

Exhibit Q

Threatened and Endangered Species

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

BLM	U.S. Bureau of Land Management
EFSC	Energy Facility Siting Council
kV	kilovolt
OAR	Oregon Administrative Rule
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects
T&E	Oregon listed threatened and endangered
USFWS	U.S. Fish and Wildlife Service

1.0 Introduction

The Energy Facility Siting Council (EFSC; Council) previously approved the Eugene-Medford 500 kV Transmission Line Project and found that PacifiCorp dba Pacific Power (PacifiCorp) appropriately analyzed potential impacts to threatened and endangered species as required for construction and operation. In this Request for Amendment No. 4, PacifiCorp seeks to expand the EFSC-certificated facility boundary to include the Grants Pass-Sams Valley Transmission Line and the Sams Valley Substation for the Sams Valley Reinforcement Projects (Project).

Exhibit Q was prepared to meet the submittal requirements for the Project, per Oregon Administrative Rule (OAR) 345-021-0010(1)(q), related to Oregon listed threatened and endangered (T&E) species.

1.1 Analysis Area

The Analysis Area for all species in Exhibit Q is defined as the Site Boundary, as described in the *Written Request for Amendment #4 Eugene-Medford 500 kV Transmission Line*, plus a 5-mile buffer, as defined by OAR 345-001-0010(59)(a).

2.0 Site Certificate Condition Compliance

PacifiCorp recommends the following new conditions for this resource to ensure compliance with the T&E Species Standard:

- Threatened and Endangered Condition 1:** During construction and operation, the site certificate holder shall not conduct work activities that produce loud noises above ambient levels within specified distances (see Table below) of any active northern spotted owl nest site during the critical early nesting period, March 1 – June 30, or until two weeks after the fledging period. This seasonal restriction may be waived if protocol surveys have determined the activity center is not occupied, owls are non-nesting, or owls failed in their nesting attempt. The distances listed in the table may be shortened if significant topographical breaks or blast blankets (or other devices) would muffle sound between the work location and nest sites.

Work Activities that Produce High Ambient Levels

Activity	Zone of Restricted Operation
Heavy equipment (including non-blasting quarry operations)	105 feet
Chain saws	195 feet
Impact pile driver, jackhammer, rock drill	195 feet
Small helicopter or plane	360 feet ¹
Type 1 or Type 2 helicopter	0.25 miles ¹

Work Activities that Produce High Ambient Levels

Activity	Zone of Restricted Operation
Blasting; 2 pounds of explosive or less	360 feet
Blasting; more than 2 pounds of explosives	1 mile
1. If less than 1,500 feet above ground level.	

- **Threatened and Endangered Condition 2:** Prior to construction, the Site Certificate holder shall conduct state listed Threatened and Endangered plant species surveys on those portions of the Site Boundary that have not been previously surveyed, if potential habitat may exist. If state listed Threatened and Endangered plant species are found during surveys, they will be flagged and avoided where possible.

3.0 Identification of Species – OAR 345-021-0010(1)(q)(A)

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), 564.105(2) or 16 USC 1533 that may be affected by the proposed facility.

In compliance with OAR 345-021-0010(1)(q)(A), PacifiCorp identified all T&E species listed under Oregon Revised Statutes (ORS) 496.172(2) (state threatened and endangered wildlife species) and ORS 564.105(2) (state threatened and endangered plant species) that may be affected by the Project.

3.1 Desktop Review

Existing data were utilized to determine the preliminary list of T&E species that could potentially occur within the Analysis Area. Review included the following databases and published literature:

- Oregon Biodiversity Information Center (ORBIC) data request (ORBIC 2017);
- Oregon Department of Agriculture (ODA) T&E Plant List (ODA 2017);
- Oregon Department of Fish and Wildlife (ODFW) T&E Fish and Wildlife List (ODFW 2017);
- The Environmental Assessment for the Project (BLM 2016);
- The Biological Assessment for the Project (Attachment P-2);
- The Biological Opinion for the Project (USFWS 2016);
- Recovery Plans (USFWS 2011 and USFWS 2012); and

- StreamNet (2012).

In order to identify T&E species with the potential to occur within the Analysis Area, known occurrence locations from ORBIC from within 5 miles of the Analysis Area were queried, as well as an additional request for occurrence locations outside of the Analysis Area in order to ensure all species with the potential to occur within the Analysis Area were included in this analysis, not just species that are known to occur within the Analysis Area.

3.1.1 Wildlife and Fish

Wildlife species other than fish were considered potentially present if there was a known occurrence within 5 miles of the Analysis Area, or if their range and suitable habitat overlapped this area. No T&E fish species have the potential to occur, as no T&E fish-bearing streams are within the Analysis Area (StreamNet 2012, USFWS 2012). Some T&E fish and wildlife species listed in Josephine and Jackson counties in the Project's Environmental Assessment (BLM 2016) were considered, but not carried forward into consideration in this exhibit (due to the Analysis Area being outside of their range, or lack of suitable habitat within the Analysis Area) include the marbled murrelet (*Brachyramphus marmoratus*; USFWS 2016), Lost River sucker (*Deltistes luxatus*; USFWS 2012), and short-nose sucker (*Chasmistes brevirostris*; USFWS 2012). The only T&E fish and wildlife species that potentially occurs within the Analysis Area and may have suitable habitat present is the northern spotted owl (*Strix occidentalis caurina*; USFWS 2011; Table Q-1).

3.1.2 Plants

ODA listed plant species from Josephine and Jackson counties were included if occurrence was considered possible within the Analysis Area or if an ORBIC occurrence was within 5 miles of the Analysis Area. T&E plant species listed in Josephine and Jackson counties by ODA (2017) that were considered but not carried forward due to their very narrow range, habitat requirements, and lack of current, known occurrences within 5 miles of the Analysis Area included the McDonald rockcress (*Arabis macdonaldiana*), Howell's mariposa lily (*Calochortus howellii*), Sexton Mountain mariposa lily (*Calochortus indecorus*), Umpqua mariposa lily (*Calochortus umpquaensis*), large-flowered rush lily (*Hastingsia bracteosa*), Howell's microseris (*Microseris howellii*) and Wolf's evening primrose (*Oenothera wolfii*; ODA 2017, ORBIC 2017). Shiny-fruited allocarya (*Plagiobothrys lamprocarpus*) is only known from one historical location in the world. It was last observed in 1921 in an area that is likely within the city limits of Grants Pass, Oregon. The species does not have any federal status, as it is presumed extinct (ODA 2017). As such, it is not carried forward as a potential to occur within the Analysis Area. Five T&E plant species were determined to have the potential to occur within the Analysis Area (Table Q-1).

Wildlife and plant T&E species that were determined to have potential to occur within the Analysis Area are listed in Table Q-1, including their state status, documented occurrence within the Analysis Area, and each species' expected habitat.

Table Q-1. State-Listed T&E Species with the Potential to Occur within the Analysis Area

Common Name Scientific Name¹	State Status	Occurrence within Analysis Area²	Expected Habitat³
Wildlife			
Northern spotted owl <i>Strix occidentalis caurina</i>	Threatened	ORBIC records within the Analysis Area and within 5 miles of the Analysis Area. USFWS designated critical habitat within the Analysis Area.	Mature and old-growth forests with moderate canopy cover
Vascular Plants			
Wayside aster <i>Eucephalus vialis</i>	Threatened	ODA listed in Josephine and Jackson counties. Two ORBIC occurrences within the Analysis Area. No other known database records within 5 miles of the Analysis Area. Not observed during Project field surveys.	Dry open oak or coniferous woods typically from 490-1,480 feet, but has been found up to 6,680 feet.
Gentner's fritillary <i>Fritillaria gentneri</i>	Endangered	ODA listed in Josephine and Jackson counties. Twenty-one ORBIC occurrences within the Analysis Area, though most have an "Extirpated," "Possibly extirpated," "Failed to find," or "Poor estimated viability" rank. Twenty-six additional database records within 5 miles of Analysis Area. Not observed during Project field surveys.	Dry, open woodlands of fir or oak
Big-flowered wooly meadowfoam <i>Limnanthes floccosa</i> ssp. <i>grandiflora</i> (<i>Limnanthes pumila grandiflora</i>)	Endangered	ODA listed in Jackson County. Twelve ORBIC occurrences within the Analysis Area. Six additional database records within 5 miles of Analysis Area.	Near the wet inner edges of vernal pools in the Agate Desert region, north of Medford near White City, Oregon.
Dwarf meadowfoam <i>Limnanthes floccosa</i> ssp. <i>pumila</i>	Threatened	ODA listed in Jackson County. Two ORBIC occurrences within the Analysis Area. No other known database records within 5 miles of the Analysis Area.	The edges of vernal pools, but may also be found near the edges of wet trails, roads, and small streams. The soils it inhabits are volcanic in origin. Only known to exist north of Medford, Oregon.

Table Q-1. State-Listed T&E Species with the Potential to Occur within the Analysis Area

Common Name Scientific Name¹	State Status	Occurrence within Analysis Area²	Expected Habitat³
Cook's desert parsley <i>Lomatium cookii</i>	Endangered	ODA listed in Josephine and Jackson counties. Twelve ORBIC occurrences within the Analysis Area. Three additional database records within 5 miles of Analysis Area.	Edges of vernal pools in poorly drained soils weathered from alluvial deposits in the Rogue River Valley on the northeast side of Medford in Jackson County.
<p>1. Species shown include only those that are listed as T&E species in Oregon. Oregon state sensitive species are addressed in Exhibit P.</p> <p>2. Wildlife and plant occurrence is based on ODA plants listed by county (ODA 2017), ORBIC occurrence data (ORBIC 2017) and Project surveys (Attachment P-1).</p> <p>3. USFWS 2011, BLM 2016, ODA 2017.</p>			

3.2 Field Surveys

3.2.1 Wildlife

In 2015, surveys for the Environmental Assessment occurred in a portion of the Site Boundary that the U.S. Bureau of Land Management (BLM) identified as potential habitat for the northern spotted owl (BLM 2016, Attachment P-1). These 2015 surveys intended to determine the suitability of the habitat and its likelihood of use by northern spotted owls; the 2015 survey area was selected to represent all of the habitat that could potentially be disturbed by construction activities in the area, including access road rehabilitation and transmission line corridor widening (i.e., tree removal and vegetation clearing). While most of the surveyed area contained young, second-growth forest stands, one small patch of relatively mature forest occurred that appeared to provide some of the primary constituent elements preferred by the northern spotted owl. Given the proximity of the survey area to designated U.S. Fish and Wildlife Service (USFWS) critical habitat (approximately 0.5 miles), and the presence of some primary constituent elements for northern spotted owl habitat, use of the site by the northern spotted owl was determined to be possible. A more detailed analysis was conducted in the Project Biological Assessment (Attachment P-2) and a Biological Opinion (USFWS 2016).

3.2.2 Plants

Different areas of BLM-managed lands within the Site Boundary were surveyed in support of the Project Environmental Assessment during the summer of 2015 and 2016 by trained botanists for wayside aster, a BLM sensitive plant. In addition, BLM-managed and private lands within the Site Boundary were surveyed in 2015 and 2016 for Gentner's fritillary, listed as federally endangered. Approximately 62 percent of the Site Boundary was surveyed for Gentner's fritillary and 15 percent

for wayside aster (BLM 2016; Attachment P-1; **Figures Q-1 and Q-2**). Neither species were detected in the Site Boundary during field surveys. The remaining three potential T&E plant species listed in Table Q-1 were not surveyed in support of the Project Environmental Assessment, are found in vernal pools, a very specific habitat type that was previously not known to occur within the Project Site Boundary (BLM 2016). Wetland delineation surveys completed in November 2017 in support of Exhibit J indicate one palustrine emergent wetland within a shallow floodplain depression to be a possible vernal pool (Attachment J-1), indicating potential habitat for these species.

4.0 Occurrence and Potential Adverse Effects – OAR 345-021-0010(1)(q)(B)

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.

In compliance with OAR 345-021-0010(1)(q)(B), this section provides a description of the nature, extent, location, and timing of occurrences in the Analysis Area for each species identified in Table Q-1, and describes how the Project might adversely affect each species. Potential adverse effects to each species that will result from the construction of the Project are based on each species' occurrence within the Analysis Area, as described in Table Q-1.

4.1 Wildlife

One T&E wildlife species has the potential to occur within the Analysis Area: the northern spotted owl. ORBIC database records are known from within the Analysis Area (Table Q-1), but there are no ORBIC records from within the Site Boundary, where Project disturbance will occur. USFWS-designated critical habitat overlaps the Analysis Area, but not the Site Boundary.

Scientific research and monitoring indicate northern spotted owls generally rely on mature and old-growth forests because these habitats contain the structures and characteristics required for nesting, roosting, and foraging (USFWS 2011). The existing transmission line corridor has already been disturbed and primarily consists of unsuitable, low-quality habitat for the northern spotted owl; however, portions of the Site Boundary contain "capable" northern spotted owl habitat, which is defined as habitat that is not currently used by the northern spotted owl, but has the potential to become higher-quality habitat for the species in the future (Attachment P-2). Approximately 18 acres of capable habitat overlap the Site Boundary. In addition, there are a few small areas along the Site Boundary that contain northern spotted owl dispersal habitat or nesting, roosting, and foraging habitat (Attachment P-2). Less than one acre of dispersal habitat and nearly two acres of nesting, roosting, and foraging habitat overlap the Site Boundary, for a total of approximately 20 acres of northern spotted owl habitat within the Site Boundary (Attachment P-2).

Potentially suitable habitat for the northern spotted owl, including capable, dispersal, and nesting, roosting, and foraging habitat, occurs within the Site Boundary and surrounding areas within the Analysis Area, and as a result, potential impacts to the northern spotted owl could result from construction or operation of the Project. The Project Grants Pass–Sams Valley Transmission Line will require both permanent and temporary vegetation removal. Permanent vegetation removal will primarily affect forested areas, whereas temporary vegetation removal will primarily affect shrub/scrub and herbaceous vegetation. Permanent vegetation clearing includes vegetation that will exceed transmission line clearance requirements, which vary relative to the location of the structures and projected line sag. Tree removal and/or pruning would generally take place within the expanded transmission line corridor widths, but may also occur within the existing corridor. Trees located in or adjacent to the Site Boundary that are identified as a danger or hazard would be removed on an as-needed basis for the life of the Project. Existing snags within the Site Boundary would be retained, provided they are not identified as a safety hazard (i.e., have the potential to fall onto the line or encroach on minimum clearance standards). The exact number and location of trees that would need to be removed is not known at this time, and preconstruction surveys by PacifiCorp would be performed to identify trees to be removed. PacifiCorp plans to discuss tree removal activities with the appropriate agencies, including the Oregon Department of Energy, prior to removal.

Best management practices are included in the PacifiCorp's *Transmission & Distribution Vegetation Management Program Standard Operating Procedures* (Attachment P-5). Operation and maintenance of the Project includes subsequent vegetation management activities, designed to continually maintain clearance around power lines and associated structures, as well as access road improvements (i.e., widening) involving removal of vegetation, blading to shape existing road surfaces and turnouts, placement of surfacing aggregate (i.e., gravel) to maintain or restore existing road surfacing, and installing water bars and drain dips as needed to manage storm water runoff.

Vegetation removal associated with access road improvements and transmission line corridor widening would occur within northern spotted owl capable, dispersal, and nesting, roosting, and foraging habitat types. In total, approximately 11 acres of northern spotted owl habitat would be affected, including just over 1 acre of nesting, roosting, and foraging habitat and less than 0.5 acre of dispersal habitat, and nearly 10 acres of capable habitat (Attachment P-2). However, the Project would not affect any USFWS-designated critical habitat, documented northern spotted owl sites (including known nesting sites), or known northern spotted owl activity centers.

In accordance with Section 7 of the Endangered Species Act, BLM initiated formal consultation with USFWS for potential impacts on the northern spotted owl and their designated habitat. A Biological Assessment was prepared for the Project and submitted to USFWS in June 2016. USFWS issued a Biological Opinion on August 15, 2016, which concluded that the Project is anticipated to adversely affect (with no incidental take), but is not likely to jeopardize the continued existence of the northern spotted owl. The Project will have no effect on northern spotted owl critical habitat, as critical habitat does not occur within the Site Boundary. Although unlikely, in the event that northern spotted owl individuals occur within or near the Site Boundary, individuals could be

disturbed by increased noise and human activity during construction, causing them to temporarily avoid the Site Boundary. This effect would be temporary, and would not result in mortality or injury to individuals. Work activities that produce loud noises above ambient levels will not occur within specified distances of active northern spotted owl nest sites during the critical early nesting period, March 1 – June 30, or until two weeks after the fledging period (BLM 2016), as recommended in Threatened and Endangered Species Condition 1 (Section 2.0). Therefore, Project-related impacts on northern spotted owl habitat and individuals are not expected to occur. Given the unlikelihood that northern spotted owl individuals do occur within or near the Site Boundary, temporary impacts to northern spotted owls during construction would be low.

4.2 Plants

Five T&E plant species were found to have the potential to occur within the Analysis Area based on desktop analysis (Table Q-1). These five T&E plant species have between 2 and 21 ORBIC occurrences within the Analysis Area (ORBIC 2017). Only one of the five plant species, Gentner's fritillary (endangered), has a known ORBIC occurrence within the Site Boundary (with a single occurrence), though the occurrence was given a rank of "Extirpated" by ORBIC (2017). As such, no known, extant ORBIC occurrences overlap the Site Boundary, where Project disturbance would occur.

No observations of wayside aster or Gentner's fritillary were made during field surveys, with 15 and 62 percent Site Boundary survey completion, respectively (Attachment P-1). One possible vernal pool, representing habitat for the remaining three T&E plant species, was delineated during wetland surveys in support of Exhibit J (Attachment J-1). This possible vernal pool is within the Project Site Boundary but does not overlap the disturbance footprint. Table Q-2 provides a summary of the blooming period, presence of habitat, and occurrences for each T&E plant species listed in Table Q-1, and the likelihood of adverse effects from the Project, not considering avoidance and mitigation measures. Potential adverse effects are unlikely due to the lack of known occurrences within the Site Boundary.

Table Q-2. Plant Blooming Period, Occurrence, and Likelihood of Adverse Effects

Species	Blooming Period ¹	Potential for Occurrence within Analysis Area				Potential Adverse Effects ²
		Potential Habitat within Site Boundary	ORBIC Records (Analysis Area)	ORBIC Records (Site Boundary)	Observed during Surveys?	
Wayside aster	July to September	Yes	Yes	No	No	Not likely
Gentner's fritillary	Late March to early April	Yes	Yes	Yes-but extirpated	No	Not likely

Table Q-2. Plant Blooming Period, Occurrence, and Likelihood of Adverse Effects

Species	Blooming Period ¹	Potential for Occurrence within Analysis Area				Potential Adverse Effects ²
		Potential Habitat within Site Boundary	ORBIC Records (Analysis Area)	ORBIC Records (Site Boundary)	Observed during Surveys?	
Big-flowered wooly meadowfoam	March to mid-April	Not likely	Yes	No	Not surveyed	Not likely
Dwarf meadowfoam	March to mid-April	Not likely	Yes	No	Not surveyed	Not likely
Cook's desert parsley	Late March to late April	Not likely	Yes	No	Not surveyed	Not likely
<p>1. Peak blooming period with potential or full blooming period in parentheses (ODA 2017).</p> <p>2. Potential for adverse effects not considering avoidance, minimization, and mitigation measures.</p>						

5.0 Avoidance and Mitigation – OAR 345-021-0010(1)(q)(C)

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.

In accordance with OAR 345-021-0010(1)(q)(C), this section provides a description of measures proposed to avoid and minimize adverse effects to species listed in Table Q-1, if required. Only species for which potential adverse impacts are anticipated are included.

5.1 Wildlife

PacifiCorp will implement seasonal restrictions to construction and operation activities around known northern spotted owl nest sites, as recommended in Threatened and Endangered Species Condition 1 (Section 2.0).

5.2 Plants

PacifiCorp will conduct T&E plant species surveys on those portions of the Site Boundary that have not been previously surveyed, if potential habitat may exist, as recommended in Threatened and Endangered Species Condition 2 (Section 2.0). If T&E plant species are found during surveys, they will be flagged and avoided where possible.

6.0 Protection and Conservation Program Compliance/Impacts – OAR 345-021-0010(1)(q)(D)

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).

ODA establishes Protection and Conservation Programs for selected species listed as threatened or endangered. Because no such programs apply to any species associated with this Project, no additional information is required under this provision (D), and OAR 345-34 022-0070(1)(q) is not applicable.

7.0 Potential Impacts to Plants, Including Mitigation Measures – OAR 345-021-0010(1)(q)(E)

OAR 345-021-0010(1)(q)(E) For each plant species identified under paragraph (A), if the Oregon Department of Agriculture has not adopted a protection and conservation program under ORS 564.105(3), a description of significant potential impacts of the proposed facility on the continued existence of the species and on the critical habitat of such species and evidence that the proposed facility, including any mitigation measures, is not likely to cause a significant reduction in the likelihood of survival or recovery of the species.

