health and the environment during both construction and operation.
16	Gail Shibley, Oregon Department of Human Services, Public Health Division Date of Letter: December 21, 2009	Page 16	The application should include an assessment of health risks that includes: (1) an evaluation of whether the maximum noise levels specified by OAR 340-035-0035 are sufficiently protective of human health, (2) measured or modeled data on noise levels at nearby buildings, and (3) collection of health concerns from residents living on or near the development.	To issue a site certificate, EFSC must determine that the proposed facility complies with the Oregon statutes and administrative rules that the project order identifies as applicable (ORS 469.503(3)), which always include the Oregon Department of Environmental Quality (DEQ) noise regulations. The Applicant demonstrates in ASC Exhibit X that the Facility does not exceed the maximum noise levels specified by OAR 340-035-0035. OAR chapter 340, division 35 was adopted in the interest of public health and welfare to protect health, safety, and welfare of Oregon citizens. See OAR 340-035-0005. If the Public Health Division (PHD) believes that the existing statutes and rules are not sufficiently protective of human health or the environment, then PHD should petition DEQ to change the current noise standards. The Applicant maintains that an evaluation of the protectiveness of the current standards is not a burden that should be assumed by a single project under the requirements of OAR chapter 345, divisions 21, 22, or 24, but should correctly be part of a public debate held in a rule-making setting. Furthermore, a multidisciplinary panel recently concluded that the sounds generated by wind turbines are not harmful to human health: (http://www.awea.org/newsroom/releases/12-15-09-sound_panel_release.html). The findings included the following:

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
				• "The sounds emitted by wind turbines are not unique. There is no reason to believe, based on the levels and frequencies of the sounds, that they could plausibly have direct adverse physiological effects." • If sound levels from wind turbines were harmful, it would be impossible to live in a city given the sound levels normally present in urban environments. • "Subaudible, low frequency sound and infrasound from wind turbines do not present a risk to human health." • "Some people may be annoyed at the presence of sound from wind turbines. Annoyance is not a pathological entity."
17	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The Service encourages the use of the 2008 Oregon Columbia Plateau Ecoregion Wind Energy Siting and Permitting Guidelines (Guidelines).	The Applicant was an active member of the task force to develop the Guidelines; both Sara Parsons and Andy Linehan participated in the meetings and shared lessons learned from past projects. The Applicant relies heavily on the Guidelines and encourages other developers to follow them as well.
18	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The Service would like to assist in pre-project assessment, monitoring, micrositing, post-project monitoring, and mitigation phases of the project to ensure any identified wildlife and habitat impacts are addressed and mitigated.	Doug Young and Jerry Cordova (USFWS), as well as representatives from other agencies and stakeholders, were invited to and attended a preproject macrositing conference call hosted by the Applicant on May 26, 2009. The details of the call are described in ASC Exhibit P, Section P.6.2. Further, the Applicant held a project briefing conference call with USFWS biologist Jerry Cordova on November 23, 2009, after Mr. Cordova was unable to participate in a November 3, 2009, site visit with ODFW. The project description, permitting, timeline, and study protocols were discussed.

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Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
				The Applicant also consulted USFWS county lists of federally protected species and the ORNHIC database during the information review for the biological resource investigation (see ASC Exhibit Q, Section Q.2.2.1). In addition, numerous prior survey results conducted nearby in similar habitats were reviewed to determine potential occurrence in Facility site boundary. The results of the information review were used to guide the field investigation. Field investigation results are presented in ASC Exhibits P and Q, and Attachments P-7 and Q-1. Monitoring will be addressed in the WMMP and HMP. The Applicant will conduct micrositing within the micrositing corridors and in compliance with site certificate conditions approved by ODOE. Finally, the Applicant has tentatively scheduled a site visit in January or February for USFWS to continue communication about the Applicant's proposed mitigation and monitoring, which will be implemented through the WMMP and HMP.
19	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The application should provide information on the available data on wildlife impacts associated with existing wind projects and activities within the general area of the project and the anticipated cumulative impacts of the project. The project's cumulative impacts assessment should include information on previous habitat loss, fragmentation, degradation, wildlife displacement and mortality data from adjacent wind projects and an estimation of the additional cumulative impact of the proposed project on a limited number of key species that could be adversely affected by additional mortality or are highly sensitive to disturbances or habitat loss.	ASC Exhibit P summarizes data available for existing wind energy facilities in the vicinity of the Facility and in the larger Columbia Basin Ecoregion. Cumulative effects are discussed in ASC Exhibit P, Attachment P-8.
20	Nancy Gilbert,		The applicant should conduct a survey to	The Applicant conducted special-status species surveys,