The five T&E plant species listed in Table Q-1 have two or more ORBIC occurrences within the Analysis Area. However, none have extant ORBIC occurrences within the Site Boundary or disturbance footprint, where Project disturbance will occur. Field surveys for Gentner's fritillary and wayside aster, the two species with potential habitat within the Site Boundary (Table Q-2), did not result in any observations (BLM 2016; Attachment P-1). Approximately 62 percent of the Site Boundary was surveyed for Gentner's fritillary and 15 percent was surveyed for wayside aster. Vernal pools, the potential habitat for the remaining three T&E plant species, (big-flowered wooly meadowfoam, dwarf meadowfoam, and Cook's desert parsley) are only known to possibly occur within one location within the Site Boundary (BLM 2016, Attachment J-1). This possible vernal pool is within the Project Site Boundary but does not overlap the disturbance footprint. The area would be spanned between two structures. Additionally, wetland impacts will only occur at the proposed Sams Valley substation. Other stream and wetlands will be avoided and spanned (Exhibit J). As such, if big-flowered wooly meadowfoam, dwarf meadowfoam, and Cook's desert parsley were to occur within the Site Boundary, impacts are not anticipated. If found during surveys recommended in Threatened and Endangered Species Condition 2 (Section 2.0), T&E plant species will be flagged

and avoided where possible. Consequently, the Project is not likely to cause a significant reduction in the likelihood of survival or recovery of these species.

8.0 Potential Impacts to Animals, Including Mitigation Measures – OAR 345-021-0010(1)(q)(F)

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.

Vegetation removal associated with access road improvements and transmission line corridor widening would occur within northern spotted owl capable, dispersal, and nesting, roosting, and foraging habitat types. In total, 11 acres of northern spotted owl habitat would be affected, including just over 1 acre of nesting, roosting, and foraging habitat and less than 0.5 acre of dispersal habitat, and nearly 10 acres of capable habitat. However, the Project would not affect any USFWS-designated critical habitat, documented northern spotted owl sites (including known nesting sites), or known northern spotted owl activity centers.

PacifiCorp recommends ***Threatened and Endangered Species Condition 1***, which would minimize the potential for the northern spotted owl to be impacted by restricting activities that are likely to disturb the species during sensitive periods. Although unlikely, in the event that northern spotted owl individuals occur within or near the Site Boundary, individuals could be disturbed by increased noise and human activity during construction, causing them to temporarily avoid the Site Boundary. This effect would be temporary and would not result in mortality or injury to individuals. Work activities that produce loud noises above ambient levels will not occur within specified distances of active northern spotted owl nest sites during the critical early nesting period, March 1 – June 30, or until 2 weeks after the fledging period. The spatial extent of the restriction is listed in Section 2.0. Therefore, Project-related impacts on northern spotted owl habitat and individuals are not expected to occur. Given the unlikelihood that northern spotted owl individuals do occur within or near the Site Boundary, temporary impacts during construction would be low. Consequently, the Project is not likely to cause a significant reduction in the likelihood of survival or recovery of this species.

9.0 Monitoring – OAR 345-021-0010(1)(q)(G)

OAR 345-021-0010(1)(q)(G) The applicant's proposed monitoring program, if any, for impacts to threatened and endangered species.

9.1 Wildlife

No post-construction monitoring is currently proposed for listed wildlife species.

9.2 Plants

No post-construction monitoring is currently proposed for listed plant species.

10.0 References

BLM (Bureau of Land Management). 2016. Environmental Assessment Sams Valley Reinforcement Project. DOI-BLM-ORWA-M050-2016-0002-EA. November 2016.

EFSC (Energy Facility Siting Council). 1990. Third Amended Site Certification Agreement for the Eugene-Medford 500 kV Transmission Line. October 26.

ORBIC (Oregon Biodiversity Information Center). 2017. Rare, Threatened, and Endangered Species GeoDatabase Request. Received September 24, 2017.

ODA (Oregon Department of Agriculture). 2017. Oregon Threatened, Endangered, and Candidate Plants. Accessed from:
<http://www.oregon.gov/ODA/programs/PlantConservation/Pages/AboutPlants.aspx>

ODFW (Oregon Department of Fish and Wildlife). 2017. Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon. Revised June 2017.

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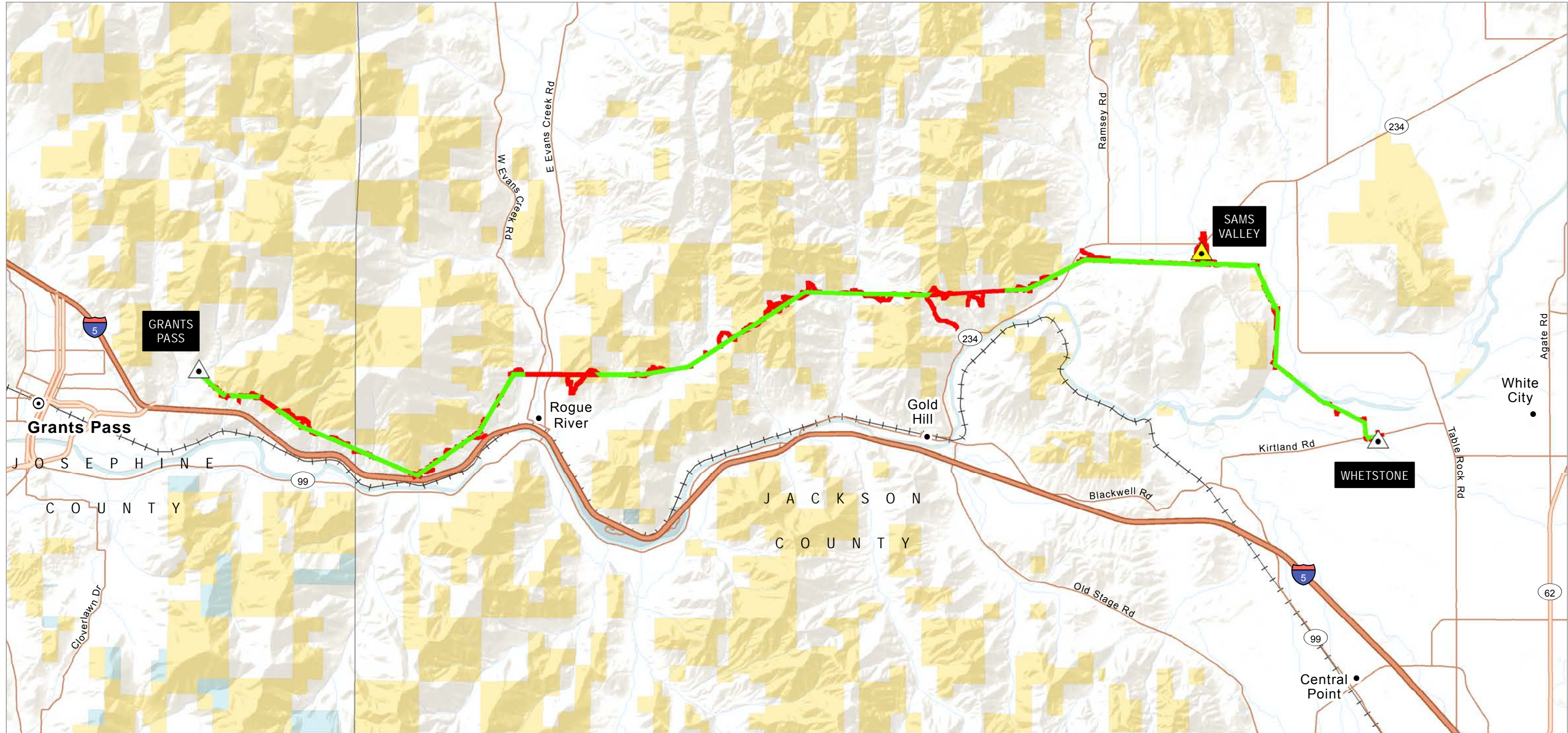
USFWS (U.S. Fish and Wildlife Service). 2011. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). U.S. Fish and Wildlife Service, Portland, Oregon. xvi + 258 pp.

USFWS. 2012. Revised recovery plan for the Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. xviii + 122 pp.

USFWS. 2016. Biological Opinion Addressing the Cold Elk, Bieber Salt and Lost Creek Forest Management Projects and the Pacific Power Transmission Line Reinforcement Project, as Proposed by the Medford District of the BLM. USFWS Reference Number 01EOW00-2015-F-0366. Roseburg, Oregon.

Figures

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Map Area

Survey Area

- 62% Complete
- Yes
- No

Project Features

- Proposed Substation
- Existing Substation

Other Features

- County Seat
- City/Town
- County

Transportation

- Interstate
- Highways
- Major Roads
- Railroads

Land Status

- Bureau of Land Management
- State or Local
- State or Local Parks and Recreation, Wildlife or Forest
- U.S. Forest Service
- Private

Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

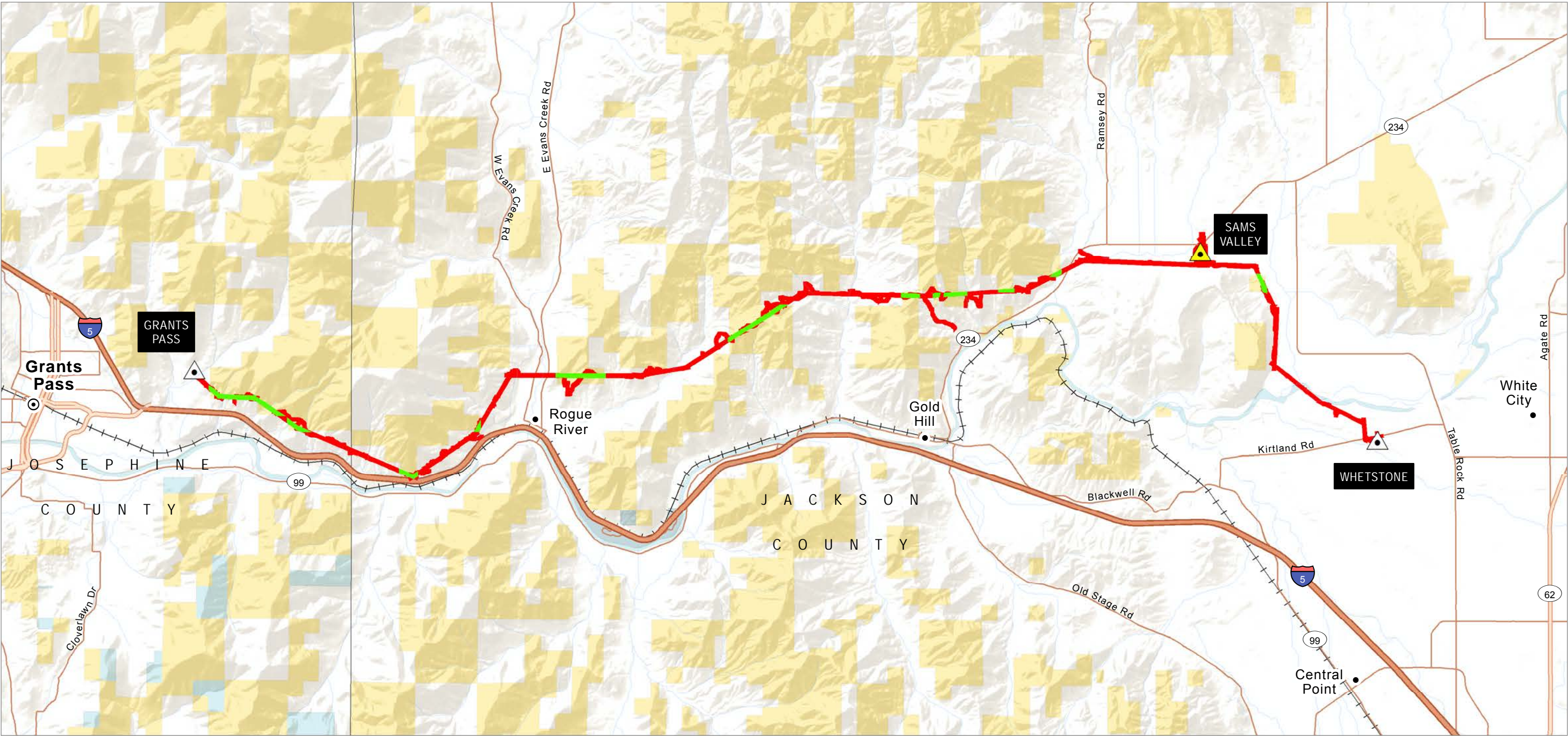
Gentner's Fritillary Survey Area

Figure Q-1

Source(s): BLM, Esri, PacifiCorp, USFWS

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit Q\FIG Q-1 Gentler's Fritillary Survey Area.mxd
November 2017



Source(s): BLM, Esri, PacifiCorp, USFWS

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit Q\FIG Q-2 Wayside Aster Survey Area.mxd November 2017

Survey Area
15% Complete
Yes
No

Project Features
Proposed Substation
Existing Substation

Other Features
County Seat
City/Town
County

Transportation
Interstate
Highways
Major Roads
Railroads

Land Status
Bureau of Land Management
State or Local
State or Local Parks and Recreation, Wildlife or Forest
U.S. Forest Service
Private



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

Wayside Aster Survey Area
Figure Q-2

Exhibit R

Scenic and Aesthetic Values

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
BLM	U.S. Bureau of Land Management
kV	kilovolt
OAR	Oregon Administrative Rule
OR 99	Oregon Highway 99
OR 238	Oregon Highway 238
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects
WSR	Wild and Scenic River

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1.0 Introduction

Exhibit R was prepared to meet the submittal requirements for the Sams Valley Reinforcement Projects (Project), per Oregon Administrative Rule (OAR) 345-021-0010(1)(r), related to scenic and aesthetic values.

2.0 Analysis Area – OAR 345-021-0010(1)(r)(A)(E)

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:

(A) A list of the local, tribal and federal plans that address lands within the analysis area.

(E) A map or maps showing the location of the scenic resources described under (B).

OAR 345-001-0010(59)(b) defines the study area for scenic resources as the area within and extending 10 miles from the Site Boundary. The Site Boundary is defined in the *Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line*, reflects the information pursuant to OAR 345-021-0010(1)(a) and (b).

The Analysis Area encompasses portions of two Oregon counties, Jackson and Josephine. The Analysis Area also includes seven incorporated cities: Grants Pass, Rogue River, Gold Hill, Central Point, Eagle Point, Medford, and Jacksonville. Land use plans for these nine local jurisdictions address lands within the Analysis Area, and have been reviewed relative to their documentation of significant or important scenic resources. There are several other locally identified communities within the Analysis Area (e.g., White City); however, these are unincorporated areas that are managed under county land use plans.

The Analysis Area does not include portions of any tribal reservations or any tribal lands. Consequently, there are no tribal plans have been reviewed for their applicability to Exhibit R.

The Analysis Area includes a substantial amount of federal land administered by the U.S. Bureau of Land Management (BLM). The Southwestern Oregon Resource Management Plan is the current land use plan applicable to the BLM lands within the Analysis Area (BLM 2016a).

Figure R-1 shows the location of scenic resources within the Analysis Area that have been identified as significant or important in applicable land use plans.

3.0 Identification of Significant or Important Scenic Resources – OAR 345-021-0010(1)(r)(B)

(B) Identification and description of the scenic resources identified as significant or important in the plans listed in (A), including a copy of the portion of the management plan that identifies the resource as significant or important.

This section inventories scenic resources within the Analysis Area that are identified as significant or important in applicable land use plans, as required to demonstrate compliance with the approval standard in OAR 345-022-0080. The applicable local and federal land use plans are described below, along with an assessment of whether each plan identifies significant or important scenic resources within the Analysis Area. Table R-1 provides a summary of applicable management plans reviewed and scenic resources identified within the Analysis Area.

Table R-1. Important Scenic Resources Inventory

Jurisdiction	Plan	Scenic Resources Specified in Plan	Important or Significant Scenic Resources Identified in Analysis Area	Name of Scenic Resource(s) in Analysis Area	Scenic Resource Description	Distance from Site Boundary (miles)	Direction from Site Boundary
Counties							
Josephine County, OR	Comprehensive Plan for Josephine County (Josephine County 2005)	No	No	--	--	--	--
Jackson County, OR	Jackson County Comprehensive Plan (Jackson County 2015)	No, not directly; plan references 1990 Goal 5 background document	No	--	--	--	--
	Jackson County Goal 5 Resources Background Document (Jackson County 1990)	Yes	Yes	Bear Creek Greenway	Linear open space and multi-use trail along Bear Creek, mostly within urbanized area	2.1	SW
				Interstate 5	Freeway segment from Josephine County line east to Rocky Point Bridge (9 miles)	<0.1	SW
				Lower Table Rock	Prominent topographic feature just north of the Rogue River	0.4	W
				Oregon Highway 99	OR 62 in Medford to I-5 north of Central Point (6.5 miles)	2.3	S
				Oregon Highway 238	Josephine County line east to Ruch, Oregon	9.4	S
				Roxy Ann Peak	Prominent topographic feature on eastern skyline for Medford area, within a Medford city park (Prescott Park)	8.3	SE
				Table Rock Road	OR 234 to the Rogue River (5 miles)	0.3	E
	Upper Table Rock	Prominent topographic feature just north of the Rogue River	1.4	NE			
Incorporated Cities and Towns							
City of Grants Pass, OR	Grants Pass and Urbanizing Area Comprehensive Community Development Plan (City of Grants Pass 2015)	Yes	Yes	Rogue River Corridor	The Rogue River within the Grants Pass Urban Growth Boundary, as defined by the 100-year floodplain of the river, is identified as a unique scenic area with exciting characteristics	1.3	SW
City of Central Point, OR	Comprehensive Plan for Central Point, Oregon (City of Central Point 1983)	No	No	--	--	--	--
City of Eagle Point, OR	Eagle Point Comprehensive Plan (City of Eagle Point 2001)	No	No	--	--	--	--

Table R-1. Important Scenic Resources Inventory

Jurisdiction	Plan	Scenic Resources Specified in Plan	Important or Significant Scenic Resources Identified in Analysis Area	Name of Scenic Resource(s) in Analysis Area	Scenic Resource Description	Distance from Site Boundary (miles)	Direction from Site Boundary
City of Gold Hill, OR	Gold Hill, Oregon Strategic Plan Update (City of Gold Hill 2012)	No	No	--	--	--	--
City of Jacksonville, OR	Jacksonville Comprehensive Plan (City of Jacksonville 1995)	Yes	Yes	Protected open space sites 1, 2, 3, 5, 6, 7, 11, 12, 13, 16, 20, 22, 23, and 24	Specific properties designated for protection under the open space/parks program because they are plainly visible from within the city, provide a pleasing backdrop for the city, and/or are part of an historic entrance viewshed.	8.4	SW
City of Medford, OR	City of Medford Comprehensive Plan Environmental Element (City of Medford 2016)	Yes	Yes	Prescott Park/ Roxy Ann Peak	Roxy Ann Peak, elevation 3,571 feet, is the dominating topographic feature east of the City and is designated as an outstanding scenic resource by Jackson County. City-owned Prescott Park, 1,200 acres in size, surrounds the peak and is the city's premier open space.	7.1 (park)	SE
City of Rogue River, OR	City of Rogue River Comprehensive Plan (City of Rogue River 2004)	Yes	Yes	Palmerton Park	5-acre city park on West Evans Creek Road; includes an arboretum with 80 tree species, group picnic facilities, playground, restrooms, and a pedestrian bridge spanning Evans Creek.	0.8	E
Tribal							
None Applicable	-	-	-	-	-	-	-
Federal							
BLM	Southwestern Oregon Record of Decision and Resource Management Plan (BLM 2016a)	Yes	Yes	Rogue River Wild and Scenic River (WSR)	The Rogue National Wild and Scenic River WSR) was one of the eight original rivers designated by Congress as the National WSR System in 1968. The 84.5-mile-long designated portion of the Lower Rogue begins 7 miles west of Grants Pass and ends 11 miles east of Gold Beach. The designation noted outstandingly remarkable fisheries, recreational and scenic values. The Rogue River is known	8.3	W

Table R-1. Important Scenic Resources Inventory

Jurisdiction	Plan	Scenic Resources Specified in Plan	Important or Significant Scenic Resources Identified in Analysis Area	Name of Scenic Resource(s) in Analysis Area	Scenic Resource Description	Distance from Site Boundary (miles)	Direction from Site Boundary
					nationally for its salmon and steelhead fishing and high-quality whitewater boating opportunities (National Wild and Scenic Rivers System 2017).		
				Table Rocks Area of Critical Environmental Concern (ACEC) (Parcel 1)	The BLM administers a total of 2,105 acres on the slopes and tops of Upper and Lower Table Rocks (The Nature Conservancy & BLM 2013). Of the total, 1,243 acres are currently designated as an ACEC; 818 acres are not included within the ACEC designation, but will be included in the ACEC as BLM plans are amended to reflect current policy direction. The Table Rocks were designated as an ACEC to protect cultural, scenic, fish and wildlife, and natural process values (BLM 2016). Parcel 1 is located on the northeastern portion of Lower Table Rock.	Crossed	Crossed
				Table Rocks ACEC (Parcel 2)	See above. Parcel 2 is located on the east-central portion of Lower Table Rock.	0.1	W
				Table Rocks ACEC (Parcel 3)	See above. Parcel 3 includes the northwest, northeast, and southeast portions of Upper Table Rock.	1.2	E

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3.1 Counties

3.1.1 Josephine County

The Comprehensive Plan for Josephine County was first adopted in 1981, and has subsequently been amended (Josephine County 2005, Josephine County 2017). A goals and policies document for the plan adopted in 2005 addresses local provisions based on statewide planning goals. Josephine County Goal 7: Preserve Valuable Limited Resources, Unique natural Areas and Historic Features,” corresponds to State Planning Goal 5, “to protect natural resources and conserve scenic and historic areas and open spaces.” Josephine County Goal 7 includes directives specific to identification and preservation of archaeological sites, significant natural areas, historic sites and artifacts, streamside vegetation and fishery resources, wildlife protection and mineral resources (Josephine County 2005). Goal 7 content does not address scenic resources, nor does the content for other local goals. County ordinances pertaining to the comprehensive plan adopted subsequent to 2005 likewise do not contain content addressing scenic resources. Therefore, PacifiCorp has concluded that the Comprehensive Plan for Josephine County does not identify any significant or important scenic resources within the Analysis Area or elsewhere within Josephine County.