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Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		determine presence of Washington ground squirrels in the project area within 1,000 feet of all ground-disturbing activities. The applicant should use a "two-survey system" (two surveys conducted in a perpendicular pattern during the same year between March 20 and June 1). Surveyors should look for burrows, scat, sightings, vocal alarms, and burrows without scat. Surveys should be conducted in all potential habitats.	focused primarily on the Washington ground squirrel (WGS), in March 2008 in a portion of the site boundary (see ASC Exhibit P, Section P.3 and Attachment P-7; and Exhibit Q, Figure Q-2). Table Q-2 describes the findings, which demonstrates that the surveys looked for burrows, scat, sightings, vocal alarms, and burrows without scat. In addition, the Applicant reviewed personal field notes from Karen Kronner (NWC) for WGS locations within the Facility vicinity. Some areas within the site boundary were previously surveyed for Pebble Springs in spring 2006 and for LJIIB in the spring of 2009. For those areas not surveyed in 2009, the Applicant will conduct additional wildlife surveys in the spring of 2010 within 1,000 feet of all ground-disturbing activities using standard protocols acceptable to ODFW, which include conducting two surveys.
21	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The applicant should conduct two years of bat acoustic surveys or sampling using a combination of Pettersson bat detectors and AnaBat bat detectors in a manner that will not only help determine bat migratory patterns, but also any patterns in local movements through the project area. The hoary bat and silver-haired bat should be the main bat species surveyed. The Service recommends that bat studies be conducted at a minimum of ten sites within the proposed project area.	As described in Exhibit Q, no threatened, endangered or candidate bat species were identified with potential occurrence within 5 miles of the site boundary. As described in Exhibit P, the Applicant has conducted an extensive review of existing data on bat species information known for the general area and on wildlife monitoring studies and post-construction fatality monitoring for other projects in the Facility vicinity as well as the larger Columbia Basin Ecoregion. This assessment methodology is the same as that used for other wind projects in the area, including the Applicant's Helix Wind Power Facility and LJII Wind Power Facility. Exhibit P, Attachment P-7 provides extensive background information on wind energy bat fatalities regionally and in the immediate vicinity of the Facility, including public data available through August 14, 2009, from the Leaning Juniper I, Pebble Springs, and Rattlesnake Road wind projects. The Applicant agrees with USFWS (December 21, 2009) that based on the species range and Facility characteristics, bat mortality at the Facility is anticipated to be similar to these operating projects, and primarily will involve

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
				migratory silver-haired and hoary bats. No other species were identified during fatality monitoring or as incidental discoveries at Leaning Juniper I during the two-year completed study. At Pebble Springs (ongoing study), for the period January through August 14, 2009, these two species were found as well as two unidentified bats (scavenged condition made identification very challenging). No bats were found at Rattlesnake Road Wind Farm for the similar study period (through August 12). With regard to other species in the landscape, Exhibit P, Attachment P-7 provides a comprehensive table of the bat species likely to occur within that part of Gilliam County as an aid in anticipating what species might be present within the site boundary. NWC has exhausted all sources of SonoBat/Pettersson detector voluntary study data (NWC's employee's studies). Their sampling using this setup was conducted at Arlington and along nearby Rock Creek over the past three summers and falls. They chose sites that are somewhat more mesic areas where one could expect to find bats, rather than on the dry ridges and plateaus of the operating and planned wind projects. These data do provide insight on species composition in the general area (no such Arlington area data existed prior to this) but are not reflective of species occurrence, number of individuals, or areas of concentrated movements and migration within the proposed Facility turbine strings. NWC relies on nearby wind project monitoring bat fatality data for the assessment. The Applicant will implement micrositing techniques in the final project design that will aid in limiting impacts to birds and bats, such as avoiding placing turbines in and near perennial streams, and setting back from basalt cliff-faces where bats and birds are likely to forage and roost.
22	Nancy Gilbert,		Conduct one full year (including at least one	As described in Exhibit P, the Applicant has conducted an

Table BB-1

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Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		spring migration season and one fall migration season) of avian and bat radar studies using marine surveillance radar. These studies will provide information on passage rates, flight directions, flight paths, and altitude of nocturnal bats and birds. We recommend month-long radar studies be conducted mid-April though mid-May and in the months of September and October. These studies should be conducted at a minimum of two sites within the proposed project area.	extensive review of existing data on avian and bat species information known for the general area and on wildlife monitoring studies and post-construction fatality monitoring for other projects in the Facility vicinity as well as the larger Columbia Basin Ecoregion. This assessment methodology is the same as that used for other wind projects in the area, including the Applicant's Helix and LJII projects. The Applicant will implement micrositing techniques in the final project design that will aid in limiting impacts to birds and bats, such as avoiding placing turbines in and near perennial streams, and setting back from basalt cliff-faces where bats and birds are likely to forage and roost.
23	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The applicant should conduct a portion of surveys for birds and bats near water sources in the project corridor that are near any proposed turbine strings.	NWC conducted avian use surveys throughout the site boundary as described in ASC Exhibit P and shown in Figure P-15. The methods and results of the surveys are detailed in Attachment P-7.
24	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The applicant should complete two years of pre-project assessment to obtain baseline information on: eagle nest productivity; use of feeding, roosting, nesting or wintering areas; eagle movements in relation to each proposed turbine location (including an analysis of spatial use in relation to rotor swept zone); numbers of eagles moving through the project area; movements in relation to meteorological conditions; and phenology of movements. Eagle movement studies should include more intense observations (at least 20 days for two years during nesting season when adult eagles and their fledged young are most active).	NWC conducted raptor nest and avian use surveys as described in ASC Exhibit P (and shown in Figures P-4 and P-15). The methods and results of the surveys are detailed in ASC Exhibit P, Attachment P-7. The data collected during the avian use and aerial raptor nest surveys were used to microsite turbines within the site boundary to avoid impacts to raptors and other special-status wildlife species (see ASC Exhibit P, Section P.9). This assessment methodology is the same as that used for other wind projects in the area, including the Applicant's Helix and LJII projects. The avian impact assessment also drew from the extensive volume of existing data on avian and bat species information known for the general area and post-construction fatality monitoring in the Facility vicinity and the larger Columbia Basin Ecoregion.

Table BB-1

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Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
			Information on migrating eagles should be collected as part of raptor migration surveys. Prior to micrositing wind turbines, the certificate holder should analyze the information collected on eagle migration and movement data to develop a quantitative risk assessment of the likelihood of incidental take of bald and golden eagles. If the quantitative risk assessment suggests that incidental take of eagles is likely, the certificate holder should employ micrositing measures for the wind turbines to fully avoid any incidental take of eagles. If the risk assessment suggests that incidental take of eagles is not likely, but important eagle feeding, roosting, nesting or wintering areas are nearby or migratory eagles frequent the project area, then monitoring of eagle nests and any turbine-related injury or mortality is recommended throughout the life of the facility to periodically reassess risk to eagles as protected under the Bald and Golden Eagle Protection Act. The Service is in the process of developing implementation guidance on final regulations to authorize the limited take of bald eagles and golden eagles under the BGEPA.	Information about eagles is provided in Exhibit P and Attachment P-7. If any active eagle nests are identified within 1,300 feet of transmission line poles or other Facility components, the nests will be flagged and avoided. The Applicant will not engage in high-impact construction activities (activities that involve blasting, grading, or other major ground disturbance) or allow high levels of construction traffic within 1,300 feet of these nest sites. To further minimize impacts to eagles and other avian species, the Applicant recently adopted its Avian and Bat Protection Plan, the first in the wind industry. The plan is modeled in part after the 2005 Avian Protection Plan template developed by some 30 electric utility companies, electric cooperatives, and rural utilities in partnership with the USFWS to address impacts of transmission and distribution lines on birds. The Applicant's plan will be implemented across its entire wind fleet, and contains a corporate policy about wildlife protection to evaluate and mitigate any potential avian or bat issues early on in the development process. It also establishes internal policies for pre- and post-construction monitoring and proper site design, impact assessment, permit compliance, nest management, and employee training. In addition, the plan supports the Applicant's ongoing efforts in wildlife research, quality control, and public awareness. A copy of the plan can be found on the Applicant's web site: http://www.iberdrolarenewables.us/rel_08.10.29.html.
25	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The applicant should conduct raptor nest surveys to help assess project impacts and potential conservation measures necessary to maintain nest viability within the project area. Surveys should include areas where updrafts utilized by raptors are prevalent.	The Applicant has established a raptor nest survey radius of 0.5 mile from the preferred transmission line route and alternates and a 2-mile raptor nest survey radius from the proposed Facility site boundary south of the transmission line corridors (i.e., the majority of the site boundary). The Applicant (through NWC) has already surveyed approximately 50 percent of the Facility site boundary for nesting raptors (as shown in ASC Exhibit P, Figure P-4) during studies conducted

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
				for Pebble Springs and LJII. In addition, in 2009 the Applicant surveyed a large portion (approximately 35 percent) of the Facility 2-mile raptor survey radius for nesting raptors in adjacent wind projects. Data were reviewed from several adjacent wind projects surveyed for raptor nests in 2009 by NWC, including LJI, LJIIA and LJIIB, and Pebble Springs. The Applicant plans to conduct surveys of the remaining area within the Facility 2-mile raptor survey radius in 2010. Surveys will include areas where updrafts are prevalent.
26	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The Service recommends that, in the final project design, the certificate holder should incorporate the micrositing considerations and recommendations outlined in the Guidelines as well as the pre-project assessment surveys and mapping information.	As mentioned earlier, the Applicant helped develop the mapping, preproject assessment, and micrositing Guidelines and is committed to following these Guidelines. During preproject assessment, the Applicant coordinated with ODFW and USFWS regarding survey protocols, identified micrositing corridors, and retained NWC to conduct habitat mapping, avian use surveys, raptor nest surveys, and sensitive species surveys and assess project impacts. The Applicant also proposed habitat mitigation in Exhibit P and will work with ODOE and ODFW to calculate habitat mitigation acreages during the completeness review. As discussed in Exhibits P and Q, the Applicant will microsite the Facility components within the micrositing corridors to avoid impacts to Category 1 habitat and threatened, endangered, or candidate species populations and in compliance with site certificate conditions approved by ODOE.
27	Nancy Gilbert, U.S. Fish and Wildlife Service Date of Letter: December 21, 2009		The Service recommends that the Council implement the ODFW Habitat Mitigation Policy.	As described in Exhibits P and Q, the Applicant has mapped and rated habitat within the site boundary and will mitigate for unavoidable impacts by implementing an HMP similar to the HMPs developed for nearby facilities, including LJII and Shepherd's Flat. Habitat types and categories will be field verified and reassessed, as needed, after the spring 2010 special status wildlife surveys.