3.1.2 Jackson County

The Jackson County Comprehensive Plan was first adopted in 1972, and has since been updated and revised (Jackson County 2015). The Natural and Historic Resources element (Chapter 16 of the current plan) addresses State Planning Goal 5 regarding open spaces, scenic and historic areas, and natural areas. This plan element establishes a goal “to preserve and conserve valued open space lands; protect and maintain existing, and establish new, historic, scenic and wildlife areas and ensure the wise utilization of natural resources.” The scenic resources portion of Chapter 16 describes scenic resources in general terms and discusses a BLM summary of four distinct physiographic provinces present in the county that influence the character of scenic resources. However, the Plan does not include an inventory of significant or important scenic resources. Chapter 16 does incorporate some content from a background report that describes four major types of scenic resources, which include scenic road corridors, scenic stream corridors, scenic viewpoints, and scenic sites, and includes maps titled “Outstanding Scenic Resources and Recreation Trails,” “Physiographic Areas in the Jackson-Klamath Planning Area,” and “Class 1 Streams.”

Chapter 16 of the plan presents findings, policy statements and implementation strategies applicable to natural and historic resources. Finding 2 addresses scenic resources and includes the following statements (Jackson County 2015):

- The natural landscape of Jackson County is a scenic resource that is of value economically and aesthetically.

- It is necessary to develop a methodology to identify and evaluate the visual attractiveness of scenic resources, and ensure that these scenic values are maintained for present and future generations.
- A county designated scenic roadway system should be utilized to enhance the public's access to the natural landscape and historical features while simultaneously allowing a reasonable use of private lands within the corridors.
- With the recognition that natural resource-based uses are important for a variety of reasons to the county, the policy and implementation approach for outstanding scenic resources allows natural resource-based uses, subject to state and federal regulations, if these are permitted in the zoning district.

Associated with Finding 2 is the following policy statement: "Through proper management, the County shall maintain or enhance the aesthetic qualities and values of the significant natural scenic landscape resources of the County." Six implementation strategies are identified for this policy, including (B) A scenic resource overlay shall be developed setting forth guidelines, performance standards, and site plan review procedures for discretionary land use actions proposed within the boundaries of the district, and (D) Besides the outstanding scenic resources identified in the background report of the scenic element of Goal 5, other significant resources shall be designated for inclusion in the scenic resources overlay, as appropriate.

Although much of Chapter 16 was apparently drawn from the *Goal 5 Resources Background Document for Open Spaces, Scientific and Natural Areas, and Historic Resources* (Jackson County 1990) (the "Goal 5 Background Document"), this document was never expressly incorporated into the Plan, and as such, any elements therein are not properly considered as part of the County's Plan.¹ Even if that document had been properly incorporated, EFSC can find that that much of its content is not clear with respect to which individual features or types of resources are identified as important scenic resources. In addition, the Goal 5 Background Document and Chapter 16 of the comprehensive plan include references to other records of county policy, in particular the development of a scenic resource overlay, that are not consistent with the direction provided in the Goal 5 Background Document and Chapter 16.

For the above reasons, EFSC should find that the Plan does not include an express scenic resource inventory, or land use restrictions or requirements pertaining to scenic areas in Jackson County. Out of an abundance of caution, PacifiCorp offers the following explanation of the scenic resources identified in the Goal 5 Background Document should EFSC find that such resources have been incorporated into the Plan.

¹ In *1000 Friends of Oregon v. City of Dundee*, 203 Or App 207, 216 (2005), the Oregon Court of Appeals held that land use decisions can only be based on resource documents if such documents are incorporated into a Comprehensive Plan: "In sum, a planning decision based on a study contemplated by a comprehensive plan but not incorporated into the comprehensive plan after the study is carried out is not a planning decision that is made on the basis of the comprehensive plan and acknowledged planning documents, as is required by Goal 2."

3.1.2.1 *Scenic Road Corridors*

Section 7 of the Goal 5 Background Document addresses Outstanding Scenic Views and Sites. The Section 7.1 Summary includes an unreferenced map titled “Jackson County Oregon, Outstanding Scenic Resources and Recreation Trails,” that is inserted between pages 122 and 123 (Jackson County 1990). The map is a small-scale, black-and-white outline map of the entire county that is not highly legible. Chapter 16 of the comprehensive plan incorporates the same map as page 16-4, although it is referenced on page 16-6 as the “Outstanding Scenic Resources Map” (Jackson County 2015). The map legend includes a dashed-line symbol titled “Roads,” and that symbol appears to be applied to a segment of I-5 on either side of Rogue River, Table Rock Road, Oregon Highway 238 (OR 238) southwest of Ruch, and perhaps other road segments in the county. At the conclusion of Section 7.3 Background is the statement “The final inventory of outstanding scenic resources is included in Tables 7.1 and 7.2, and the scenic resources map” (Jackson County 1990).

Table 7.1 in the Goal 5 background document is titled “Outstanding Scenic Roadways in Jackson County.” The table identifies 17 road segments in the county, including two segments of I-5; segments of Oregon highways 140, 227, 66, 62, 238, 230 and 99; and segments of 9 roads under Jackson County, BLM and/or U.S. Forest Service jurisdiction, including Table Rock Road (Jackson County 1990). As listed in Table R-1, the scenic road segments in the Analysis Area include 9 miles of I-5 from the Josephine County line to the Rocky Point Bridge; Oregon Highway 99 (OR 99) from OR 62 in Medford north to I-5; Table Rock Road from OR 234 to the Rogue River; and a few miles of OR 238 east of the Josephine County line. However, there are no standards or limitations set forth in the Plan or Jackson County Land Development Ordinance that govern or limit land uses as a result of these designations.

3.1.2.2 *Scenic Stream Corridors*

The Goal 5 Background Document, Section 7.3 Background includes two paragraphs describing the aesthetic elements that distinguish a stream corridor as scenic. This content includes the statement “the meandering stream corridors, especially the Class 1 streams in the county, create a pleasing pattern and add scenic variety” (page 126). Section 7.3 also includes an unreferenced map titled “Jackson County Oregon, Class 1 Streams,” that is inserted along with several tables between pages 127 and 128. The map is a small-scale, black-and-white outline map of the entire county that does not have a legend and is not highly legible, but it shows numerous major and tributary streams in a heavy dashed line. Chapter 16 of the comprehensive plan includes the same map as page 16-7, although it is not specifically referenced in the text. Associated text on page 16-8 references the stream corridor content from Section 7.3 of the Goal 5 background document, with the additional statement that “Both public and private interests have jurisdiction over the county’s scenic stream corridors, which includes all Class 1 streams” (Jackson County 2015). Although this statement in the comprehensive plan appears to indicate the intent to identify all Class 1 streams in Jackson County as important scenic resources with respect to Goal 5, it is not consistent with apparent direction provided in other applicable documentation.

As noted above, Section 7.3 of the Goal 5 Background Document concludes with the statement “The final inventory of outstanding scenic resources is included in Tables 7.1 and 7.2, and the scenic resources map (Jackson County 1990). Table 7.2 identifies 17 features, of which two are stream segments: the Upper Rogue River Corridor/Rogue River Gorge, located above Lost Creek Lake in northeastern Jackson County, and the Bear Creek Greenway Corridor through about 20 miles of the Bear Creek valley (Jackson County 1990). Table 7.2 does not include any reference to Class 1 streams, as a group or individually.

Based on a thorough review of the various passages of the Goal 5 background document that apply to streams, EFSC can find that that Upper Rogue River and the Bear Creek Greenway are the only stream segments that are actually identified as important scenic resources, and that Class 1 streams in the county as a group have not been identified as important scenic resources. However, there are no standards or limitations set forth in the Plan or Jackson County Land Development Ordinance that govern or limit land uses as a result of these designations.

3.1.2.3 Scenic Viewpoints and Scenic Sites

Section 7.3 of the Goal 5 Background Document includes two paragraphs describing the distinction between scenic viewpoints and scenic sites (Jackson County 1990, page 126). Again, Section 7.3 also states that the final inventory of outstanding scenic resources is included in Tables 7.1 and 7.2, and the scenic resources map. Table 7.2 is titled “Outstanding Scenic Streams, Views and Sites in Jackson County.” This table identifies 17 features, of which 15 are physical or area features; examples include Mt. McLoughlin, Mount Ashland and the Lost Creek lake area.

EFSC can find that that the Goal 5 Background Document identifies Lower Table Rock, Upper Table Rock and Roxy Ann Peak as outstanding scenic views or sites within the Analysis Area. The resources are listed in Table R-1 and their locations are indicated on Figure R-1. PacifiCorp interpreted land ownership and terrain data to define polygons to represent the spatial extent for the Table Rocks, and used the boundary of Prescott Park to represent the extent of Roxy Ann Peak. However, as explained in the County staff report issued for the Sams Valley Substation, dated May 23, 2017, the protected view shed associated with Lower Table Rock, if any, is south of Lower Table Rock, whereas all elements of the Project save for the proposed reconductoring will be located north of Lower Table Rock, and therefore outside of and not visible from the protected view shed.²

² “The Goal 5 Document, Table 7.2 Outstanding Scenic Streams, Views, and Sites in Jackson County does list Lower Table Rock as [sic] outstanding view site. The Table identifies the location of the outstanding view site as 36S-2W-08, 09, 16 and 17. [...] The proposed substation development is not located in section 08, 09, 16, or 17, Township 36 South, Range 2 West. Impacts to the view shed resource are not found.” Jackson County, Planning Staff Report File 439-16-03222-ZON 7 (May 23, 2017).

3.2 Municipalities

3.2.1 *Grants Pass*

The Grants Pass and Urbanizing Area Comprehensive Community Development Plan was first adopted in December 1982 and was last amended in August 2015 (City of Grants Pass 2017a). The 2015 version of the plan includes 14 elements; Element 3 is titled “Scenic, Rogue River, Historic and Natural Resources and addresses resources corresponding to State Planning Goal 5. The inventory section of Element 3 states “The River Corridor establishes the location of the Scenic Overlay Zone and is covered by the same area as the 100 Year Flood Plain” (City of Grants Pass 2002).

Subsequent content addressing Scenic Views and Areas includes statements that the Rogue River is a unique scenic area with exciting characteristics, and has been identified as the area’s most important recreational asset. Additional content under that heading provides general discussion of scenic entrances to the community, streets that have attractive old trees, entrances to the city that have few trees and considerable visual clutter, and areas with scenic vantage points.

With respect to Element 3, the compilation of Comprehensive Plan Policies states a goal “To conserve, restore and enhance the area’s scenic river, historic and natural resource” (City of Grants Pass 2014). Two policies address scenic considerations. One is for the City and County to explore the creation of a scenic route and major gateway overlay designation on the Urban Growth Boundary land use map, to be used in determining major arterial routes or entrances to the City where special landscaping or scenic effect is desired (Policy 3.1). The second policy is for the Development Code to require an appropriate level of landscaping for all new development and redevelopment (Policy 3.2). Four policies address the Rogue River, including direction that the City shall recognize the Rogue River as the most significant natural and economic resource (Policy 3.3), and as the predominant visual feature in the community by installation of a “Scenic Overlay Zone” along the entire length and width of the river within the Urban Growth Boundary (Policy 3.4).

The Development Code (City of Grants Pass 2017b) does not include reference or direction applicable to the Scenic Overlay Zone mentioned in the Element 3 inventory documentation and in Policy 3.4. The Planning Division of the Parks and Community Development Department is currently conducting three planning projects related to Statewide Planning Goal 5, one of which is inventory and planning work for open space and scenic views and sites (City of Grants Pass 2017c). As part of that effort, in November 2016 the City issued a request for proposals (RFP) for Goal 5 Resource Planning – Open Space and Scenic Views and Sites consulting services. The goal of the work addressed in the RFP is to inventory scenic views and sites, identify those which are significant, and develop a program to protect those views and sites (City of Grants Pass 2017d). The RFP notes that OAR 660-023-0230 does not require local governments to amend comprehensive plans to identify new scenic views and sites.

Based on the plan and code content discussed above, and the ongoing City effort to inventory scenic views and sites, EFSC can find that the Grants Pass Comprehensive Plan does not yet clearly identify any features as significant or important scenic resources. While EFSC should find that the

Grants Pass Plan does not currently include a scenic resources inventory, PacifiCorp has evaluated the Rogue River as it passes through Grants Pass should EFSC find that the Grants Pass Plan has, in fact, designated the Rogue River as a scenic resource.

3.2.2 Rogue River

The City of Rogue River Comprehensive Plan was first adopted in 1990 and was most recently amended in 2004 (Reagles, personal communication, 2017). The plan (City of Rogue River 2004) includes a chapter titled “Goal 5 - Open Space, Scenic and Historic Areas, Natural Resources. This plan element (page 19) establishes a goal “to conserve open spaces and to protect natural and scenic resources within the Urban Growth Boundary and to insure the continued existence of these areas and resources.” Under the heading Outstanding Scenic Views and Sites the plan states that “Palmerton Park is the outstanding site in the Rogue River Urban Growth Boundary that requires special attention and is under County control.” Available information on city parks indicates that Palmerton Park is a 5-acre park property on West Evans Creek Road that includes an arboretum with 80 tree species, group picnic facilities, a playground, restrooms, and a pedestrian bridge spanning Evans Creek (City of Rogue River 2017). Thus, PacifiCorp has evaluated Palmerton Park as a significant or important scenic resource that is within the Analysis Area.

3.2.3 Gold Hill

PacifiCorp’s consultant conducted a thorough search for planning documentation applicable to the City of Gold Hill. A standard online search produced no references to a Gold Hill comprehensive plan, and no such information could be obtained through the City website. The website does provide access to a Gold Hill Strategic Plan Update adopted by the City in September 2012. The website also indicates that the City currently has no planning commission, and that issues formerly handled by the planning commission are administered by the City with assistance from the Rogue Valley Council of Governments. PacifiCorp’s consultant, Tetra Tech, contacted City staff by telephone in October and November 2017, both times inquiring whether the City had adopted a comprehensive plan and whether the strategic plan was considered the equivalent of a comprehensive plan, and requesting access to a comprehensive plan if it existed. In both cases the City staff person indicated that someone else with the City would need to address the questions and make a return call. No return call has been received to date.

Based on the limited information available and the lack of a response from the City, PacifiCorp assumes that Gold Hill has not prepared or adopted a comprehensive plan. The Strategic Plan Update (City of Gold Hill 2012) does not include discussion of scenic resources. Therefore, PacifiCorp has concluded that Gold Hill does not have an applicable comprehensive plan and has not identified any significant or important scenic resources within the Analysis Area.

3.2.4 Central Point

The City of Central Point (2017) Comprehensive Plan was first adopted in 1980 and has been amended many times since that date. The Environmental Management element (City of Central Point 1983) includes a brief discussion of titled Open Space and Scenic Resources. This plan element (page VI-28) references Statewide Planning Goal 5 describes how Central Point's location in the Bear Creek Valley provides interesting and attractive views in all directions, and references the surrounding mountains and features such as Mt. McLoughlin, Roxy Ann Butte, Table Rocks, and the Bear Creek Greenway. The plan states that "It is the policy of Central Point [T]o preserve its existing scenic qualities and amenities and to ensure that future growth and development results in an increasingly attractive community, in harmony with the natural environment." Based on the general nature of the policy statement and other language in the plan, EFSC can find that the Comprehensive Plan for Central Point does not identify any significant or important scenic resources within the Analysis Area.

3.2.5 Eagle Point

PacifiCorp's consultant conducted a thorough search for planning documentation applicable to the City of Eagle Point. The Planning Department page on the City website provides a list of planning documents that includes a link to the comprehensive plan map (City of Eagle Point 2015), but no reference to the comprehensive plan itself (City of Eagle Point 2017). A standard online search produced no references to an Eagle Point comprehensive plan. Other information indicates that the original comprehensive plan was adopted in 1980 and a revised plan was adopted in 1982 (City of Eagle Point 2001), and that the City initiated a periodic review of the plan in 2001 (Community Planning Workshop 2001). PacifiCorp's consultant contacted City planning staff by telephone and email messages on different dates in November 2017, in both cases inquiring about the status and availability of the City's comprehensive plan. Neither message has been returned to date.

Based on the limited information available and the lack of a response from the City, PacifiCorp assumes that City of Eagle Point has adopted a comprehensive plan but has not updated it in recent years and has not provided public access to the plan. Therefore, PacifiCorp assumes that the City has not identified any significant or important scenic resources within the Analysis Area.

3.2.6 Medford

The City of Medford (2017) Comprehensive Plan was originally adopted in 1975 and has been amended or updated many times from that date through April 2017. The Environmental Element of the plan, which was last updated in February 2016, includes the plan content addressing Goal 5 resources. The Environmental Element discusses scenic resources in the Physical Characteristics chapter, which states as Goal 2 "To provide and maintain open space within the Medford planning area for recreation and visual relief, and to protect natural and scenic resources" (City of Medford 2016). Policy 2-A under that goal states that "The City of Medford shall acknowledge Prescott Park (Roxy Ann Peak) as the city's premier open space and viewshed, and recognize its value as

Medford's most significant scenic view, currently and historically." No other specific features within or near the City are addressed in the same context. Based on the language in the plan, EFSC can conclude that the Comprehensive Plan for Medford identifies Prescott Park (which is owned by the City and includes most of Roxy Ann Peak) as a significant or important scenic resource that is within the Analysis Area.

3.2.7 Jacksonville

The City of Jacksonville Comprehensive Plan was originally adopted in 1982 (City of Jacksonville 1995). The Plan consists of 10 chapters that address standard comprehensive plan elements, along with citizen involvement and general implementation (City of Jacksonville 2017). Many of the chapters were revised in 1995, including Chapter 7 addressing Parks, Recreation, Open Space, Natural and Scenic Resources. Chapter 7 does not include content that identifies specific features as significant or important scenic resources. Rather, the document acknowledges the importance of open space in creating or protecting scenic vistas, and states that the open space Plan "coordinates the various objectives of providing natural areas, open space, fish and wildlife habitat, and scenic resources" (City of Jacksonville 1995). Chapter 7 also has multiple references to the Historic Element of the comprehensive plan and a 1993 historic and cultural resource inventory that included documentation of scenic character and viewsheds. Chapter 7 includes an inventory of 31 specific properties within the city in open space use. For 14 of the 31 sites, the discussion of importance as open space includes some aspect of scenic value, such as statements that the site "is plainly visible from all areas of the city, and provides a scenic backdrop to the city;" "serves ... to protect the western viewshed entrance;" "is very visible from Highway 238 and creates a pleasing natural entry corridor to the city;" or "is also a component of the Historic Entrance Viewshed to the downtown core" (City of Jacksonville 1995). However, the Plan does not include an inventory of scenic resources.

For these reasons, EFSC can find that there are no scenic resources established in the City of Jacksonville. However, PacifiCorp includes in its inventory sites identified in the Plan that have scenic value should EFSC find that the City does indeed have a scenic resource inventory. These sites are referenced in Table R-1 and their location is shown on Figure R-1.

3.3 Tribal Lands

There are no tribal lands located within the Analysis Area. Therefore, no tribal plans were reviewed for identification of scenic resources.

3.4 Federal Lands

Land use planning direction for federal lands in the Analysis Area administered by the BLM is provided by the Southwestern Oregon Record of Decision and Resource Management Plan, which was issued in August 2016. The plan applies to lands managed by the BLM Medford District, the South River Field Office of the Roseburg District, and the Klamath Falls Field Office of the Lakeview District. Under the adopted plan, all federal lands within the scope of the plan are assigned to one of

six major land use allocations, each of which has two or more defined sub-allocations (BLM 2016a). One of the major land use allocations includes Congressionally Reserved Lands and National Conservation Lands; management direction for most areas in this category was determined through Congressional action, such as designation of wild and scenic rivers and wilderness or wilderness study areas. A second major category is comprised of District-Designated Reserves, including ACECs and lands managed for their wilderness characteristics. Some of the land area designations within these two major allocations are based at least in part on the scenic values of the specific land units.

The Congressionally Reserved Lands include the Rogue National Wild and Scenic River. The Rogue WSR was one of the eight original rivers designated by Congress as the National WSR System in 1968. The 84.5-mile-long designated portion of the Lower Rogue begins 7 miles west of Grants Pass and ends 11 miles east of Gold Beach. The designation noted outstandingly remarkable fisheries, recreational and scenic values. The Rogue River is known nationally for its salmon and steelhead fishing and high-quality whitewater boating opportunities (National Wild and Scenic Rivers System 2017).

BLM designates selected land areas as ACECs to protect a variety of important values that are considered to merit special management. The types of important values identified are generally classified as cultural, scenic, fish and wildlife, and natural process values. Some ACECs are designated to protect one type of value, and others involve multiple values. The Table Rocks ACEC north of Central Point is the only BLM ACEC within the Analysis Area for scenic resources. The Table Rocks ACEC includes 2,101 acres and was designated to protect cultural, scenic, fish and wildlife, and natural process values (BLM 2016a).

Based on the references to scenic values in the reasoning for designating the Rogue WSR and the Table Rocks ACEC, EFSC can find that that these features should be considered as significant or important scenic resources in Exhibit R. These resources are referenced in Table R-1 and their location is shown on Figure R-1.

4.0 Impact Assessment – OAR 345-021-0010(1)(r)(C)

(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*
- (ii) Visual impacts of facility structures or plumes.*

OAR 345-021-0010(1)(r)(C) requires a description of significant potential adverse impacts to important scenic resources identified in land management plans including, but not limited to: (i) loss of vegetation or alteration of the landscape as a result of construction or operation; and (ii) visual impacts of facility structures or plumes. The Project would not create emissions plumes. This

section of Exhibit R addresses potential adverse impacts to the important scenic resources identified in Table R-1 and discussed in Section 4.

A key component of the assessment of the potential visual impacts of the Project is the determination of their likely visibility from the important scenic resources identified in the Analysis Area. Figure R-2 is a map displaying the results of a bare-earth viewshed analysis conducted for the Project facilities. The gray-shaded area in Figure R-2 identifies locations from which there would be a direct line of sight to at least a portion of one or more Project structure (either a transmission line structure or a structure within a substation). The viewshed analysis considers only the effect of terrain on the potential visibility of Project structures. The potential for views toward the Project facilities to be blocked by existing buildings or screened by existing vegetation is not factored into the analysis. In addition, the analysis is based on the maximum height of the individual Project structures, and indicates potential visibility if there is a line of sight from a ground surface location to only the top-most part of a Project structure.

The following discussion summarizes the assessment of potential visual impacts for the important scenic resources identified in Table R-1. It follows the jurisdictional organization of the table. EFSC can find that impacts to scenic resources will be minimal because the proposed transmission component of the project will take advantage of developed transmission corridors that already have transmission lines. Thus, to the extent that the Project facilities will be visible from any scenic resources discussed in Section 4, there will be little perceptible increase in scenic impacts beyond the impacts of the transmission lines already present.

4.1 Jackson County

4.1.1 Bear Creek Greenway

Figure R-2 indicates that the full length of the Bear Creek Greenway is within the area of potential Project visibility, based on bare-earth viewshed analysis. Review of the analysis data on which the viewshed map is based indicates that the potential Project visibility is based primarily on the existence of a direct line of sight from points on the Greenway to one or more structures on the 230 kilovolt (kV) Sams Valley–Whetstone Reconductoring segment. Because that segment of the Project only involves replacing the conductors on an existing transmission line, there would be no visible change resulting from that Project component. Therefore, although the new conductors might theoretically be visible to Greenway users at a distance of 2 miles or more, any viewers who could see the conductors will not notice a visual effect.

The viewshed data also indicate that, based on consideration of terrain alone, there may be a direct line of sight from points on the Greenway to one or more structures on the 230/115 kV transmission line in the vicinity of Mile 14-15. The northern end of the Greenway, approximately 2 miles north of Central Point, is the closest Greenway point to this section of the transmission line, at a viewing distance of approximately 5 miles. From the southern edge of the Analysis Area through the urbanized areas in Central Point, ground-level views outward from the Greenway are likely to be blocked in the foreground by existing structures associated with developed land uses. In

addition, the Greenway segment north of Central Point is flanked by riparian vegetation along Bear Creek, and there is an extensive area of forest vegetation to the northwest in the vicinity of Kelly Slough on the Rogue River. As a result, it is extremely unlikely that any viewers on the Greenway would actually be able to see or notice any Project structures in the vicinity of Mile 14-15. Therefore, EFSC can find that the Project would have no visibility from the Greenway, and no adverse visual effect on this scenic resource.

4.1.2 Interstate 5

Figure R-2 indicates that approximately 7 miles of the I-5 segment identified as an important scenic resource is within the area of potential Project visibility, based on bare-earth viewshed analysis. The map shows that the Project might be visible along about 6 continuous miles of I-5 from the Josephine County line to the City of Rogue River, and for about 1 mile at the eastern end of the freeway segment near the Rocky Point Bridge. The subject segment of I-5 runs generally parallel to the Rogue River and travels through a confined river valley that exhibits a substantial level of development, including the freeway, other roads, the community of Rogue River, low-density development near the river outside of established communities, a railroad line, and the existing transmission lines.

For approximately 3 miles at the western end of the I-5 segment, the Project alignment is located within foreground distance of the freeway and the Project would be visible to people traveling on I-5. From Rogue River eastward I-5 is generally from 1 to 3 miles south of the Project alignment; in this area, Project features would likely be visible in some locations and would likely be screened from view by vegetation or structures in other locations. Because the new Project structures would be similar to the existing transmission lines and consistent with the existing character of the landscape in this area, the visual changes associated with the Project are expected to be unnoticeable to most viewer groups (BLM 2016b). Therefore, EFSC can find that the Project would have limited visual effect on I-5 travelers, and minimal adverse impact on this scenic resource.

4.1.3 Lower Table Rock

As shown in Figure R-2, bare-earth viewshed analysis indicates that Project features would potentially be visible from the northern half of Lower Table Rock. The mapped area of potential visibility includes a band that wraps around the northwestern, northern and eastern portions of the mesa, and primarily includes the slopes of the mesa. The potential Project visibility on the eastern side of Lower Table Rock is based primarily on the existence of a direct line of sight to one or more structures on the Sams Valley–Whetstone Reconductoring. Viewers in this area would not notice a visible change resulting from that Project component. Structures in the Sams Valley Substation and along the 230/115 kV transmission line may be visible from the northwestern part of Lower Table Rock.

Viewers in some locations on Lower Table Rock may have views of the substation facilities and/or the transmission line west of the substation, at viewing distances of 1 mile or less. Because the

locations at Lower Table Rock with potential visibility of the Project are relatively distant from the access point and designated trail for the area, a relatively small segment of Lower Table Rock users will be able to see Project construction activities and permanent structures. To the extent this occurs, the Project features would be seen within the context of the landscape in Sams Valley, which includes visual contrast created by existing transmission lines, a state highway, secondary roads, rural residential development, and extensive agricultural use. The Project transmission facilities would be similar in character to the existing 230 and 115 kV lines. The Sams Valley Substation structures would be different from existing facilities, but would be seen adjacent to a 500 kV transmission line with taller and more prominent structures. As a result, the additional visual contrast introduced by the Project will be minimal and will not dominate the landscape or cause a substantial reduction in visual quality. Based on the limited extent of possible views of the Project features, the small user population that might experience such views, and the limited degree of visual contrast, the visual impact of the Project for visitors to Lower Table Rock will not be significant. Therefore, EFSC can find that the Project would not have a significant adverse visual effect on this scenic resource.

4.1.4 OR 99

Figure R-2 indicates that the full length of the OR 99 scenic roadway segment is within the area of potential Project visibility, based on bare-earth viewshed analysis. The viewshed data indicate that, based on consideration of terrain alone, there may be a direct line of sight from points on OR 99 to one or more structures on the 230/115 kV transmission line in the vicinity of Mile 14-15. The northern end of the scenic roadway segment, approximately 2 miles north of Central Point, is the closest point to this section of the transmission line, at a viewing distance of approximately 5 miles. A large majority of this roadway segment passes through urbanized areas in Central Point, where ground-level views outward are likely to be blocked in the foreground by existing structures associated with developed land uses. In addition, views along the segment north of Central Point up to I-5 could be screened by riparian vegetation along Bear Creek, and/or by an extensive area of forest vegetation to the northwest in the vicinity of Kelly Slough on the Rogue River. As a result, it is extremely unlikely that any viewers on this OR 99 segment would actually be able to see or notice any Project structures in the vicinity of Mile 14-15. Therefore, EFSC can find that the Project would have no visibility from OR 99, and no adverse visual effect on this scenic resource.

4.1.5 OR 238

Figure R-2 indicates that none of the OR 238 segment identified as an important scenic resource is within the area of potential Project visibility, based on bare-earth viewshed analysis. Therefore, EFSC can find that the Project would have no visibility from OR 238, and no adverse visual effect on this scenic resource.

4.1.6 Roxy Ann Peak

As shown in Figure R-2, bare-earth viewshed analysis indicates that Project features would potentially be visible from approximately the western half of Roxy Ann Peak (as represented by the extent of Prescott Park). Project visibility conditions at Roxy Ann Peak are similar to those discussed above for the Bear Creek Greenway. Review of the analysis data indicates that the potential Project visibility is based on the existence of a direct line of sight from points on the peak to one or more structures on the Sams Valley–Whetstone Reconductoring and to one or more structures on the Grants Pass–Sams Valley Transmission Line in the vicinity of Mile 14-15. Because the Sams Valley–Whetstone Reconductoring portion of the Project involves no visible change, Roxy Ann Peak users at a distance of 8 miles or more would not notice a visual effect. The upper slopes of Roxy Ann Peak are more than 13 miles from Mile 15 of the 230/115 kV transmission line. At this extended distance, it is extremely unlikely that any viewers on Roxy Ann Peak would actually be able to see or notice any Project structures in the vicinity of Mile 14-15. Therefore, EFSC can find that the Project would have no effective visibility from Roxy Ann Peak, and no adverse visual effect on this scenic resource.

4.1.7 Table Rock Road

Figure R-2 indicates that the full length of Table Rock Road from OR 234 to the Rogue River (approximately 6 miles of road) and identified as an important scenic resource is within the area of potential Project visibility. The road passes through a largely undeveloped rural area between Upper and Lower Table Rock, with irrigated agriculture the primary land use adjacent to the road. Development features in and near the road corridor include highway (OR 234), secondary roads, farm structures and facilities, and some low-density rural residential properties.

Review of the viewshed data indicates that the potential Project visibility along most of Table Rock Road is based on a direct line of sight from points on the road to one or more structures on the Sams Valley–Whetstone Reconductoring. This portion of the Project is located approximately 0.3 mile west of Table Rock Road in some locations, and is within 1.5 mile or less in other locations. As noted previously, viewers would not notice a visible change resulting from that Project component.

Viewers on the northerly 1.5 mile segment of Table Rock Road, from OR 234 south to about Tresham Lane, would have direct views of the Sams Valley Substation facilities and the 230/115 kV transmission line west of the substation. Views from locations on this part of Table Rock Road could occur at viewing distances of approximately 1.5 mile or more. Riparian vegetation associated with Snider Creek is located to the west of Table Rock Road except near the OR 234 intersection, and would likely provide at least partial screening of views toward the Project. As discussed above for Lower Table Rock, to the extent that travelers on Table Rock Road could view the Project they would see Project features within the context of the landscape in Sams Valley, which includes visual contrast created by existing transmission lines, a state highway, secondary roads, rural residential development, and extensive agricultural use. The additional visual contrast introduced by the Project would be moderate and would not dominate the landscape or cause a substantial reduction

in visual quality. Based on the limited extent of possible views of the Project features and the moderate degree of visual contrast, the visual impact of the Project for travelers on Table Rock Road would not be significant. Therefore, EFSC can find that the Project would not have a significant adverse visual effect on this scenic resource.

4.1.8 Upper Table Rock

As shown in Figure R-2, bare-earth viewshed analysis indicates that Project features may be visible from slightly less than half of Upper Table Rock. The area of potential visibility includes a band that wraps around the western and southern portions of the mesa and a small area at the northern end, and primarily includes the slopes of the mesa. Potential Project visibility on the southern side of Upper Table Rock is based primarily on the existence of a direct line of sight to one or more structures on the Sams Valley– Whetstone Reconductoring. Viewers in this area would not notice a visible change resulting from that Project component. Structures in the Sams Valley Substation and along the eastern part of the 230/115 kV transmission line may be evident to viewers in the western and northern parts of Upper Table Rock.

Potential views of the substation facilities and the transmission line west of it from locations on Upper Table Rock could occur at distances of about 2 miles or more. The trailhead and parking lot serving Upper Table Rock are located at the eastern edge of the mesa, adjacent to Modoc Road. Because the locations at Upper Table Rock with potential visibility of the Project transmission line and substation are relatively distant from the access point and designated trail for the area, only a small number of Upper Table Rock users could be exposed to views of Project construction activities and permanent structures. To this extent this occurs, the Project features would be seen within the context of the landscape in Sams Valley, which includes visual contrast created by existing transmission lines, a state highway, secondary roads, rural residential development, and extensive agricultural use. The Project transmission facilities would be similar in character to the existing 230 and 115 kV lines. The Sams Valley Substation would be different from existing facilities, but would be seen adjacent to a 500 kV transmission line with taller and more prominent structures. As a result, the additional visual contrast introduced by the Project will be minimal and would not dominate the landscape or cause a substantial reduction in visual quality. Based on the limited extent of possible views of the Project features, the small user population that might experience such views, and the limited degree of visual contrast, the visual impact of the Project for visitors to Upper Table Rock will not be significant. Therefore, EFSC can find that the Project would not have a significant adverse visual effect on this scenic resource.

4.2 City of Grants Pass – Rogue River Corridor

Figure R-2 shows the portion of the Rogue River that is addressed in the City’s Plan, although as explained above, EFSC can find that the Plan does not include a scenic resource inventory. The subject segment of the river runs through a large community with extensive urban development along both sides of the river. Development features near the river corridor include major highways

(U.S. 199 and OR 99), urban arterials and other roads, bridges, and commercial, industrial and residential uses within Grants Pass.

The viewshed data also indicate that, based on consideration of terrain alone, there may be a direct line of sight from points along the river corridor to one or more structures on the 230/115 kV transmission line in the vicinity of Mile 1-4. The eastern end of the river corridor is the closest point on to this section of the transmission line, at a viewing distance of approximately 2 miles.

Throughout the river corridor in Grants Pass, ground-level views outward from the river are likely to be blocked in the foreground by existing structures associated with developed land uses. In addition, aerial imagery indicates trees are numerous within the developed areas above the river banks. As a result, it is unlikely that viewers in the river corridor would actually be able to see or notice any Project structures in the vicinity of Mile 1-4. Therefore, EFSC can find that the Project would have no visibility from the Rogue River corridor in Grants Pass, and no adverse visual effect on this scenic resource.

4.3 City of Jacksonville – Open Space Properties

Figure R-2 indicates that a group of open space properties around the northwest perimeter of Jacksonville is not within the area of potential Project visibility, based on bare-earth viewshed analysis. Another group of open space properties around the eastern and southern edges of Jacksonville are shown within the area of potential Project visibility. These properties only have a direct line of sight to one or more structures on the Sams Valley– Whetstone Reconductoring. As noted previously, viewers would not notice a visible change resulting from that Project component. More importantly, at a viewing distance of more than 9 miles, it is highly unlikely that viewers in Jacksonville would be able to detect any structures in this portion of the Project. Therefore, EFSC can find that the Project would have no visibility from Jacksonville open space properties, and no adverse visual effect on this scenic resource.

4.4 City of Medford – Prescott Park/Roxy Ann Peak

As discussed in Section 4.2.6, the City of Medford followed the action of Jackson County in identifying Prescott Park/Roxy Ann Peak as an important scenic resource. The impact assessment provided in Section 5.1.5 above also applies in full to the scenic resource identified by Medford. At the extended distance of more than 13 miles, it is extremely unlikely that any viewers on Roxy Ann Peak would actually be able to see or notice any Project structures. Therefore, EFSC can find that the Project would have no effective visibility from Prescott Park/Roxy Ann Peak, and no adverse visual effect on this scenic resource.

4.5 City of Rogue River – Palmerton Park

Figure R-2 indicates that 5-acre Palmerton Park in the City of Rogue River is within the area of potential Project visibility. The park is located just inside the northern City limits and on the west side of Evans Creek. This part of the Evans Creek valley is characterized by a community with

relatively low-density urban use along both sides of the creek. West Evans Creek Road and East Evans Creek Road run along the respective sides of the creek.

The viewshed data indicate that, based on consideration of terrain alone, there may be a direct line of sight from points in Palmerton Park to one or more structures on the 230/115 kV transmission line in the vicinity of Mile 5-8. Between Mile 5 and 6 the Project route is approximately 0.8 mile west of the park and at a substantially higher elevation. Where the Project route crosses Evans Creek at approximately Mile 6.7, it is about 1.5 mile north of the park and at about the same elevation. It is likely that views to the west from the park would be blocked in the foreground by existing residential structures. In addition, aerial imagery indicates there is forest cover on the lower slopes of Fielder Mountain to the west of the residential area, which could provide at least partial screening of views toward the Project facilities. Similarly, existing vegetation to the north and northeast of the park is likely to provide at least partial screening of views in those directions toward the Project facilities. As a result, it is unlikely that viewers in Palmerton Park would actually be able to see or notice any Project facilities. If any of the facilities would be visible, the visual changes associated with the Project are expected to be unnoticeable to most viewers because the new facilities would be similar to the existing transmission lines (BLM 2016b). Therefore, EFSC can find that the Project would have little or no visibility from Palmerton Park in Rogue River, and no adverse visual effect on this scenic resource.

4.6 Bureau of Land Management

4.6.1 *Rogue River WSR*

Figure R-2 indicates that approximately the upstream (easternmost) 2 miles of the Rogue River WSR corridor is within the area of potential Project visibility. The subject segment of the river runs through a largely undeveloped rural area at the western end of the valley in which Grants Pass is located. Aerial imagery indicates that a narrow strip of riparian vegetation is continuous along both banks of the river, and cultivated fields are present in most of the adjacent upland area.

Development features beyond the river corridor are limited to secondary roads, farm structures and irrigation or drainage features, and some areas of low-density residential uses.

The viewshed data indicate that, based on consideration of terrain alone, there may be a direct line of sight from points along the eastern end of the WSR corridor to one or more structures on the 230/115 kV transmission line in the vicinity of Mile 1-2. The eastern end of the WSR corridor is approximately 8.3 miles from the western terminus of the Project. Throughout this part of the corridor, ground-level views outward from the river are likely to be at least partially screened by the riparian vegetation. As a result, it is extremely unlikely that viewers in the river corridor would actually be able to see any Project structures in the vicinity of Mile 1-2, or to identify them as transmission structures. Therefore, EFSC can find that the Project would have no visibility from the Rogue River WSR corridor within the Analysis Area, and would have no adverse visual effect on this scenic resource.

4.6.2 Table Rocks ACEC

The BLM-administered Table Rocks ACEC consists of two parcels within the Lower Table Rock feature discussed above as a Jackson County scenic resource, and one parcel within the Upper Table Rock scenic resource. As a result, the assessment content presented in Sections 5.1.3 and 5.1.7 is generally applicable to the Table Rocks ACEC.

As shown in Figure R-2, bare-earth viewshed analysis indicates that Project features would potentially be visible from virtually all locations within the Lower Table Rock ACEC parcels. Review of the analysis data indicates that the potential Project visibility on the eastern side of Lower Table Rock is based primarily on the existence of a direct line of sight to one or more structures on the Sams Valley–Whetstone Reconductoring. Viewers on these ACEC parcels would not notice a visible change resulting from that Project component. Potential views of structures in the Sams Valley Substation and/or along the 230/115 kV transmission line would occur within approximately the western half of ACEC Parcel 2, on the eastern part of the Lower Table Rock mesa. Interpretation of the viewshed results suggests that views to the Project in this area would likely involve transmission structures in the vicinity of Mile 11-14, located from 3 to 6 miles west of the ACEC parcel. Notably, views toward the Sams Valley Substation and/or along the 230/115 kV transmission line from ACEC Parcel 1, which includes the Lower Table Rock trailhead, would be blocked by the terrain.