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
28	Confederated Tribes and Bands of the Yakama Nation Established by the Treaty of June 9, 1855 Date of Letter: November 30, 2009		Although this project is located on private land, the proposed wind turbines are going to be connected to Bonneville Power Administration transmission lines and substations. The applicant should follow federal guidelines outlined in the National Historic Preservation Act and consult with Tribes (the Yakama, Confederated Tribes and Bands of the Warm Springs, Confederated Tribes and Bands of the Umatilla, and Nez Perce) in order to comply with the Native American Religious Freedoms Act.	The Applicant will comply with state regulations for this state-permitted project, and in its review of the application, ODOE will ensure compliance with EFSC requirements in OAR Chapter 345, division 21 and 22, including Exhibit S (Historic, Cultural, and Archaeological Resources) and the Cultural Resources Standard in OAR 340-022-0090. ODOE does not oversee the issuance of federal permits, and does not assume the obligations of federal agencies like Bonneville Power Administration (BPA). However, the Applicant expects to meet National Historic Preservation Act (NHPA) requirements for the issuance of federal actions and permits, including the BPA interconnection. The Applicant also intends to comply with Section 404.
29	Confederated Tribes and Bands of the Yakama Nation Established by the Treaty of June 9, 1855 Date of Letter: November 30, 2009		The Yakama recommend that the applicant have a professional archaeologist or Tribal representative survey access roads, staging areas and proposed turbine tower locations for cultural material and prepare a report to be reviewed by all interested parties.	The Applicant had a professional archaeologist survey all areas where Facility components are being considered, including access roads, staging areas, and proposed turbine tower locations. A representative from the Confederated Tribes and Bands of the Warm Springs Region (CTWSR) was invited to join the cultural resource survey team, and an ethnographer from CTWSR, Bridget Whipple, attended a site tour on December 1, 2009. The confidential cultural resources survey report is provided as an attachment to ASC Exhibit S and will be provided to both the CTWSR and the Confederated Tribes of Umatilla Indian Reservation. The Yakama and Nez Perce Tribes will also be noticed by ODOE.
30	David Welch, Oregon-California Trails Association Date of Letter:		The maps provided as part of the NOI are inadequate with regard to assessing the location or impacts to the Oregon National Historic Trail (ONHT). Surveys of the trail's location and status must be documented on the equivalent of a USGS topographic quad or better (1:24,000 or 1:12,000). The Oregon-	The maps provided in the NOI are intended only for scoping purposes. The Applicant assesses the location of the ONHT and potential impacts to the ONHT in relation to the Facility site boundary in ASC Exhibits S (Historic, Cultural, and Archaeological Resources) and T (Recreational Facilities and Opportunities). The Oregon-California Trails Association (OCTA) Mapping Emigrant Trails (MET) Manual is available

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	December 18, 2009		California Trails Association (OCTA) requests that the applicant use OCTA's Mapping Emigrant Trails (MET) Manual to assess impacts to the trail. The Manual provides a classification system for documenting the condition of the trail.	online at http://www.octa-trails.org/preserve/MET_field.pdf and is a method for identifying and classifying historic trails and physical impacts. Use of the MET manual is not required by EFSC standards, has not been requested on other projects in the vicinity of the ONHT (e.g., Shepherds Flat, LJII), and was not used to assess potential Facility impacts to the ONHT. However, in accordance with standard cultural resources survey protocols, the visually intact remnants of the ONHT were mapped using global positioning system (GPS) devices, photodocumented, and recorded on State of Oregon site record forms (see Appendix A to ASC Exhibit S Attachment S-1 [confidential and not for public distribution] for site record forms). The Applicant will avoid construction of Facility components on visually intact remnants of the ONHT.
31	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		The certificate holder should avoid direct impacts to OCTA MET Class 1, Class 2 and Class 3 segments.	The Applicant's position is that the MET classification system is not required by EFSC standards. However, the Applicant will not construct Facility components on the visually intact remnants of the ONHT identified on the basis of literature and field cultural surveys conducted as described in ASC Exhibit S.
32	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		The applicant's archaeological survey should include an historical archaeologist familiar with emigrant trails and their remaining signatures.	The cultural resource survey team included archaeologists familiar with emigrant trails and their remnants.

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
33	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		The applicant should consult with OCTA regarding mitigation for impacts to the trail. Mitigation should include improved signage and interpretation at selected sites in or near the project area.	ODOE will determine mitigation requirements, as appropriate, on review of the ASC, in consultation with the Oregon State Historic Preservation Office (SHPO), and considering input from the Oregon-California Trails Association (OCTA), OHTAC, and others. If ODOE determines that mitigation is required, the Applicant would involve OCTA in developing this mitigation. The Applicant notes that no mitigation for impacts to the ONHT has been required for other nearby wind projects, including Shepherds Flat and LJII.
34	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		Except where it has already been improved, the identified route of the ONHT should not be used as an access road before, during or after construction.	The Applicant will not use identified visually intact remnants of the ONHT as access roads during Facility construction or operation.
35	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		All excavations across or near the trail route should be monitored by a qualified archaeologist.	The Applicant does not plan excavations across the ONHT route.
36	David Welch, Oregon-California Trails Association Date of Letter:		Trail crossings regardless of the visual appearance should be designed to minimize impacts to the trail resource.	No direct impacts from the Facility will occur to visually intact remnants of the ONHT.

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Project Order VII: Public and Reviewing Agency Concerns Regarding the Montague Wind Power Facility

Item Number	Agency	Project Order, Page and Line Reference	Comment	Response
	December 18, 2009			
37	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		Visibility of turbines and infrastructure should be minimized as viewed from high quality segments of the ONHT. OCTA recommends a 0.25-mile setback from the trail. The applicant should conduct a visibility analysis as seen by a person on the trail.	The Applicant conducted a visibility analysis for the Facility as presented in ASC Exhibit R. Previous projects in the vicinity of the ONHT, including LJII and Shepherds Flat, did not include specific setback requirements from the ONHT and it is the Applicant's position that there is no reason to change that approach for the Facility.
38	David Welch, Oregon-California Trails Association Date of Letter: December 18, 2009		OCTA believes that this project is a "federal undertaking," based on the list of federal permits on page E-1 of the NOI, and that Section 106 of the National Historic Preservation Act applies. Mitigation of adverse effects will be required.	Because this is a state-permitted project, it is ODOE's obligation to ensure that the Facility will comply with EFSC requirements. EFSC cannot oversee the issuance of federal permits, and does not assume the obligations of federal agencies. However, the Applicant expects to meet National Historic Preservation Act (NHPA) requirements for the issuance of any required federal permits. Mitigation requirements, if any, will be determined by ODOE and by federal agencies as part of their permitting process.