The mapped area of potential Project visibility for Upper Table Rock includes multiple relatively small areas in the western, northern and eastern portions of ACEC Parcel 3. As discussed previously, viewers on Upper Table Rock would not notice a visible change resulting from the Sams Valley–Whetstone Reconductoring. Structures in the Sams Valley Substation and along the eastern part of the 230/115 kV transmission line would likely be evident to viewers in the identified parts of Table Rock ACEC Parcel 3 at a distance of approximately 2 miles or more. As indicated for Lower Table Rock, views toward the Sams Valley Substation and/or the 230/115 kV transmission line from the Upper Table Rock trailhead would be blocked by the terrain.

To the extent that Table Rocks ACEC visitors were able to view Project facilities, the Project features would be seen within the context of the landscape in Sams Valley, which includes visual contrast created by existing transmission lines, a state highway, secondary roads, rural residential development, and extensive agricultural use. The Project transmission facilities would be similar in character to the existing 230 and 115 kV lines. The Sams Valley Substation structures would be different from existing facilities, but would be seen adjacent to a 500 kV transmission line with taller and more prominent structures. As a result, the additional visual contrast introduced by the Project will be minimal and will not dominate the landscape or cause a substantial reduction in visual quality. Based on the relatively limited extent of possible views of the Project features, the availability of these views to only a portion of the ACEC user population, and the degree of visual contrast, the visual impact of the Project for visitors to the Table Rocks ACEC will not be significant. Therefore, EFSC can find that the Project would not have a significant adverse visual effect on this scenic resource.

5.0 Avoidance and Mitigation – OAR 345-021-0010(1)(r)(D)

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

No significant adverse impacts on important scenic resources will result from Project design, construction, and operation. This outcome is in part attributable to the proposed design for the Project transmission structures, with predominant use of single-pole structures (rather than lattice steel) and use of wood or self-weathering steel structures in some locations. As a result, the Project structures would appear similar to existing transmission structures, and the visual change in the landscape would be minor (BLM 2016b). Therefore, no additional measures are proposed to avoid, reduce, or otherwise mitigate Project visual impacts.

6.0 Monitoring – OAR 345-021-0010(1)(r)(F)

(F) The applicant's proposed monitoring program, if any, for impacts to scenic resources.

Because there will be no significant impacts to important scenic resources, no monitoring program is proposed.

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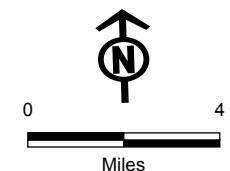
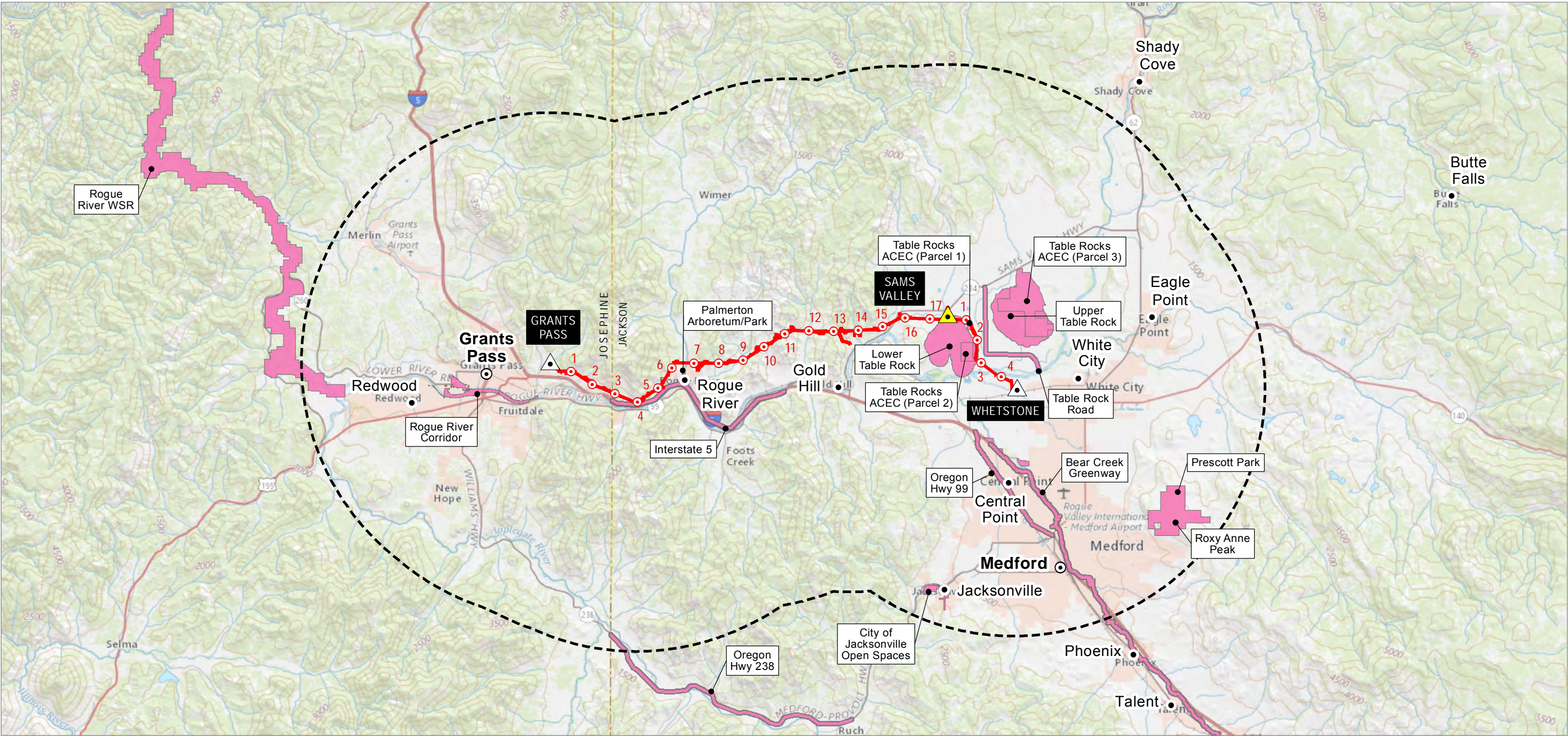
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Figures

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- Scenic Resources**
- Analysis Area (10-mile buffer of Site Boundary)
 - Scenic Roadway or Greenway
 - Scenic Area or Site

- Project Features**
- Site Boundary
 - Mile
 - Substations
 - Proposed
 - Existing



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

Source(s): BLM, City of Grants Pass, City of Jacksonville, City of Medford, Esri, Jackson County, PacifiCorp, USGS

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

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December 2017

Important Scenic Resources
Figure R-1

Exhibit S

Historic, Cultural, and Archaeological Resources

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

BLM	U.S. Bureau of Land Management
CRMMP	Cultural Resources Mitigation and Monitoring Plan
HDR	HDR, Inc.
IDP	Inadvertent Discovery Plan
OAR	Oregon Administrative Rule
NRHP	National Register of Historic Places
Project	Sams Valley Reinforcement Projects
SHPO	Oregon State Historic Preservation Office

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1.0 Introduction

Exhibit S was prepared to meet the submittal requirements for the Sams Valley Reinforcement Projects (Project), per Oregon Administrative Rule (OAR) 345-021-0010(1)(s), related to historic, cultural, and archaeological resources.

Exhibit S provides an analysis of potential significant adverse impacts of the Project to historic, cultural, and archaeological resources. This exhibit demonstrates that the Project complies with the approval standards in OAR 345-022-0090 and the submittal requirements in OAR 345-021-0010(1)(s) paragraphs (A) through (E). Specifically, OAR 345-022-0090 states that:

(1) Except for facilities described in sections (2) and (3), to issue a site certificate, the 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).

(2) The Council may issue a site certificate for a facility that would produce power from wind, solar or geothermal energy without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

(3) The Council may issue a site certificate for a special criteria facility under OAR 345-015-0310 without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

This analysis utilizes the federal definition for archaeological sites (a resource 50 years or older), rather than Oregon State Historic Preservation Office's (SHPO) state guidelines for such resources (abandoned for 75 years). The federal definition is more conservative and encompasses sites that would meet the state definition. Further, this approach allows for consistency with the Project's federal regulatory process. It is also consistent with the approach being taken with other EFSC projects subject to both state and federal regulations.

1.1 Analysis Area

This exhibit summarizes information collected about historic, cultural, and archaeological resources within the Site Boundary for the Project. The Site Boundary is the Analysis Area for cultural resources and is defined in Request for Amendment No. 4 Project Description and OAR Division 27 Compliance, pursuant to OAR 345-021-0010(1)(a) and (b).

2.0 Site Certificate Condition Compliance

No existing Site Certificate conditions apply to this resource. New conditions are recommended below and in Section 6.3.

PacifiCorp proposes the following new conditions:

- **Cultural Resources Protection Condition 1:** The certificate holder will coordinate with the State Historic Preservation Office (SHPO) prior to construction to identify, if necessary, the need for cultural and historical surveys on those portions of the Site Boundary not previously surveyed.
- **Cultural Resources Protection Condition 2:** 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 will be disturbed during construction and the areas that were surveyed for historic, cultural, and archaeological resources.
- **Cultural Resources Protection Condition 3:** 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.
- **Cultural Resources Protection Condition 4:** If construction activities will occur within 200 feet of an identified site, the certificate holder shall flag a 30-meter no-entry buffer around the site.
- **Cultural Resources Protection Condition 5:** Prior to construction, the certificate holder shall finalize, and submit to the Department, a Cultural Resources Mitigation and Monitoring Plan (CRMMP).
- **Cultural Resources Protection Condition 6:** Before beginning construction, the certificate holder shall ensure that a qualified archeologist, as defined in OAR 736-051-0070, trains construction contractors on how to identify sensitive historic, cultural, and archaeological resources present onsite and on measures to avoid accidental damage to identified resource sites. Records of such training must be maintained onsite during construction, and made available to the Department upon request.
- **Cultural Resources Protection Condition 7:** During construction, the certificate holder shall conduct all work in compliance with the final CRMMP as well as the Inadvertent Discovery Plan (IDP).
- **Cultural Resources Protection Condition 8:** During construction, the Site Certificate holder shall ensure that construction personnel cease all ground-disturbing activities in the immediate area if any archeological 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 the SHPO of the find. If ODOE, in consultation with SHPO, determines that the resource meets the definition of an

archaeological object, archaeological site, or is eligible or likely to be eligible for listing on the NRHP, the certificate holder shall, in consultation with the Department, SHPO, interested Tribes and other appropriate parties, make recommendations to the Council for mitigation, including avoidance, field documentation and data recovery. The certificate holder shall not restart work in the affected area until the Department, in consultation with SHPO, agree that the certificate holder has demonstrated that it has complied with archeological resources protection regulations.

3.0 Description of Cultural Resources Surveys Performed - OAR 345-021-0010(1)(s)(D)(i) and (ii)

OAR 345-021-0010(1)(s) (D) The significant potential impacts, if any, of the construction, operation and retirement of the proposed facility on the resources described in paragraphs (A), (B) and (C) and a plan for protection of those resources that includes at least the following:

(i) A description of any discovery measures, such as surveys, inventories, and limited subsurface testing work, recommended by the State Historic Preservation Officer 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).

(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.

HDR, Inc. (HDR), on behalf of PacifiCorp, conducted a records review followed by field surveys in support of the Project's Environmental Assessment (EA) prepared by the BLM (2016). The EA is included in Exhibit B, Attachment B-1; the cultural resources survey report is included in this exhibit as confidential Attachment S-1. The survey report is currently undergoing SHPO review as part of the Project's federal regulatory compliance efforts. An addendum or supplement to the report, based on SHPO's comments, is expected to be issued in January 2018. PacifiCorp does not anticipate changes to the inventory or NRHP-eligibility statements presented here. Information presented in the EA and Attachment S-1 has been used to inform this exhibit. However, the area evaluated for cultural resources in the EA and Attachment S-1 does not match the Analysis Area for Exhibit S; therefore, additional data were reviewed to inform this exhibit, including a supplemental review of Oregon SHPO's online databases. The area surveyed by HDR is referred to here as the "EA survey area."

3.1 Methods

HDR's methods for the cultural resource survey included a records review and subsequent field surveys, as described in the following sections. Table S-1 summarizes the field efforts completed for

the Project. Some of the EA survey area extends beyond the Site Boundary. Portions of the Site Boundary remain unsurveyed due to access denials, submerged lands, and project re-design post-survey. In addition to HDR's efforts, Tetra Tech conducted a supplemental records review of the Site Boundary.

Table S-1. Field Efforts Undertaken for the Project

Date	Description
August 2015	Pedestrian field survey of the reinforcement portion of the Site Boundary.
July 2016	Pedestrian field survey of the reconductoring portion of the Site Boundary and for some small modifications of the reinforcement portion of the Site Boundary. Additionally, shovel probing was conducted at the Sams Valley Substation parcel to test for presence/absence of cultural resources.
March 2017	Pedestrian field survey of a small area near the Sams Valley Substation parcel where there was a change to the Site Boundary. Additional excavation efforts at site HDR-SV-10/14 within the Sams Valley Substation parcel to evaluate this site for the NRHP. Shovel probing at Structures 6/13 and 7/13 along the line to be reductored to test for presence/absence of cultural resources.
June/July 2017	Completion of additional excavation efforts at site HDR-SV-10/14 within the Sams Valley Substation parcel to evaluate this site for the NRHP. Additional excavations at site 35JA 00274 along the line to be reductored to evaluate this site for the NRHP.

3.1.1 Records Review

HDR completed a records review of the EA survey area in June 2014, May 2015, and March 2016. Tetra Tech conducted a supplemental review in November 2017. The area researched by HDR included the EA survey area and a 0.25-mile buffer around that area. The records review included examination of available resources from the SHPO online databases for archaeological resources and historic built environment resources, including a search of properties listed on the NRHP. In addition to checking records available through SHPO, historic maps were investigated for potential historic features that may be present within the EA survey area or nearby. Additionally, the BLM Medford field office was contacted regarding relevant files prior to starting fieldwork. Tetra Tech's supplemental review utilized the same online SHPO databases, but focused on previously recorded cultural resources in the areas of the Site Boundary that were not surveyed by HDR.

The records reviews identified 25 previous cultural resources investigations within 0.25 miles of the Site Boundary, of which 15 were located within the Site Boundary. The investigations occurred between the 1970s and 2014, and were conducted prior to a variety of different undertakings, including transmission line construction, development of an irrigation district, fire salvage and fuel reduction projects, a parking lot expansion, construction of a roof runoff collection facility, bridge replacements/repairs, a dam removal, pipeline construction and maintenance, construction of a telecommunications facility, and abandoned mine closures. A very small portion (roughly 10 to 20 percent) of the Site Boundary was surveyed as a result of these previous investigations.

The records reviews identified 40 cultural resources previously documented within 0.25 miles of the Site Boundary, of which 16 are within the Site Boundary or immediately adjacent to it. (The EA survey area included 14 previously recorded cultural resources, as noted in Attachment S-1.) Of the 40 cultural resources within 0.25 miles of the Site Boundary, 15 are categorized as isolated finds, six are built environment resources, 18 are archaeological sites, and one is unidentified. Four of the built environment resources are eligible for the NRHP, while two remain unevaluated. Of the remaining 34 previously recorded cultural resources, two have been previously evaluated as ineligible for the NRHP, and the rest (32 sites and isolates) appear not to have been evaluated. However, isolated finds are generally found to not qualify for consideration under the NRHP and are assumed to be ineligible.

Based on the number of previously recorded cultural resources in the Site Boundary and the 0.25-mile study area, many of the historic features shown on historic-era maps of the Project area have not been formally recorded. HDR's review of historic maps resulted in the identification of 30 to 40 locations where unrecorded historic period sites or features may be present within the Site Boundary. These sites and features include potential roads and trails, Highway 234, mines, a prospect, a transmission line, and a substation. In addition to actual historic features that are depicted, early historic plats identify portions of the Site Boundary and its vicinity as part of the Table Rock Indian Reservation and one plat shows two mining claims within the Site Boundary, though no actual mining features are shown on the map.

3.1.2 Field Surveys

Following the records review, HDR completed a pedestrian survey of the EA survey area in August 2015, July 2016, and March 2017. The survey was carried out using parallel pedestrian transects spaced 20-30 meters or less apart, depending on density of vegetation and/or topographic features. All topographic features encountered and considered to be sensitive for cultural resources (i.e., springs, drainages, etc.) were thoroughly inspected. Areas within the EA survey area that could be accessed safely were subjected to inspection. Roughly 15 percent of the EA survey area could not be surveyed due to steep, unsafe slopes and/or dense vegetation that could not be penetrated. Two other locations also were not surveyed due to access issues. One of these was the location of an existing steel lattice transmission line structure located on an inaccessible, island-like area surrounded by water. The other location is where the Project crossed a residential development where permission to enter was not granted by private land owners. Maps documenting HDR's survey coverage results are provided in Appendix E of the survey report (Attachment S-1 to this exhibit). As noted above, the Site Boundary includes areas that were added to the Project after HDR's survey was completed. These areas have not been surveyed by HDR and are considered unsurveyed. Of the roughly 487-acre Site Boundary, approximately 313 acres were subjected to survey by HDR and approximately 174 acres were not surveyed. Survey was not conducted in the EA survey area due to steep terrain (14.5 acres), dense vegetation (2.3 acres), or a combination thereof (25.5 acres). The survey was also not conducted in areas where land owners had denied access to their property (0.5-acre), where residential development precluded visibility of the

ground surface (7.6 acres), areas where no ground disturbance will occur (transmission line spans; 90 acres), and where the Site Boundary was expanded after the EA survey was conducted (34.25 acres). A map of the survey coverage of the Site Boundary is included in Figure S-1.

In addition to the pedestrian survey, subsurface testing was conducted at the proposed Sams Valley Substation parcel and at two of the structures to be replaced along the reconductoring line, Structures 6/13 and 7/13. These locations are, for various reasons, in areas sensitive for cultural resources.

Following the pedestrian survey and subsurface testing survey, excavations were conducted to evaluate the NRHP eligibility of two archaeological sites identified within the Site Boundary: HDR-SV-10/14 and 35JA 00274. The Cow Creek Tribe of Umpqua Indians provided a tribal monitor for the duration of those excavations in March and June/July 2017.

3.2 Survey and Inventory Results

The cultural resources inventory and evaluation efforts conducted by HDR resulted in the identification of seven isolated finds, 18 archaeological sites (one of these includes a standing historic barn), and one historic built environment resource (a historic substation) within the Site Boundary. In addition, two more previously recorded isolated finds are located within the Site Boundary, but outside of HDR's EA survey area. (All resources identified by HDR in the EA survey area also in the Site Boundary.) Additional resources may exist in the 174 acres that could not be or have not been surveyed. Of the 18 archaeological sites identified within the Site Boundary, six were previously recorded and 12 were newly recorded. No other previously recorded cultural resources were identified during the surveys. A map of the results of the survey and inventory efforts in the Site Boundary are included in confidential Figure S-2.

Both of the existing Project transmission lines (the 115-kilovolt Grants Pass-Lone Pine line to be replaced and the existing 230-kilovolt Grants Pass-Meridian line to be reconductored) were constructed in the mid to late 1950s, making them historic in age. However, inspection of these lines during the survey revealed that line maintenance over the years has resulted in almost the entirety of these lines through the Site Boundary having been replaced and/or modified. Thus, there is little, if anything, left of the lines that is actually historic. Since no historic components of these transmission lines were observed during the survey, neither of the lines were recorded as historic resources.

Of the resources recorded as a result of the surveys, the seven isolated finds, five of the archaeological sites (HDR-SV-08, HDR-SV-10/14, HDR-SV-12, HDR-SV-15, and 0511050266SI/OR110-1929), and the one built environment resource (Grants Pass Substation) are recommended as ineligible for inclusion on the NRHP. The two isolated finds outside the EA survey area, but within the Site Boundary were not analyzed by HDR. However SHPO's database indicates they have been previously determined not eligible for listing on the NRHP. One archaeological site (35JA 00274) is recommended eligible for the NRHP. Three of the archaeological sites (HDR-SV-03, -05, and -07) are linear resources (ditches or roads) and, while the entirety of each of these resources has not been assessed with regard to its eligibility for the NRHP, the segments of these

resources recorded for this Project are recommended to be non-contributing elements (i.e., not eligible for listing on the NRHP) of these unevaluated sites. The remaining nine archaeological sites (HDR-SV-01, -02, -04, -06, -09, -11, -13, 35JA 00200, and 35JA 00275) are considered unevaluated and require further investigation before they can be evaluated for the NRHP. Table S-2 summarizes the results of the survey and supplemental records search.