EXHIBIT CC

ADDITIONAL STATUTES, RULES, AND ORDINANCES
OAR 345-021-0010(1)(cc)

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CC.1 INTRODUCTION

Exhibit CC identifies all state statutes, administrative rules, and local government ordinances containing standards or criteria that the proposed Montague Wind Power Facility (Facility) must meet for the Council to issue a site certificate, other than statutes, rules, and ordinances identified in Exhibit E.

This Exhibit is organized in accordance with the application requirements contained in OAR 345-021-0010(1)(cc).

CC.2 ADDITIONAL STATUTES, RULES, AND ORDINANCES

OAR 345-021-0010(1)(cc) *Identification, by legal citation, of all state statutes and administrative rules and local government ordinances containing standards or criteria that the proposed facility must meet for the Council to issue a site certificate, other than statutes, rules and ordinances identified in Exhibit E, and identification of the agencies administering those statutes, administrative rules and ordinances. The applicant shall identify all statutes, administrative rules and ordinances that the applicant knows to be applicable to the proposed facility, whether or not identified in the project order. To the extent not addressed by other materials in the application, the applicant shall include a discussion of how the proposed facility meets the requirements of the applicable statutes, administrative rules and ordinances.*

CC.2.1 Statutes, Rules, and Local Ordinances Referenced in Other Exhibits

Response: The following statutes, rules, and local ordinances are referenced in various Exhibits but are not addressed in Exhibit E. Discussion of compliance with these laws is found in each applicable Exhibit of this site certificate application and is not repeated here.

1. **Oregon Department of Agriculture**—Plant Conservation Biology Program—ORS 564; OAR Chapter 603, Division 73.

   Agency: Oregon Department of Agriculture
   635 Capitol Street, N.E.
   Salem, OR 97301-2532
   (503) 986-4550

2a. **Oregon Department of Environmental Quality**—Water Quality—ORS Chapter 468 and 468B; OAR Chapter 340, Divisions 14, 41, 45, 52, and 55.

   Agency: Oregon Department of Environmental Quality
   475 NE Bellevue Drive, Suite 110
   Bend, OR 97701
   (541) 388-6146

2b. **Oregon Department of Environmental Quality**—Noise—ORS 467; OAR Chapter 340, Division 35.

Agency: Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696

2c. **Oregon Department of Environmental Quality**—Hazardous Waste Management—ORS 465 and 466; OAR Chapter 340, Divisions 100-113.

Agency: Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696

2d. **Oregon Department of Environmental Quality**—Solid Waste—ORS 459; OAR Chapter 340, Division 93.

Agency: Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696

3. **Oregon Department of Fish and Wildlife**—Habitat Conservation Division—ORS 496 and 506; OAR Chapter 635, Divisions 100 and 415.

Agency: Oregon Department of Fish and Wildlife
3406 Cherry Avenue N.E.
Salem, OR 97303
(503) 947-6000

4. **Oregon Department of Geology and Mineral Industries**—OAR Chapter 632.

Agency: Oregon Department of Geology and Mineral Industries
800 NE Oregon Street, Suite 965
Portland, OR 97232
(971) 673-1555

5. **Oregon Office of State Fire Marshal**—EPCRA—ORS 453; OAR Chapter 837, Divisions 85 and 95

Agency: Oregon Office of State Fire Marshal
4760 Portland Rd NE
Salem, OR 97305
(503) 378-3473

Exhibit K identifies the numerous state statutes, administrative rules, and local government ordinances that contain land use standards or criteria the Facility must meet for issuance of a site certificate. Exhibit K also includes a discussion of how the Facility meets the requirements of the applicable statutes, rules, and ordinances identified therein. Rather than repeat those statutes, rules, and local ordinances here, the Applicant requests that the Council refer to Exhibit K.

CC.2.2 Spill Response Statutes

Response: The state and federal release reporting requirements are contained in the following statutes and rules: ORS 466.635, OAR Chapter 340, Divisions 45, 47, 108, 122, 150, 160; 33 CFR part 153; and 40 CFR parts 110, 122, 262, 265, 280, 302, 355, 761. These provisions include requirements for responding to, or reporting, spills or release of various hazardous materials under a variety of circumstances or conditions. Depending on the nature of the particular spill or release, Oregon agencies that may be notified of a spill or release include the Oregon Emergency Management Division, the Oregon Department of Environmental Quality, and the Oregon Department of State Police.

EXHIBIT DD

SPECIFIC STANDARDS FOR WIND FACILITIES
OAR 345-021-0010(1)(dd)

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DD.1 INTRODUCTION

Iberdrola Renewables, Inc. (Applicant) proposes to construct the Montague Wind Power Facility (Facility) in Gilliam County, Oregon, with generating capacity of up to 404 megawatts (MW).

OAR 345-021-0010(1)(dd) *If the proposed facility is a facility for which the Council has adopted specific standards, information about the facility providing evidence to support findings by the Council as required by the following rules:*

DD.1 WIND ENERGY FACILITIES

OAR 345-021-0010(1)(dd)(A) *For wind energy facilities, OAR 345-024-0010 and -0015.*

Response: Please refer to Section DD.2.1 for discussion of OAR 345-024-0010 and Section DD.2.2 for discussion of OAR 345-024-0015.