Table S-2. Cultural Resources Identified in the Site Boundary

Resource #	Resource Description	Landowner Status	NRHP Recommendation
Archaeological Sites			
HDR-SV-01	Historic Site. Mine shaft with tracks for ore carts. Modern mining by locals has completely modified the entire area and the mine entrance, but it is assumed that the shaft and ore cart tracks are historic.	Private	Unevaluated
HDR-SV-02	Historic Site. Large mining site on mountain top. Boundaries of the site were not defined, only the features within the Site Boundary were noted and include three pits and a large tailings pile.	BLM	Unevaluated
HDR-SV-03	Historic Site. Dirt road segment.	Private	Unevaluated (non-contributing element)
HDR-SV-04	Historic Site. Large mining site on mountain top. Boundaries of the site were not defined, only the features within the Site Boundary were noted and include two prospect trenches.	Private	Unevaluated
HDR-SV-05	Historic Site. Ditch segment that appears related to irrigation.	Private	Unevaluated (non-contributing element)
HDR-SV-06	Historic Site. Large refuse dump and historic road segment. Boundaries of the site were not defined, only the portion of the site within the Site Boundary was noted.	Private	Unevaluated
HDR-SV-07	Historic Site. Two segments of an active irrigation ditch.	Private	Unevaluated (non-contributing elements)
HDR-SV-08	Historic Site. Modern to historic debris dump.	Private	Ineligible
HDR-SV-09	Historic Site. Homestead site with a refuse scatter, one artifact concentration, and a structural depression.	Private	Unevaluated
HDR-SV-10/14	Multicomponent Site. Small barn and five associated features. Prehistoric lithic scatter were observed.	Private	Ineligible
HDR-SV-11	Historic. Mining complex with an historic car.	BLM	Unevaluated
HDR-SV-12	Historic. Refuse scatter.	Private	Ineligible
HDR-SV-13	Prehistoric. Lithic flake scatter.	Private	Unevaluated
HDR-SV-15	Historic. Nine ditches.	Private	Ineligible

Table S-2. Cultural Resources Identified in the Site Boundary

Resource #	Resource Description	Landowner Status	NRHP Recommendation
35JA 00200	Prehistoric. Rockshelter.	Private	Unevaluated
35JA 00274	Multicomponent Site. Lithic scatter. Concrete features and two historic artifacts.	Private	Eligible (prehistoric component only)
35JA 00275	Prehistoric. Lithic scatter.	Private	Unevaluated
0511050266SI/ OR110-1929	Historic. Mining complex called the Big Chief Property, originally documented by the BLM.	BLM	Ineligible
Built Environment Sites			
Grants Pass Substation	Grants Pass Substation, originally built in the 1950s to service the Grants Pass area. The substation is still active today and exhibits extensive modern modifications.	Private	Ineligible
Isolated Finds			
HDR-SV-ISO-1	Prehistoric. Cryptocrystalline silicate (CCS) flake measuring 4.0 by 2.0 by 1.0 centimeters. Yellow/orange secondary flake with less than 10 percent cortex.	Private	Ineligible
HDR-SV-ISO-2	Historic. Rusted car door, possible manufactured circa 1930s. Door has some faded green paint.	Private	Ineligible
HDR-SV-ISO-3	Prehistoric. CCS interior flake; red/brown. Possibly heat treated.	Private	Ineligible
HDR-SV-ISO-4	Prehistoric. CCS expedient tool/utilized flake; red/brown. Worked along one edge.	Private	Ineligible
HDR-SV-ISO-5	Prehistoric. Complex interior CCS flake; brown.	Private	Ineligible
HDR-SV-ISO-6	Historic. Rusted and fragmented body of automobile. Possibly old model T (1920s style).	BLM	Ineligible
HDR-SV-ISO-7	Prehistoric. CCS cortical reduction flake; grey. CCS exhausted core; red. CCS cortical flake; brown/orange. CCS simple interior flake; orange/brown. These materials were recovered from Shovel Probes 46, 55, 152, and 153, 10 to 25 centimeters below surface.	Private	Ineligible
93-16	Prehistoric. CCS flake discovered during post-disturbance inventory.	Private	Ineligible
93-14	Prehistoric. Five CCS flakes discovered during post-disturbance inventory.	Private	Ineligible

In addition to the identified cultural resources above, there are three areas with increased subsurface potential for cultural deposits: the proposed location for the proposed Sams Valley Substation, the reductoring portion of the Project, and the residential development area in the vicinity of Evans Creek. Additional areas with increased potential for subsurface deposits may exist in unsurveyed areas.

4.0 Historic and Cultural Resources Listed, or Likely Eligible for Listing, on the National Register of Historic Places – OAR 345-021-0010(1)(s)(A)

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 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:

OAR 345-021-0010(1)(s) (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.

There are no historic or cultural resources identified within the Analysis Area that are listed on the NRHP. One archaeological site (35JA 00274) identified by surveys in the Site Boundary has been recommended as eligible for listing on the NRHP. Nine other archaeological sites (HDR-SV-01, -02, -04, -06, -09, -11, -13, 35JA 00200, and 35JA 00275) identified by surveys in the Site Boundary have not been evaluated for NRHP eligibility, and are considered potentially NRHP-eligible. Another three archaeological sites are linear sites that have not been evaluated for NRHP eligibility as a whole; however, those segments that are within the Analysis Area have been recommended as non-contributing elements (i.e., not eligible for listing on the NRHP). NRHP-eligible and unevaluated resources will be avoided by the Project and monitored during construction. (See Section 6.3.)

5.0 Archaeological Objects and Sites on Private Lands within the Analysis Area – OAR 345-021-0010(1)(s)(B)

OAR 345-021-0010(1)(s) (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.

Fifteen of the 18 archaeological sites identified in surveys for the Project are located on private lands within the Analysis Area. Eight of the nine archaeological objects (isolated finds) identified are on private lands. The archaeological sites include three prehistoric sites, 10 historic sites, and two multicomponent sites. One of the sites has been recommended as NRHP-eligible, while seven are unevaluated for NRHP eligibility. The remainder have been recommended as not eligible for listing on the NRHP, or are considered non-contributing elements of unevaluated resources. The archaeological objects include seven prehistoric isolated finds and one historic isolated find. None are considered NRHP-eligible.

6.0 Archaeological Objects and Sites on Public Lands within the Analysis Area – OAR 345-021-0010(1)(s)(C)

OAR 345-021-0010(1)(s) (C) For public lands, archaeological sites, as defined in ORS 358.905(1)(c), within the analysis area.

Three of the 18 archaeological sites identified by survey for the Project are located on public lands managed by the U.S. Bureau of Land Management (BLM) within the Analysis Area. In addition, one archaeological object is on BLM-managed public land. The archaeological sites include three historic-era sites, two of which are unevaluated for NRHP eligibility. The remaining site has been recommended not eligible for listing on the NRHP. The archaeological object consists of one historic isolated find that is considered not eligible for listing on the NRHP.

7.0 Significant Potential Impacts of Construction and Operation, and Retirement of the Facility on Historic, Cultural, and Archaeological Resources

As noted above, 130 acres of the Site Boundary have not been surveyed for historic, cultural, and archaeological resources due to access issues. Additionally, nine isolated finds, 18 archaeological sites (one with a historic built environment resource), and one historic built environment resource have been identified in the Site Boundary, as have three areas with increased potential for subsurface archaeological deposits. One archaeological site has been recommended as NRHP-eligible, while nine additional archaeological sites are considered unevaluated at this time.

All NRHP-eligible and unevaluated resources will be avoided by the Project, reducing Project impacts on significant cultural resources. However, EFSC approval standards consider impacts to all archaeological sites and objects, not just those that are NRHP-listed, -eligible, or unevaluated. (See OAR 345-022-0090(1)(a) through (c).) As such, disturbance to all cultural resources identified in the Site Boundary (9 archaeological objects/isolated finds, 18 archaeological sites, and one historic built environment resource) would result in significant potential impacts.

Additional unidentified cultural resources or areas with increased potential for subsurface deposits may exist in unsurveyed areas or even surveyed areas. Disturbance of cultural resources in these areas would result in significant potential impacts.

As discussed below in Section 6.1, implementation of the conditions listed in Section 2 of this exhibit will be implemented to reduce the significance of the above impacts.

7.1 Measures Designed to Prevent the Destruction of Historic, Cultural, and Archaeological Resources – OAR 345-021-0010(1)(s)(D)(iii)

(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.

In an effort to avoid and minimize potential effects on historic, cultural, and archaeological resources during construction and operation of the Project, the conditions listed in Section 2 of this exhibit will be implemented.

7.2 Permit Application

No permit applications have been submitted at this time because none are needed. In the event that previously undiscovered archaeological sites are inadvertently disturbed during construction, construction work would cease and PacifiCorp would direct the site archaeologist to apply for necessary archaeological excavation permits from SHPO.

8.0 Proposed Monitoring Plan – OAR 345-021-0010(1)(s)(E)

OAR 345-021-0010(1)(s) (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.

Monitoring of Project-associated ground-disturbing activity by archaeologists and/or Tribal representatives would be conducted in compliance with the CRMMP required under the conditions listed in Section 2 of this exhibit. In addition, the IDP will be followed in the event of any inadvertent discoveries.

9.0 References

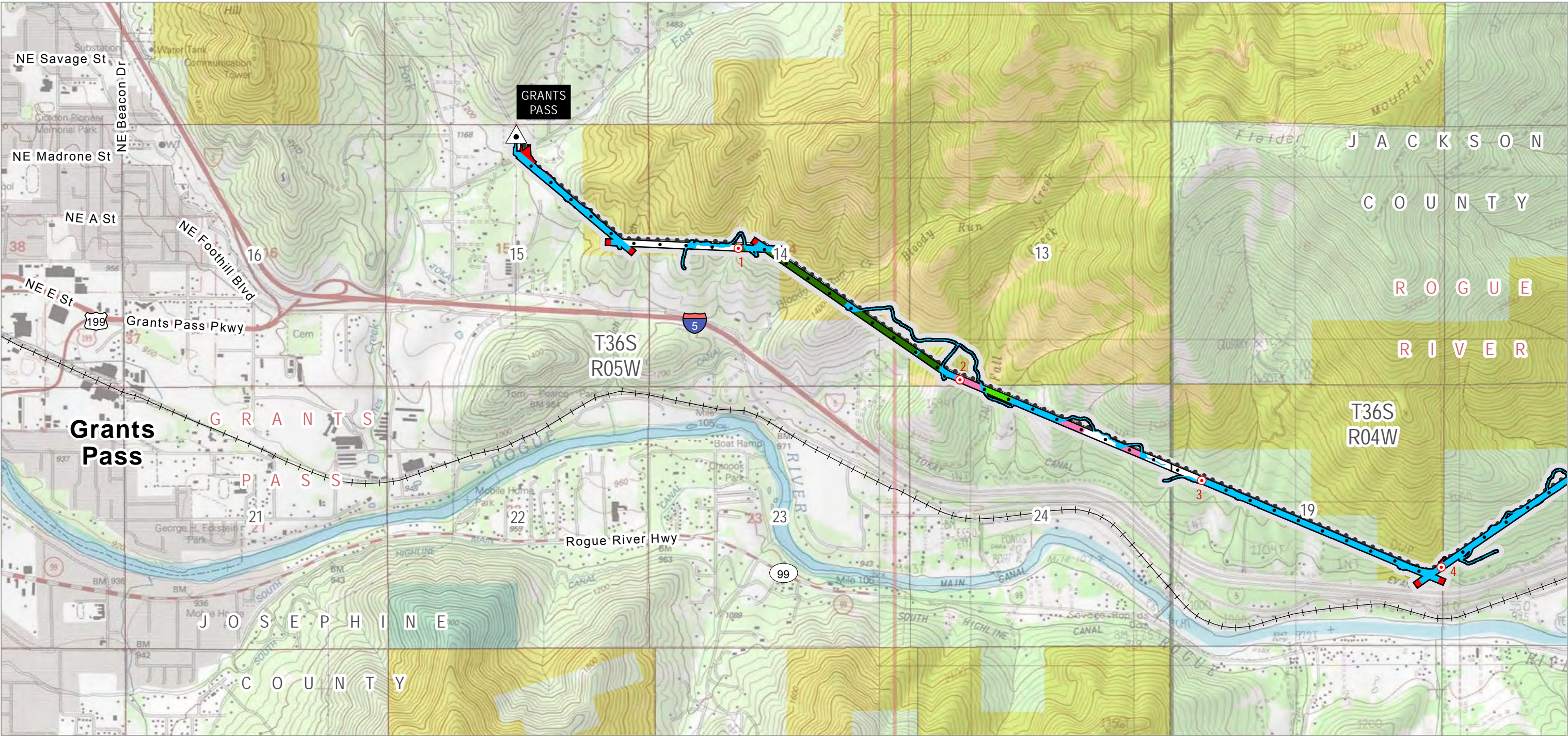
BLM (Bureau of Land Management). 2016. Environmental Assessment Sams Valley Reinforcement Project. DOI-BLM-ORWA-M050-2016-0002-EA. November 2016.

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Figures

Note that Figure S-2 (Cultural Resource Locations within Site Boundary) is confidential and provided under separate cover.

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0 2,000
Feet

Map Area

Salem
OREGON

Source(s): Copyright: © 2013 National Geographic Society, i-cubed, BLM, Esri, HDR, PacifiCorp

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit S_Cultural\FIG S-1 Cultural Survey Status.mxd
December 2017

Project Features

- Site Boundary
- Existing Substation
- Mileposts
 - Mile
 - Tenth-mile

Survey Status within Site Boundary

- Survey Complete
- No Survey(s) Completed
- Heavy Vegetation
- Heavy Vegetation and Steep Terrain
- Post-Survey Expanded Site Boundary
- Steep Terrain
- Transmission Span, No Ground Disturbance

Land Status

- Bureau of Land Management
- Private
- State or Local

Other Features

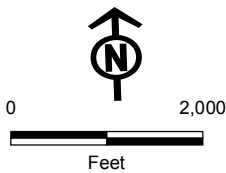
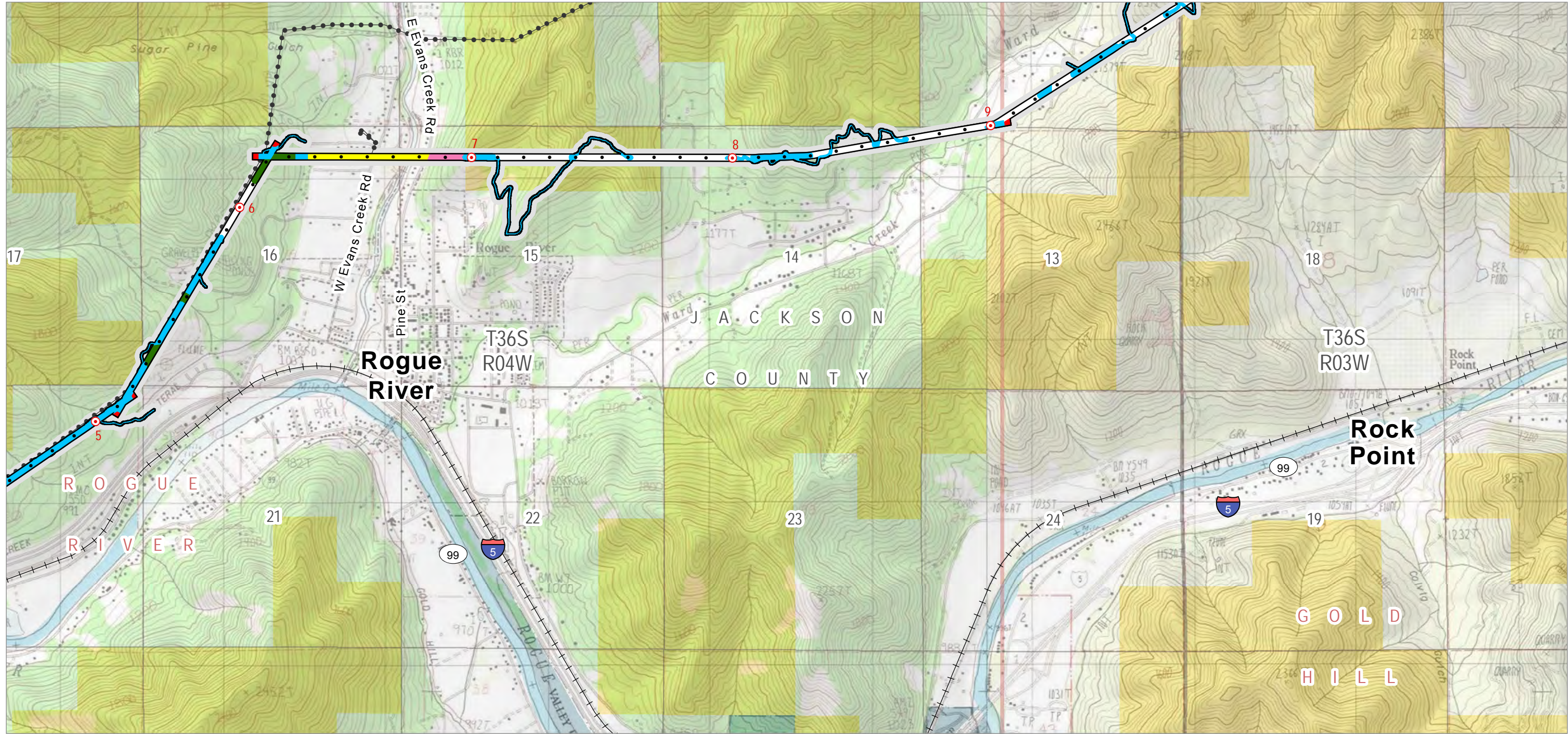
- Existing Transmission Lines
- Railroad
- PLSS TOWNSHIP AND RANGE
- PLSS SECTION
- USGS 7.5' QUAD MAP INDEX

PACIFICORP
A PACIFIC ENERGY HOLDINGS COMPANY

Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

**Cultural Survey Status
within Site Boundary**

Figure S-1.1



Map Area

Project Features

- Site Boundary
- Mileposts
 - Mile
 - Tenth-mile

Survey Status within Site Boundary

- Survey Complete
- No Survey(s) Completed
- Heavy Vegetation and Steep Terrain
- Post-Survey Expanded Site Boundary
- Residential Area
- Steep Terrain
- Transmission Span, No Ground Disturbance

Land Status

- Bureau of Land Management
- Private
- State or Local
- State or Local Parks and Recreation, Wildlife or Forest

Other Features

- Existing Transmission Lines
- Railroad
- PLSS TOWNSHIP AND RANGE
- PLSS SECTION
- USGS 7.5' QUAD MAP INDEX



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

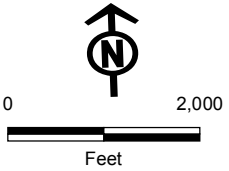
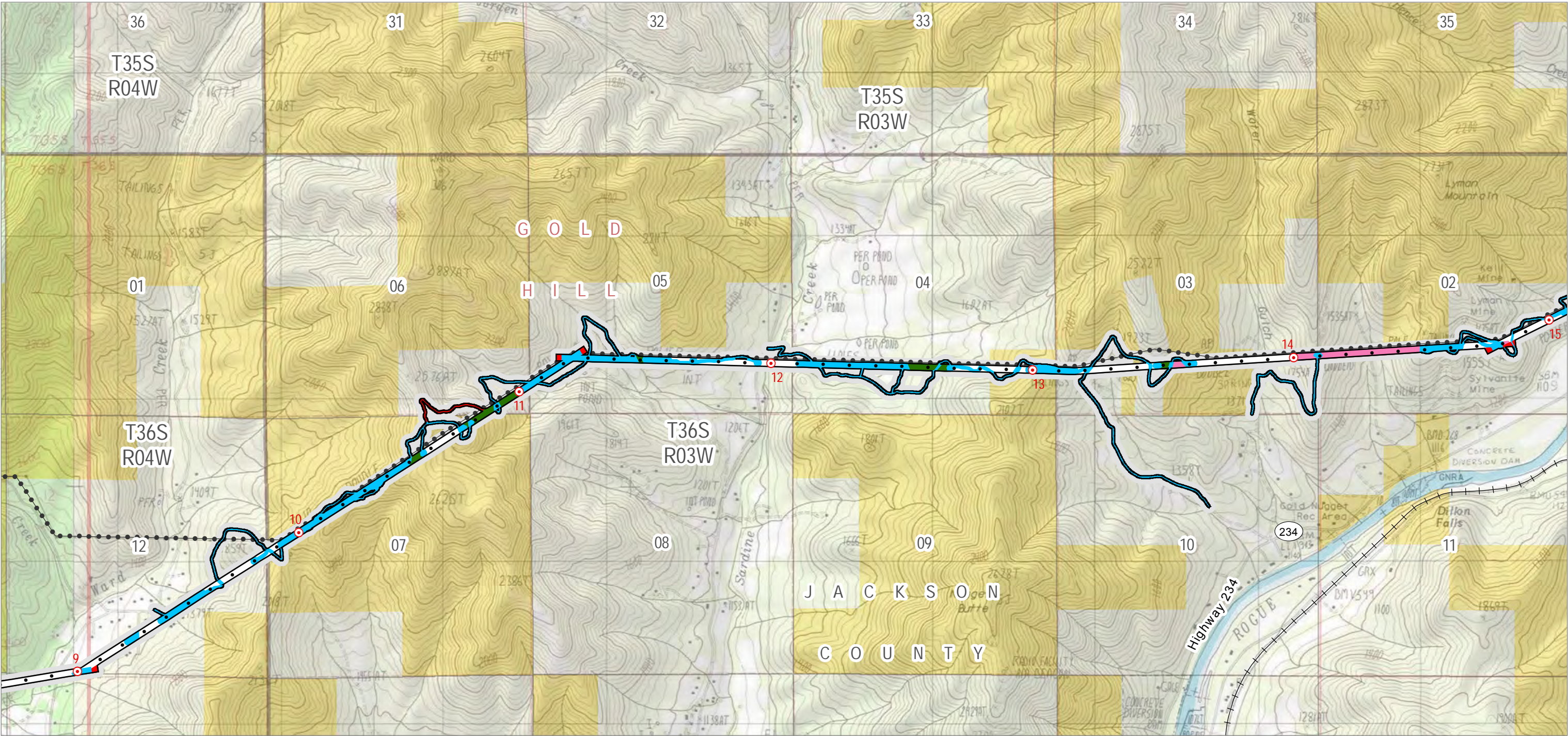
Cultural Survey Status within Site Boundary

Figure S-1.2

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Z:\UtilServ\Sams Valley\Reports\Exhibit S_Cultural\FIG S-1 Cultural Survey Status.mxd
December 2017



Map Area

Project Features

- Site Boundary
- Mileposts
 - Mile
 - Tenth-mile

Survey Status within Site Boundary

- Survey Complete
- No Survey(s) Completed
- Heavy Vegetation and Steep Terrain
- Post-Survey Expanded Site Boundary
- Steep Terrain
- Transmission Span, No Ground Disturbance

Land Status

- Bureau of Land Management
- Private
- State or Local

Other Features

- Existing Transmission Lines
- Railroad
- PLSS TOWNSHIP AND RANGE
- PLSS SECTION
- USGS 7.5' QUAD MAP INDEX



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

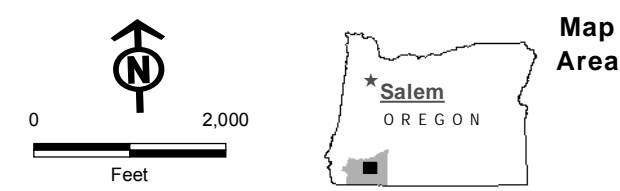
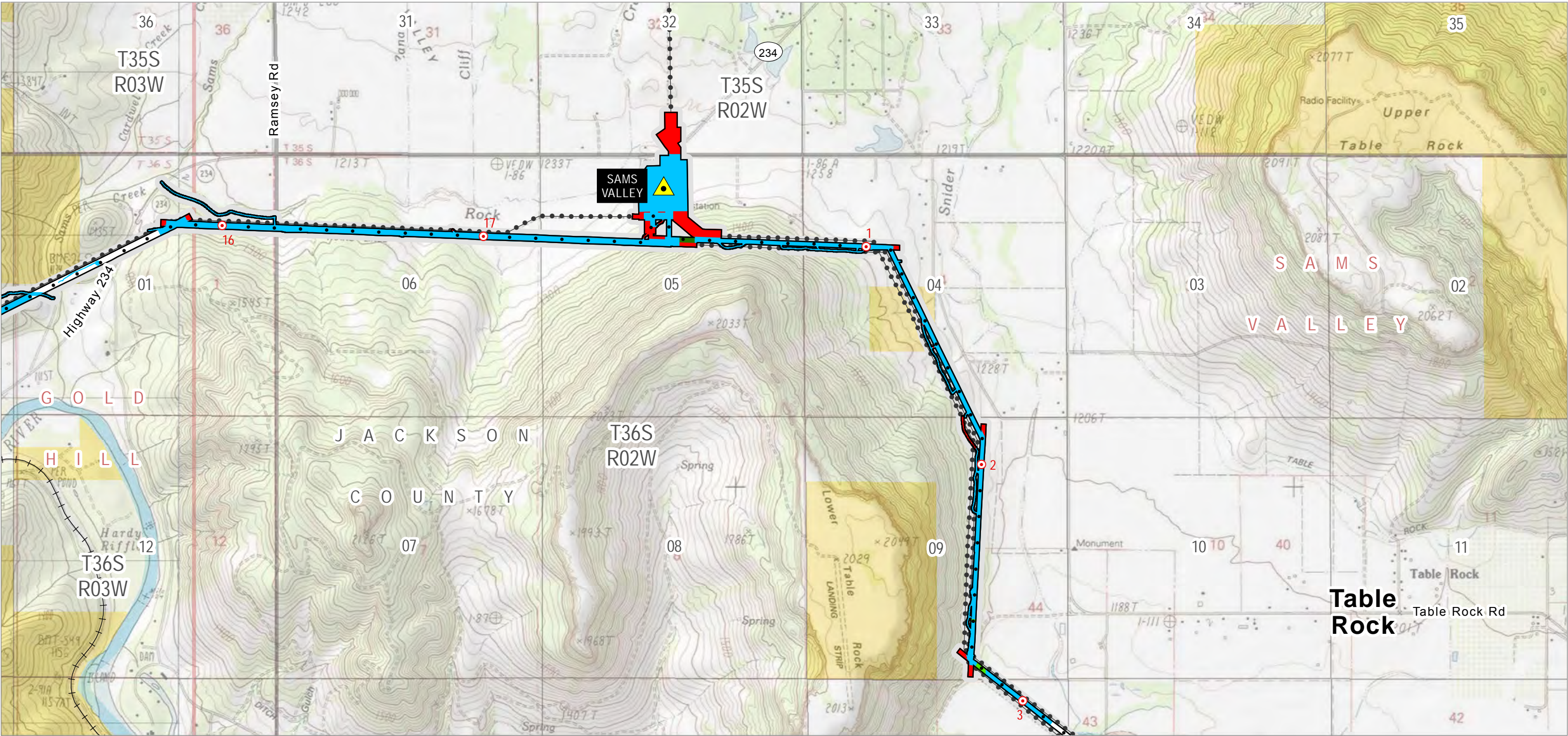
**Cultural Survey Status
within Site Boundary**

Figure S-1.3

Source(s): Copyright: © 2013 National Geographic Society, i-cubed, BLM, Esri, HDR, PacificCorp

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Z:\UtilServ\Sams Valley\Reports\Exhibit S_Cultural\FIG S-1 Cultural Survey Status.mxd
December 2017

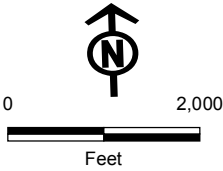
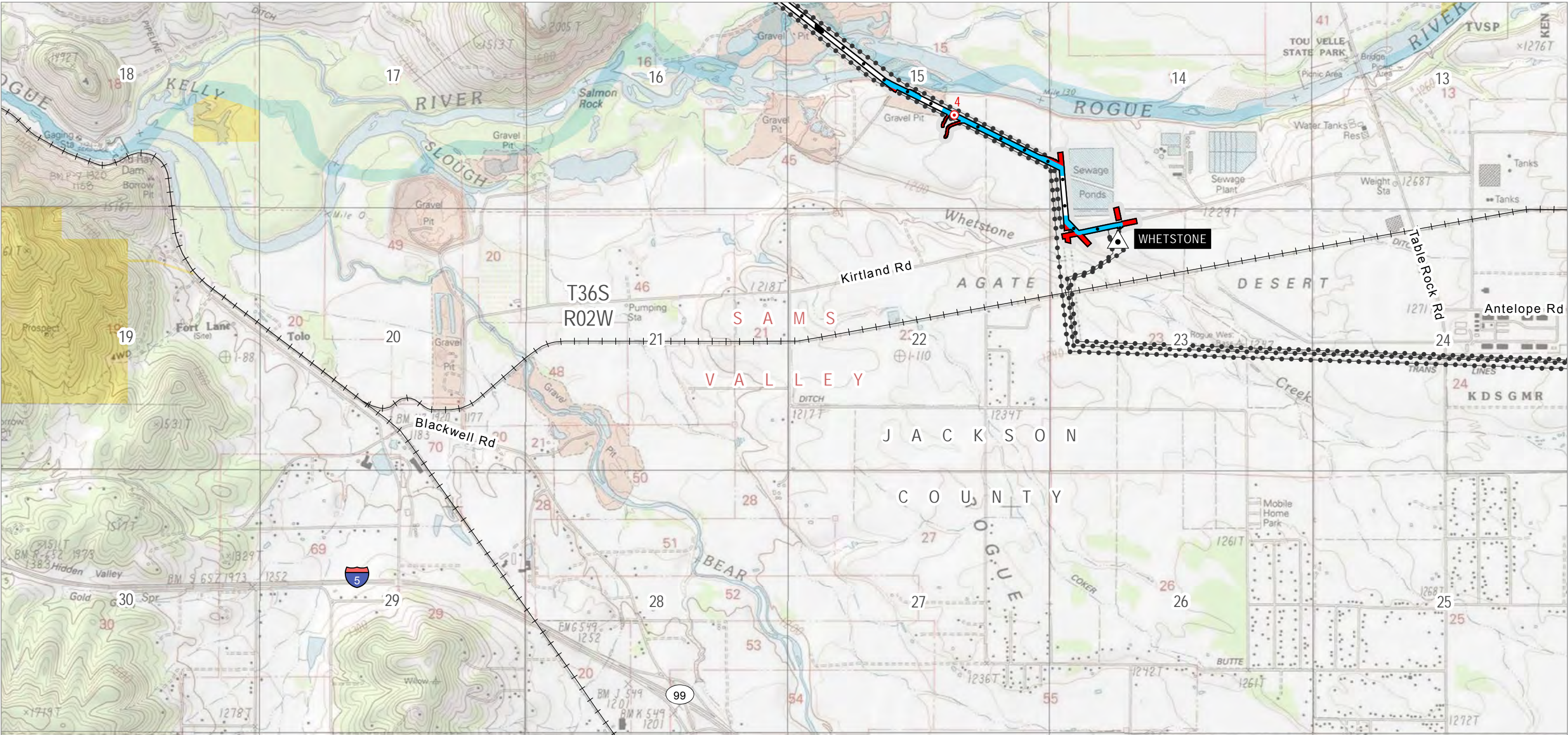
- | Project Features | Survey Status within Site Boundary | Land Status | Other Features |
|---------------------|--|---------------------------|-----------------------------|
| Site Boundary | Survey Complete | Bureau of Land Management | Existing Transmission Lines |
| Proposed Substation | No Survey(s) Completed | Private | Railroad |
| Mileposts | Heavy Vegetation | State or Local | PLSS TOWNSHIP AND RANGE |
| Mile | Heavy Vegetation and Steep Terrain | | PLSS SECTION |
| Tenth-mile | Post-Survey Expanded Site Boundary | | USGS 7.5' QUAD MAP INDEX |
| | Transmission Span, No Ground Disturbance | | |

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Josephine and Jackson Counties
Amendment #4

**Cultural Survey Status
within Site Boundary**

Figure S-1.4



Map Area

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Z:\UtilServ\Sams Valley\Reports\Exhibit S_Cultural\FIG S-1 Cultural Survey Status.mxd
December 2017

Project Features

- Site Boundary
- Existing Substation
- Mileposts
 - Mile
 - Tenth-mile

Survey Status within Site Boundary

- Survey Complete
- No Survey(s) Completed
- Post-Survey Expanded Site Boundary
- No Access
- Transmission Span, No Ground Disturbance

Land Status

- Bureau of Land Management
- Private
- State or Local

Other Features

- Existing Transmission Lines
- Railroad
- PLSS TOWNSHIP AND RANGE
- PLSS SECTION
- USGS 7.5' QUAD MAP INDEX



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

Cultural Survey Status within Site Boundary

Figure S-1.5

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**Attachment S-1: Cultural Resources
Inventory and Evaluation Report**

**(CONFIDENTIAL – PROVIDED UNDER
SEPARATE COVER)**

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Exhibit T

Recreational Opportunities

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Figure T-1. Recreational Opportunities in the Analysis Area

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Attachment T-1. Inventory of Recreational Opportunities in the Analysis Area

Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
ADT	average daily traffic
BLM	U.S. Bureau of Land Management
dbA	A-weighted decibels
EFSC	Energy Facility Siting Council
I-5	Interstate 5
OAR	Oregon Administrative Rules
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OPRD	Oregon Parks and Recreation Department
OR-99	Oregon Highway 99
OR-234	Oregon Highway 234
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects

1.0 Introduction

The Energy Facility Siting Council (EFSC; Council) previously approved the Eugene-Medford 500 kV Transmission Line Project (EFSC 1990) and found that PacifiCorp dba Pacific Power (PacifiCorp) addressed the requirements for recreational opportunities. In this Request for Amendment No. 4, PacifiCorp seeks to expand the EFSC-certificated facility boundary to include the Grants Pass-Sams Valley Transmission Line and the Sams Valley Substation for the Sams Valley Reinforcement Projects (Project). The analysis in this exhibit focuses on the Project described in the *Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line*.

Exhibit T contains information pertaining to potential adverse impacts of construction and operation of the Project on important recreational opportunities, as required to meet the submittal requirements in OAR 345-021-0010(t) paragraphs (A) through (E). This exhibit demonstrates that the Project can comply with the approval requirements found in OAR 345-022-0100:

(1) Except for facilities described in section (2), to issue a site certificate, the Council must find that the design, construction and operation of a facility, taking into account mitigation, are not likely to result in a significant adverse impact to important recreational opportunities in the analysis area as described in the project order. The Council shall consider the following factors in judging the importance of a recreational opportunity:

- (a) Any special designation or management of the location;*
- (b) The degree of demand;*
- (c) Outstanding or unusual qualities;*
- (d) Availability or rareness; and*
- (e) Irreplaceability or irretrievability of the opportunity.*

(2) The Council may issue a site certificate for a special criteria facility under OAR 345-015-0310 without making the findings described in section (1). However, the Council may apply the requirements of section (1) to impose conditions on a site certificate issued for such a facility.

The “special criteria facility” mentioned in section 2 refers to certain natural gas-fired energy generating facilities, and does not apply to the Project.

2.0 Analysis Area – OAR 345-021-0010(1)(t)(A)

OAR 345-001-0010(59)(d) defines the Analysis Area for recreational resources as the area within and extending 5 miles from the Site Boundary. The Recreational Analysis Area is shown on Figure T-1.

3.0 Recreational Opportunities in the Analysis Area

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:

(A) A description of the recreational opportunities in the analysis area that includes information on the factors listed in OAR 345-022-0100(1) as a basis for identifying important recreational opportunities.

3.1 Inventory Methods

Recreational opportunities within the Analysis Area were identified through collection and review of existing information available from desktop research sources, including the following types of sources:

- Geographic Information System files documenting recreational resources obtained from key recreation provider agencies, including the Bureau of Land Management (BLM; BLM 2017), Oregon Parks and Recreation Department (OPRD; OPRD 2017a), and Oregon Department of Fish and Wildlife (ODFW; ODFW 2016).
- Comprehensive plans, park and recreation plans, and individual park master plans prepared by OPRD and by counties and municipal governments within the Analysis Area (BLM 2016a, OPRD 2017a, City of Central Point 2017, City of Grants Pass 2010).
- Internet sites maintained by recreation provider agencies, including OPRD and county and city park departments (Jackson County GIS Services 2017a, Jackson County GIS Services 2017b, OPRD 2017a).
- Internet sites maintained by various commercial entities, including sites providing general recreation and tourism information and sites applicable to specific private-sector recreational opportunities (MTB Project 2017, ORBIC 2015).

3.2 General Resource Descriptions

Recreational opportunities occurring in the vicinity of the Project include hiking, fishing, hunting, mountain biking, bicycling, boating, wildlife viewing, camping, picnicking and sightseeing. These activities may occur in numerous locations both inside and outside the Analysis Area. The Analysis Area includes both urbanized and developed areas (e.g., Grants Pass, Central Point, Gold Hill, Rogue River, and White City), as well as more natural areas along the Rogue River and elsewhere outside the cities. City parks and recreational opportunities are typically developed with facilities such as playgrounds and sports courts that primarily serve the residents of the city. The recreational opportunities outside the cities are primarily focused on providing access to the Rogue River and unique natural areas such as Table Rocks, volcanic “islands,” and vernal pools and savannas south of the river. On the whole, there are numerous recreational opportunities in the Analysis Area both

for passive recreation, such as bird watching, and active recreation, such as biking. Attachment T-1 provides information regarding 24 recreational opportunities identified within the Analysis Area, including a summary of each opportunity and an assessment of its importance. Section 4.1 provides a more detailed assessment of recreational opportunities' importance as considered in the context of this application.

3.3 Importance Criteria

Recreational opportunities identified within the Analysis Area were evaluated for "importance" based on the criteria outlined in OAR 345-022-0100. A recreational opportunity may be determined to be important based on assessment of available information specific to each criterion, and a qualitative balancing of the attributes for all five criteria for a given resource. Specific considerations used to characterize the importance of a recreational opportunity relative to the five criteria outlined in OAR 345-022-0100 are summarized as follows:

- 1. Any special designation or management of the location;*

There are distinct, identifiable differences among the types of special management designations that apply to lands within the Analysis Area, and their associated implications for resource protection. Wilderness designation, for example, results in management direction to preserve the resource values of the designated area, and represents a high level of protection. Other types of designations allow much more latitude in undertaking management activities, and involve a lower degree of resource protection. The source of the special designation is also a relevant consideration; a designation established through an act of Congress clearly carries more weight than an administrative designation applied by a resource management agency.

- 2. The degree of demand;*

Qualitative ratings of High, Moderate, and Low were used as proxy measures for the level of demand for a specific recreational opportunity.

- 3. Outstanding or unusual qualities;*

Identification of characteristics that might be considered outstanding or unusual for a given opportunity is a highly subjective task, as there is a wide variation in the values, tastes, and perceptions among the recreational public. The standard does not specify what qualities would define an opportunity as "outstanding" or "unusual," or indicate how those characteristics could be measured. Some sites or areas have attributes that qualify them as "unique" (i.e., one of a kind), while others have qualities that are not unique, but intuitively set them apart from other opportunities and could be considered outstanding or unusual.

- 4. Availability or rareness; and*

Qualitative ratings of Rare, Uncommon, and Common were used to address the criterion based on the apparent rareness of an opportunity. Consideration of this rareness attribute was based on the approximate set of comparable opportunities (and the geographic scale appropriate to each type of opportunity) available within the region surrounding the Project.

5. *Irreplaceability or irretrievability of the opportunity.*

Ratings of Irreplaceable, Somewhat Irreplaceable, and Replaceable were used to address the criterion based on the ability to replace an opportunity. In general, opportunities based on inherent natural resource characteristics that could not feasibly be recreated in the same place or at another reasonably nearby location were considered Irreplaceable. By contrast, most opportunities that are based on constructed recreational facilities or infrastructure (such as typical campgrounds) could feasibly be replaced and were considered Replaceable.

The assessment of the overall importance for each identified recreational opportunity occurred on a case-by-case basis. Attachment T-1 provides a summary of each identified recreational opportunity in the Analysis Area, describes the characteristics of the opportunity relative to the importance criteria, and indicates which opportunities are considered important for the purposes of this exhibit. A description of each recreational opportunity appears in the following section.

3.4 Importance Assessment Summary

Based on the importance criteria described above and summarized in Attachment T-1, 11 of the identified recreational resources are considered to be important for the purposes of this exhibit. The determination that a specific resource was considered not to be important typically reflects lack of a special designation, relatively limited use or capacity, resource qualities that are not outstanding or unusual, a type of opportunity that is relatively common within the surrounding area, or the ability to replace the opportunity. Further explanation of the importance determinations is provided below.

3.4.1 Identified Recreational Opportunities That Do Not Meet the Criteria of Important

3.4.1.1 Federal

Three federal resources were not considered to meet the criteria of important: the Mountain of the Rogue Trail System, Cathedral Hills Trail System, and Gold Nugget Waysides. Although these BLM-administered resources all have a Special Recreation Management Area designation, they provide recreational opportunities that are not unique or rare for the natural settings in the region, and could be replicated at a different site. The primary recreational attraction of the Mountain of the Rogue and Cathedral Hills opportunities consists of trails for biking and hiking, for which there are a number of other opportunities for in the area. Although the Gold Nugget Waysides provide opportunities for recreational gold mining and access to the Rogue River for other recreation, there are other sites for recreational mining besides Gold Nugget Waysides, and sites to access to the Rogue River for recreation are plentiful. For example, on an ODFW web page that identifies “50 Places to Go Fishing within 60 Minutes of Medford,” most of the sites listed are along the Rogue River (ODFW 2017). For these reasons, these three federal resources were determined to not be important for the purpose of this application.