DD.1.1 PUBLIC HEALTH AND SAFETY STANDARDS FOR WIND ENERGY FACILITIES

OAR 345-024-0010 *To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant:*

DD.1.1.1 Restrict Public Access

OAR 345-024-0010(1) *Can design, construct and operate the facility to exclude members of the public from close proximity to the turbine blades and electrical equipment.*

Response: The Facility turbines will be located on private lands and therefore public access will already be restricted. Further, each turbine tower will have a locked entry door at ground level and an internal access ladder with safety platforms for access to the nacelle to prevent unauthorized individuals from climbing the tower. Step-up transformers will be located within locked cabinets at the base of each tower. Towers will be located at least 1,320 feet from residences. Towers will also be located at least 110 percent of maximum blade tip height from the edge of the nearest right-of-way of any public road and from the nearest boundary of the lease area.

Additionally, the Applicant will restrict public access to any related or supporting facilities that could pose a potential threat to the safety of visitors (i.e., substations). The substations will be located within a fenced area with a locked gate. The Applicant will also provide gates on private access roads where appropriate to protect adjacent or nearby property.

The Applicant proposes that site certificate conditions such as condition 39 from the Leaning Juniper II Wind Power Facility Site Certificate be included in the site certificate for the Montague Wind Power Facility. Specifically, the Applicant proposes the following condition:

The certificate holder shall construct all facility components in compliance with the following setback requirements:

(a) All facility components must be at least 3,520 feet from the property line of properties zoned residential use or designated in the Gilliam County Comprehensive Plan as residential.

(b) Where (a) does not apply, the certificate holder shall maintain a minimum distance of 110-percent of maximum blade tip height, measured from the centerline of the turbine tower to the nearest edge of any public road right-of-way. The certificate holder shall assume a minimum right-of-way width of 60 feet.

(c) Where (a) does not apply, the certificate holder shall maintain a minimum distance of 1,320 feet, measured from the centerline of the turbine tower to the center of the nearest residence existing at the time of tower construction.

(d) Where (a) does not apply, the certificate holder shall maintain a minimum distance of 110-percent of maximum blade tip height, measured from the centerline of the turbine tower to the nearest boundary of the certificate holder's lease area.

(e) The certificate holder shall maintain a minimum distance of 250 feet measured from the center line of each turbine tower to the nearest edge of any railroad right-of-way or electrical substation.

(f) The certificate holder shall maintain a minimum distance of 250 feet measured from the center line of each meteorological tower to the nearest edge of any public road right-of-way or railroad right-of-way, nearest boundary of the certificate holder's lease area or nearest electrical substation.

(g) The certificate holder shall maintain a minimum distance of 50 feet measured from any facility O&M building to the nearest edge of any public road right-of-way or railroad right-of-way or the nearest boundary of the certificate holder's lease area.

(h) The certificate holder shall maintain a minimum distance of 50 feet measured from any substation to the nearest edge of any public road right-of-way or railroad right-of-way or the nearest boundary of the certificate holder's electrical substation easement or, if there is no easement, the nearest boundary of the certificate holder's lease area.

These safety measures, in combination with the setback distances, significantly reduce the likelihood of the public coming into proximity with turbine blades and electrical equipment and demonstrate that the Facility will be designed, constructed, and operated to adequately restrict public access.

DD.1.1.1 Prevent Structural Failure

OAR 345-024-0010(2) *Can design, construct and operate the facility to preclude structural failure of the tower or blades that could endanger the public safety and to have adequate safety devices and testing procedures designed to warn of impending failure and to minimize the consequences of such failure.*

Response: The Applicant has successfully developed, managed construction of, and operated wind energy projects, as described in Exhibit D. No regulatory citations have been issued to the Applicant in connection with the construction or operation of similar project facilities in Oregon. The Applicant holds itself to a high standard on safety, and all construction general contractors are required to meet strict safety qualifications. A strong environmental health and safety (EHS) record is exemplified by the title of IBR's EHS Policy: "People & the Environment First." The Applicant has had zero employee lost-time accidents for all company operations in the United States and Canada for more than 7 years.

Prior to 2008, there were no accidents involving employees or contractors. In 2008, the Applicant's contractors had four minor lost time accidents with a total of 8 days lost time. Tragically, a serious accident occurred at an IBR-owned wind project, Klondike III in Oregon, constructed and operated by turbine manufacturer Siemens. One of the Siemens employees was killed, and another injured. The accident was investigated by Siemens with Applicant oversight team, and Siemens was precluded from operating until all IBR required corrective actions were implemented. Oregon OSHA also thoroughly investigated the accident and Siemens received a citation and fine from Oregon OSHA. This is the first known fine and serious citation against an Applicant contractor. The Applicant received no citation from Oregon OSHA as a result of its investigation. Further, the Applicant is working diligently to prevent the recurrence of this kind of accident, both with its employees and contractors, and through its leadership position on the American Wind Energy Association Safety Committee.

In 2009, one minor lost time accident involving an employee resulted in 5 days of lost time. In 2006, IBR (then PPM Energy) was notified by the U.S. Corps of Engineers about a shot-crete lined culvert crossing apparently constructed by Northwestern Windpower as part of the Klondike I project over 5 years prior to the Corps notification. PPM performed remedial action in conjunction with completion of construction for the Klondike III project.

It is the Applicant's formal policy that safety of people and conservation of the environment come first in the conduct of operations. The Applicant is committed to a safe and healthy workplace that promotes a zero accident culture in which no one is harmed in association with business activities. The Applicant also is committed to being an environmentally-conscious company that promotes development of clean energy production and storage with minimal adverse environmental effects. Finally, the Applicant is committed to continuous improvement to identify and control risks so that company performance meets high expectations. Therefore, relative to EHS issues, all organizations and individuals will do the following:

- Operate in compliance with or exceed all EHS governmental laws, regulations, ordinances, standards and permit requirements, and established Applicant policies and standards;
- Ensure all employees are involved in EHS programs with appropriate training and communication to work responsibly, make decisions to carry out their duties, and to be accountable for the results;

- Provide a structure that ensures effective EHS management throughout the business with risks, impacts, and legal requirements controlled through appropriate actions and governance;
- Ensure that EHS goals and stretch targets are set, communicated to all employees, and performance monitored to promote continuous improvement;
- Work to proactively prevent incidents, accidents, and environmental damage before these occur by sustainable actions and process improvements at all locations;
- Promote the health and wellness of employees by identifying and controlling workplace health risks, promoting work-life balance, and encouraging employees and their families to be proactive about their health through communication, activities, and the provision of robust health insurance;
- Require that contractors and others associated with operations comply with EHS requirements, and never be asked to perform anything unsafe or in violation of environmental laws;
- Ensure that public safety, security of people and assets, conservation, and environmental stewardship are fundamental to company operations;
- Design, construct, and operate facilities in ways that minimize their negative EHS impacts, and maximize their positive EHS contribution, as available technology and conditions permit; and
- Play a leading role in the development of a renewable energy market through strategic relationships with industry, regulatory bodies, and other external stakeholders, with open communication that maintains their confidence in the Applicant's commitment to EHS in company operations.

This policy commits the company to its core belief, which is integral to its business philosophy and success, that an excellent EHS culture among all employees will deliver superior performance that protects employees, contractors, the public, and the environment.

Additionally, turbine towers and tower foundations, as well as aboveground transmission line support structures, will be designed according to applicable building codes to avoid failure or collapse. During Facility construction, the Applicant will follow the manufacturers' recommended handling instructions and procedures to prevent damage to towers or blades that could lead to failure.

For these reasons, the Applicant demonstrates that the Facility will be designed, constructed, and operated in a manner that protects public safety and preclude structural failure. Adequate safety devices, company operational policies, and testing procedures will be in place to assure safe construction and operation of the Facility.

DD.1.2 SITING STANDARDS FOR WIND ENERGY FACILITIES

OAR 345-024-0015 *To issue a site certificate for a proposed wind energy facility, the Council must find that the applicant can design and construct the facility to reduce cumulative adverse environmental effects in the vicinity by practicable measures including, but not limited to, the following:*

DD.1.2.1 Access Roads

OAR 345-024-0015(1) *Using existing roads to provide access to the facility site, or if new roads are needed, minimizing the amount of land used for new roads and locating them to reduce adverse environmental impacts.*

Response: The Facility site is in a relatively low-density area of the state, where existing public and private roads are widely dispersed. Transportation to and from the site will follow a route that includes access via interstate, state, and county roads, as further described in Exhibit U.

Constructing the Facility will require improving some existing roads. Improvements will be made to existing public roads within the County right-of-way (ROW), including grading and graveling. In addition, existing private roads will be improved by widening, grading, and graveling. Typical existing roads are 8 to 12 feet wide, and will need to be widened to up to 80 feet during construction and up to 20 feet during operations.

In areas where existing roads do not provide access to wind turbine locations, and along the length of turbine strings, new gravel access roads will be constructed. Generally, these new access roads will be up to 20 feet wide (with up to an additional 60 feet temporarily disturbed for crane paths[1] during construction). Roads will be designed under the direction of a licensed engineer and compacted to meet equipment load requirements. In addition, the Applicant will also site roads so as to avoid and minimize significant impacts to wetlands, other waters of the State, or fish and wildlife habitat, as described in Exhibits J and P. Within the Facility, up to approximately 70 miles of new roads will be constructed (see Figure C-2), and the majority of the roads will continue to be used during the Facility's operation.

To the maximum extent feasible, the Applicant proposes to use existing roads to access the Facility site, because doing so minimizes both environmental impacts and Facility construction costs.

[1] The cranes required to erect turbines will temporarily disturb a corridor up to 60 feet wide during transport between turbine locations. This 60-foot corridor will parallel the access road corridor where possible, and will allow for the irregular path made by the 30-foot-wide crane, and up to 10 feet on either side of the crane for support vehicles. Where vegetation needs to be cleared (i.e., vegetation too large for the crane to walk over), the vegetative spoils will be pushed beyond the 50-foot path for up to 5 feet on either side, for a maximum disturbance width of 60 feet. In locations where the crane paths do not parallel access roads, temporary crane paths will be 55 feet in width.

DD.1.2.2 Transmission Lines

OAR 345-024-0015(2) *Using underground transmission lines and combining transmission routes.*

Response: Energy generated from the turbines will be collected by the cable system and connected to two Facility Collector Substations (collector substations). The collector substations will be centrally located within the site boundary to minimize the overall length of the cable collection system. The Facility will have approximately 76 miles of underground collector cables and approximately 15 miles of aboveground collector cables.

A new overhead 230-kilovolt (kV) transmission line will connect the Facility to the existing 500- kV Bonneville Power Administration (BPA) Slatt-Buckley transmission line at the Slatt Interconnection substation (Slatt substation) located approximately 1.5 miles from Arlington, Oregon. The new overhead 230-kV transmission line will run from the Facility's western collector substation to the central collector substation and from the central collector substation to BPA's Slatt substation. The overhead 230-kV transmission line from the western collector substation to the central collector substation is approximately 8.2 miles in length. The transmission line from the central collector substation to the Slatt substation is approximately 8.8 miles in length.

The Applicant has proposed corridors for the transmission line (or transmission line segments) to allow for micrositing around wetlands, Washington ground squirrel colonies, and other sensitive features. In addition, the Applicant has proposed a preferred and two alternate routes for the portion of the transmission line from the central collector substation to the Slatt substation. The preferred transmission line route is approximately 8.8 miles long, and the alternate transmission line routes are approximately 8.9 miles long, as shown in Figures C-3 and C-5. Both routes terminate at a proposed interconnection point, as shown on the same figures.

However, there is no alternative route significantly different from these corridors that would better meet the Applicant's needs and at the same time satisfy the Council's standards. The transmission line routes are limited by the need for a direct route to carry electricity from the proposed turbines to the interconnection point at Slatt substation, topography, and the need to locate the route through other wind facilities on land for which the Applicant has negotiated or is in the process of negotiating long-term wind leases or easements with adjacent landowners and developers.

The segment of the transmission line route from the western portion of the site boundary to the central collector substation crosses through the Leaning Juniper II Wind Power Facility (LJF) and needs to be sited around the LJF turbines and other facilities. The segment of the transmission line route from the central collector substation to the Slatt substation is located through the operating Pebble Springs Wind Power Facility.

In sum, other than the preferred and alternate routes for the transmission line from the central collector substation to the Slatt substation, there are no alternative routes other

than those which have been proposed that would "better meet the applicant's needs and satisfy the Council's standards."

DD.1.2.3 Substations

OAR 345-024-0015(3) *Connecting the facility to existing substations, or if new substations are needed, minimizing the number of new substations.*

Response: The Applicant proposes to construct two collector substations. The proposed collector substations will be located as shown in Exhibit C, Figure C-4. The new overhead 230-kV transmission line will run from the Facility's western collector substation to the central collector substation and from the central collector substation to BPA's Slatt substation. BPA currently is constructing a new 230-kV yard addition to expand the Stall substation for this interconnection.

DD.1.2.4 Raptor and Wildlife Protection

OAR 345-024-0015(4) *Designing the facility to reduce the risk of injury to raptors or other vulnerable wildlife in areas near turbines or electrical equipment.*

Response: The Facility will be designed to minimize raptor injury by adhering to the 2006 Avian Powerline Interaction Committee (APLIC) suggested practices for raptor protection on power lines. Overall, the Facility will minimize impacts of disturbance to wildlife habitats, and will provide mitigation according to Oregon Department of Fish and Wildlife (ODFW) habitat mitigation guidelines for unavoidable impacts to habitats. Further details are provided in Exhibits P and Q.

DD.1.2.5 Visual Features

OAR 345-024-0015(5) *Designing the components of the facility to minimize adverse visual features.*

Response: The Applicant understands that this standard applies to specific features on components, such as signs, versus the overall Facility. The Facility will not include unusual visual features. Signs and similar components will be minimized.

The Facility will also make use of the latest generation of turbines, which are larger, more widely spaced, and rotate at lower revolutions per minute (rpm) than those used in projects installed in the 1980s and 1990s. These factors combined ensure that the Facility is designed to minimize adverse visual features.

DD.1.2.6 Lighting

OAR 345-024-0015(6) *Using the minimum lighting necessary for safety and security purposes and using techniques to prevent casting glare from the site, except as otherwise required by the Federal Aviation Administration or the Oregon Department of Aviation.*

Response: The Facility will be lighted in accordance with Federal Aviation Administration (FAA) regulations. In addition, security lighting at the O&M facility(s)

and Facility substations will be provided such that lighting is shielded or downward-directed to reduce glare. Minimum lighting will be used for necessary nighttime repairs, and outdoor night lighting will be restricted to the minimum required for safety and security. Sensors and switches will be used to keep lighting turned off when not required, and lights will be hooded and directed to minimize backscatter and offsite light trespass. During construction, lighting will be restricted to the minimum necessary for construction, directed to illuminate the work area and shielded or downward-directed to reduce glare.

DD.2 GAS FACILITIES

OAR 345-021-0010(1)(dd)(B) *For surface facilities related to underground gas storage reservoirs, OAR 345-024-0030, including information required by OAR 345-021-0020.*

Response: Not applicable.

DD.3 TRANSMISSION LINES UNDER COUNCIL JURISDICTION

OAR 345-021-0010(1)(dd)(C) *For any transmission line under Council jurisdiction, OAR 345-024-0090.*

Response: Not applicable, although the 230-kV transmission line and 34.5-kV collector cables do amount to related or supporting facilities. For information regarding compliance with OAR 345-024-0090 for these related or supporting facilities, see Exhibit AA, Sections AA.3 and AA.4.

DD.4 REFERENCES

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: the State of the Art in 2006*. Edison Electric Institute/ Raptor Research Fund. PIER Final Project Report CEC-500-2006-022.