3.4.1.2 State

One state recreational opportunity does not meet the criteria of important: Coyote Evans Wayside. This park provides access to the Rogue River for recreational fishing, rafting, and wildlife viewing opportunities. However, as noted above, there are numerous federal, state, and local recreational sites that provide access to the Rogue River; the Coyote Evans site is a common opportunity and does not have outstanding or unusual qualities that set it apart. In addition, the site does not have a special designation, appears to have moderate demand, and is considered replaceable. Therefore, this recreational opportunity was determined to not be important for the purpose of this application.

3.4.1.3 Local

Attachment T-1 includes information about 11 identified recreational opportunities provided by county or municipal governments. (The cities of Grants Pass and Central Point both provide an abundance of parks and other recreational opportunities; these resources were reviewed individually for importance, but for convenience are addressed collectively in Attachment T-1.) Local government recreational opportunities tend to be smaller-scale urban parks with an emphasis on day-use activities, and they typically serve more localized user populations. Generally, these parks are similar to other small parks in other towns and cities in the region, and provide recreational opportunities that are common and replicated elsewhere. All recreational opportunities in the cities, and all but three county resources, were determined to not be important for the purpose of this exhibit.

3.4.1.4 Non-governmental Organizations and Private Sector

Attachment T-1 includes information about three identified recreational opportunities provided by non-governmental organizations (NGOs) and two opportunities provided by private parties. All three NGO opportunities were considered to meet the importance criteria. The two private sector opportunities are both commercial campgrounds, one of which is located on the Rogue River. These opportunities are replaceable, are not rare, and are considered to have moderate demand because they appeal to a specific segment of the camping population. Therefore, the private sector opportunities were considered to not meet the importance criteria.

3.4.2 Identified Recreational Opportunities That Do Meet the Criteria of Important

3.4.2.1 Federal

Table Rocks Area of Critical Environmental Concern

The Table Rocks (Upper and Lower) are rare, remnant volcanic ‘islands’ that are prominent physiographic features in the center of the Rogue Valley. The BLM has designated federal lands on both mesas as the Table Rocks Area of Critical Environmental Concern (ACEC). The ACEC

designation applies to approximately three quarters of Upper Table Rock, and less than one quarter of Lower Table Rock. The Nature Conservancy owns most of the remainder of the Table Rocks, and manages them as a natural area preserve (see discussion below) in collaboration with the BLM. BLM management direction is to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural systems or processes. Management activities include surveying and monitoring rare plant populations, non-native species, bats, butterflies, and birds; evaluating altered fire cycles; and supporting recreational and cultural uses (The Nature Conservancy & BLM, 2013). There is a trail up to the plateau at the top of each Table Rock and parking is provided at the trailheads, both of which are located on BLM-administered parcels. Recreational opportunities at the Table Rocks include wildlife and wildflower viewing and interpretation, as well as hiking. Combined use of Upper Table Rocks and Lower Table Rocks, including BLM and The Nature Conservancy lands, was estimated at 45,000 visitors in 2010 (The Nature Conservancy & BLM 2013). Table Rocks ACEC is considered an important recreation resource because of its designation status, high level of use, rareness, outstanding natural and scenic attributes, and irreplaceable character.

3.4.2.2 State

Tou Velle State Recreation Site

This day-use park is located on the north and south banks of the Rogue River near the geologically prominent Table Rocks. The park provides opportunities to picnic, fish, launch boats, swim, hike, and watch wildlife (OPRD 2017b). The park is adjacent to the Denman Wildlife Area. The park has a large picnic shelter with cooking facilities, and additional picnic sites with water and electricity, making it suitable for family gatherings and group picnics. Although there are plenty of access points to the Rogue River in the vicinity, Tou Velle State Recreation Site is considered an important recreation opportunity because it provides more diverse recreational facilities than do many other sites in the area (e.g., there is a boat ramp in addition to picnic and toilet facilities, and rainbow trout are stocked by ODFW in this location), and because of its location adjacent to Table Rocks and Denman Wildlife Area.

Denman Wildlife Area

The Ken Denman Wildlife Area was established in 1954, when the United States General Services Administration conveyed 1,760 acres of land to the Oregon Game Commission by means of a restrictive deed, specifying that the land be used for the purpose of wildlife conservation. Additional land acquisitions since that time have increased the size of the area to 1,858 acres (ODFW 2006). The wildlife area is managed to protect, enhance, and restore all fish and wildlife species and their habitats located within the wildlife area, and to provide a wide variety of wildlife-oriented recreational and educational opportunities to the public, including hunting and fishing. Use of the wildlife area has been estimated at 31,300 visitor use days annually (ODFW 2006).

As explained in Attachment T-1, Denman Wildlife Area is an important recreation opportunity because it includes varied habitat types, such as vernal pools and oak savannas, experiences

relatively high demand, and provides hunting, fishing and other wildlife-oriented opportunities that are readily accessible to an urban population.

Valley of the Rogue State Park

Valley of the Rogue State Park is a long, narrow park property with 3 miles of shoreline frontage along the north bank of the Rogue River. Day-use facilities include a boat ramp, river access sites, restrooms, group picnic area, vending machines, a wildlife viewing platform on the river, a disc golf course, a volleyball court, and horseshoe pits. Overnight facilities include 162 campsites (95 sites with full utility hookups, 53 sites with electrical hookups, and 14 tent sites), eight yurts, a three-site group camping area, restrooms with flush toilets and showers, laundry facilities, and an RV dump station (OPRD 2017c). There is an easy, self-guided, interpretive 1.25-mile walking trail along the river's edge (OPRD 2017c). In addition, a 3.5-mile segment of the paved Rogue River Greenway Trail transects the park and provides connections to other existing or planned segments of the Rogue River Greenway Trail.

There are numerous recreation sites along the Rogue River, most of which provide day-use access. Valley of the Rogue State Park exhibits a high level of recreational facility development and provides camping along the Rogue River, in addition to several types of day-use facilities. The campground has a large capacity that is indicative of high demand, and the park has outstanding or unusual qualities that include high accessibility, a long segment of the Rogue River Greenway Trail, and an interpretive trail along the river. Annual visitation was reported as 103,000 for overnight use and 1.8 million for day use (OPRD 2017d). Based on these attributes, the Valley of the Rogue State Park is considered an important recreational opportunity for the purpose of this application.

3.4.2.3 Non-Governmental Organizations

Bear Creek Greenway Trail

The Bear Creek Greenway Trail is a 20-mile corridor in the Bear Creek valley that links the cities of Ashland, Talent, Phoenix, Medford and Central Point. The central feature of the greenway is a paved, multi-use trail that currently extends more than 18 miles, with one segment of the trail in Central Point remaining to be constructed. The trail parallels Interstate 5 (I-5), Oregon Highway (OR-99), and Bear Creek, providing Rogue Valley residents and visitors links to a number of parks and spots for bird watching and wildlife viewing, as well as exercise and general recreation. Long-term plans include developing extensions north to the Rogue River Greenway Trail and beyond Ashland to Emigrant Lake. The lead proponent for the Bear Creek Greenway Trail is the Bear Creek Greenway Foundation, a non-profit organization based in Medford (Bear Creek Greenway Foundation 2017). Jackson County Parks and the cities along the route have cooperated in development of the trail. Similar to the Rogue River Greenway Trail, the Bear Creek Greenway Trail is considered an important recreational opportunity because of its location along Bear Creek, high regional visibility, and ability to provide multimodal connections for residents of the valley communities.

Table Rocks Significant Natural Heritage Area

In 1979, The Nature Conservancy bought and set aside 751 acres of land on Lower Table Rock as Lower Table Rock Preserve, with the intent of protecting its ecological diversity. Over the next 30 years, The Nature Conservancy acquired a total of 1,911 acres, including a 795-acre perpetual conservation easement purchased in 1980. The easement provides a buffer for the important natural features on the top of Lower Table Rock, provides scenic and biologic continuity between Lower Table Rock and the Rogue River, and protects the area from potential subdivision or development. In 1997, The Nature Conservancy transferred 37 acres to BLM to serve as a trailhead on Lower Table Rock (also see Table Rocks ACEC). In 2009, the Conservancy acquired an additional 1,710 acres provided by the Oregon Watershed Enhancement Board (OWEB), U.S. Fish and Wildlife Service, the Doris Duke Charitable Foundation and a donation in memory of Harriet Gardener. With this final acquisition, the entire summits and most of the flanks of the Table Rocks are now owned either by the Conservancy or the BLM (The Nature Conservancy & BLM 2013).

Rogue River Greenway Trail

The Rogue River Greenway Trail is envisioned as a 30-mile long linear corridor connecting public parks and access sites along the Rogue River between Grants Pass and Central Point. The lead proponent for the Greenway is the Rogue River Greenway Foundation, a non-profit organization based in the community of Rogue River (Rogue River Greenway Foundation 2017). The Rogue River Greenway Trail is being developed under the guidance of a core team comprised of representatives of the Rogue River Greenway Foundation, the Rogue Valley Council of Governments, OPRD, and the Jackson County Roads and Jackson County Parks Departments. Josephine County, the municipalities along the corridor, and the Oregon Department of Transportation are also collaborating in the development of the resource. The key component of the greenway concept is the Rogue River Greenway Trail, a paved, multi-use trail to be developed along the entire length of the corridor that will eventually connect to the 20-mile Bear Creek Greenway Trail. As explained in Attachment T-1, the Rogue River Greenway Trail is considered an important recreation opportunity because of its location along the Rogue River, high regional visibility, and ability to provide multimodal connections between multiple communities and recreation sites.

4.0 Impact Assessment

The potential effects to important recreational opportunities in the Analysis Area were studied to determine whether the Project's design, construction, and operation, when taking into account mitigation, would be likely to result in any significant adverse impacts. The following sections summarize the types of potential adverse impacts evaluated and provide summaries of the analysis.

(B) A description of any significant potential adverse impacts to the important opportunities identified in (A) including, but not limited to:

4.1 Direct or Indirect Loss of Recreational Opportunities – OAR 345-021-0010(1)(t)(B)(i)

(i) Direct or indirect loss of a recreational opportunity as a result of facility construction or operation.

Most of the important recreation opportunities are not in close proximity to the Project, as shown on Figure T-1. However, the proposed Project right-of-way crosses portions of the Table Rocks ACEC and Lower Table Rock SNHA along the east side of Lower Table Rock. Although the Project will be constructed inside the boundaries of these resources, the new transmission line structures will replace existing transmission line poles in generally the same locations. New rights-of-way would only be acquired to meet required transmission line right-of-way width standards; use of the land within the right-of-way would stay the same as the existing use. In addition, the Project will not impact access to the Lower Table Rock parking area and trailhead, so access to the protected area would not be hindered. Therefore, there will be no permanent or direct loss of a recreational opportunity as a result of Project construction or operation.

An indirect loss of opportunity could occur if 1) a recreational opportunity near the Project would not be physically disturbed by construction activity, but might need to be temporarily closed to public use in response to safety concerns; or 2) if development of the Project were to so alter the environment of a recreational opportunity through indirect effects that it substantially, adversely impacted the quality of the recreational experience at that site.

Most of the public access points for the important recreational opportunities in the Analysis Area are located farther than 0.5 miles from the Site Boundary; therefore, indirect loss of opportunity for safety concerns is unlikely to occur. The indirect effects of the Project, including traffic, noise, and visual impacts, are similarly unlikely to impact any important recreation resource such that the resource would be considered lost or substantially impaired. Indirect effects are described further below.

4.2 Facility Noise – OAR 345-021-0010(1)(t)(B)(ii)

(ii) Noise resulting from facility construction or operation.

Exhibit X provides an assessment of the existing acoustical environment and anticipated Project sound levels. Exhibit X describes sound level thresholds derived from the Oregon Department of Environmental Quality (ODEQ) noise regulations (OAR 340-035-0035), which are used to assess the significance of impacts to noise sensitive properties. As defined in OAR 340-035-0035, “noise sensitive properties” are “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 above criteria in more than an incidental manner.” With the exceptions of camping in Valley of the Rogue State Park, which is several miles from the Site Boundary, none of the important recreation opportunities are considered to be noise sensitive properties.

The Oregon State Noise Control Regulations specifically exempt noise emanating from construction activities from compliance with the state noise regulations under OAR 340-035-0035(5)(g). However, as described in Exhibit X, projected noise levels resulting from Project construction and operation will be minimal and meet requirements contained in ODEQ rules. Most of the important recreational opportunities are more than 2 miles from the facility. In addition, most of the proposed disturbance area is already maintained for utility use, including vegetation management; this condition will minimize the amount of site preparation needed for the Project, and thus construction noise. Although potentially audible in the Table Rocks SNHA and the Table Rocks ACEC, and Tou Velle State Park, the construction noise level is not such that it will impact or deter use of recreational opportunities, and the noise would largely be similar to maintenance and operations noise along the existing transmission line. In short, construction noise would be short-term, intermittent, transient noise as construction activities progress along the right-of-way and at the substation, and would not negatively affect the recreational opportunities at Table Rocks ACEC, Table Rocks SNHA and the Rogue-Umpqua National Scenic Byway.

Audible noise levels are dependent upon the configuration of the transmission line and there are three different configurations being analyzed as part of the Project; the existing 230 kV single circuit line, the proposed 230/115 kV double circuit line, and a section of the transmission line where the 230 kV single circuit and 230/115 kV double circuit transmission lines are adjacent to one another. In Exhibit X, Figure X-1 displays the audible noise modeling results for the 230/115 kV double circuit line in both fair and foul weather conditions. Audible noise levels are given in terms of the L_{50} metric, which corresponds to metric cited in the applicable ODEQ noise regulations. The transmission line is in the center of a 135 right-of-way. The plot shows that during foul weather conditions, when more corona is generated, received sound levels attenuate to approximately 40 to 41 dBA at the edge of the right-of-way for the new, double circuit 230/115 kV Grants Pass-Sams Valley Transmission Line. The overall voltage and capacity of the reconductoring will not change, therefore it is expected that operational sound levels will either remain the same or decrease with the use of newer conductors. Because the areas that are used for recreation are at least 0.5 miles from the transmission line, there will be no significant potential adverse impact from the new, double circuit 230/115 kV transmission line.

The Project has a design goal threshold of 10 dBA above the background level to represent the point where the audibility of Project noise might be characterized as an adverse noise impact per the OAR 340-035-0035 (1)(b)(B)(i). As the Project progresses, the acoustic modeling analysis and compliance assessment will be refined to incorporate ambient sound data collected in the vicinity of the Sams Valley Substation as well as any further design and/or mitigation changes, if necessary. Final design of the Sams Valley Substation will be specified to comply with all applicable ODEQ noise regulations; OAR Chapter 340, Division 35. In general, because of the distance from the substation to areas that provide allowed public recreational access, operation noise from the substation taking into account mitigation, if necessary, would not negatively affect the recreation values for which the Table Rocks ACEC and Table Rocks SNHA were originally designated. The same conclusion applies to other recreation areas within the Analysis Area, due to their distance from the facility.

4.3 Traffic – OAR 345-021-0010(1)(t)(B)(iii)

(iii) Increased traffic resulting from facility construction or operation.

As noted in Exhibit U, Interstate-5 (I-5), Oregon Highway 99 (OR-99), Oregon Highway-234 (OR-234), Table Rock Road, and Kirtland Road would be used to transport most of the equipment and materials for Project construction. Most of the existing access roads originate from I-5 and OR-234. Between the East Grants Pass Interchange (U.S. Highway 199) and the city of Gold Hill, the annual average daily traffic (ADT) on I-5 is 32,320 vehicles (ODOT 2015). Between the Rogue River Highway-Rock Point Interchange and the end of the Project near Sams Valley Road, the annual ADT volume on OR-234 is approximately 2,786 vehicles (ODOT 2015).

Jackson County recently completed its updated Transportation System Plan (TSP) in March 2017. The TSP does not include information regarding current transportation uses or volumes (Jackson County and Kittleson and Associates 2017). However, Figure 12B in the TSP identifies OR-234 as a Rural Arterial, Table Rock Road as a Rural Major Collector from OR-234 to Modoc Road and as a Rural Arterial south from Modoc Road and Kirtland Road as an Urban Major Arterial. Table 6 in the TSP provides Planned Average Daily Traffic Ranges. The planned ADT for Rural Major Collectors is 4,500-15,000, and greater than 5,000 for Rural Arterials and greater than 15,000 for Urban Arterials. Table 6 in the TSP also defines the traffic function as the road types as:

Arterial - Primary function is to serve both local and through traffic as it enters and leaves urban areas; serves major traffic movements; access control may be provided through medians and/or channelization; restricted on-street parking; pedestrian and bicycle facilities provided; will be used by public transit in urban areas. Carries high volumes of freight traffic that have both local and external destinations.

Major Collector - Primary function is to serve traffic between neighborhoods and community facilities; provides some degree of access to adjacent properties, while maintaining circulation and mobility for all users; carries lower traffic volumes at slower speeds than arterials; typically has two or three lanes; pedestrian and bicycle facilities provided; may be used by public transit in urban areas. Some freight traffic is destined for local delivery or local markets (Jackson County and Kittleson and Associates 2017).

The only important recreational opportunities that may experience traffic impacts are the Table Rocks ACEC, Table Rocks SNHA, the Tou Velle State Recreation Site, and the Bear Creek Tract of the Denman Wildlife Area. Visitors traveling to all three areas could experience minor delays as a result of congestion created by construction-related traffic volumes, slow-moving construction vehicles and potential lane closures. Construction-related traffic would represent a small volume compared to the existing average daily traffic (ADT) levels for these routes; however, and timing patterns for construction-related traffic and recreational traffic to the recreational opportunities would likely differ substantially. If lanes closures area necessary, they would involve short-term events happening intermittently during the construction period. Visitors would still be able to access the Table Rocks, and no visitors would experience major delays in accessing the site. Therefore, any congestion-based or lane closure traffic impacts would consist of minor delays for individual

visitors that would occur intermittently during the period of construction activity. Based on any traffic impacts for visitors to nearby recreational opportunities would have at most a minor effect on their experience, and would not be significant.

After construction, there may be a small amount of additional traffic as a result of the Sams Valley Substation and other increased operation and maintenance needs, though the increase would be negligible in relation to existing operations and maintenance volumes. The Project-related traffic would represent a small increase in daily traffic compared to the ADT volumes for roads in the area that are used to access the recreational activities, most specifically OR-234. Therefore, traffic impacts would not constitute a significant impact as defined by OAR 345-001-0010(53), because the magnitude and intensity of impacts will not have an important consequence that precludes use or enjoyment of the important recreational opportunities.

4.4 Visual – – OAR 345-021-0010(1)(t)(B)(iv)

(iv) Visual impacts of facility structures or plumes.

Exhibit R provides an assessment of the anticipated Project impacts on identified scenic resources. Exhibit L includes information addressing the anticipated Project impacts on protected areas. Because there is considerable overlap among scenic resources, protected areas and important recreation resources, the applicable content from Exhibits R and L directly or indirectly addresses the potential visual impacts of the Project on important recreation resources.

The design, construction and operation of the facility are not expected to result in significant adverse effects to important recreational opportunities as a result of the visual effects of the Project. The basis for this conclusion is summarized below for the respective recreation resources discussed in Section 4.4.2.

- Table Rocks ACEC and SNHA. The Project facilities would potentially be visible to some visitors to the ACEC and SNHA lands at Lower Table Rock and Upper Table Rock. Based on the limited extent of possible views of the Project features, the small user population that might experience such views, and the limited degree of visual contrast, the visual impact of the Project for visitors to Lower or Upper Table Rock will not be significant (see Exhibit R, Sections 5.1.3, 5.1.8 and 5.6.2). Therefore, EFSC can find that the Project would not have a significant adverse visual effect on these important recreation resources.
- Tou Velle State Recreation Site. Visitors at Tou Velle will likely be able to see transmission facilities in portions of the Sams Valley–Whetstone Reconductoring segment between Sams Valley Substation and Whetstone Substation. Viewers at this site would not notice a visible change resulting from that Project component. Views northwest toward the Sams Valley Substation are screened by vegetation along the Rogue River or blocked by Lower Table Rock. Therefore, EFSC can find that the Project would not have a significant adverse visual effect on this important recreation resource.
- Denman Wildlife Area. Visitors at any of the three Denman parcels may be able to see transmission facilities in portions of the Sams Valley–Whetstone Reconductoring segment

between Sams Valley Substation and Whetstone Substation, although those views are likely to be screened by vegetation along the Rogue River. Viewers at these sites would not notice a visible change resulting from that Project component. Views north or northwest from the Denman parcels toward the Sams Valley Substation are screened by vegetation along the Rogue River or blocked by Lower or Upper Table Rock (see Exhibit L, Section 4.4). Therefore, EFSC can find that the Project would not have a significant adverse visual effect on this important recreation resource.

- Valley of the Rogue State Park. Viewshed analysis results reported in Exhibit R for the I-5 alignment indicate that visitors in some locations within the Valley of the Rogue State Park may have views of Project 230/115 kV transmission facilities. Project features may be visible in some locations, at a distance of approximately 3 miles, and will likely be screened from view by vegetation or structures in other locations. Because the new Project structures will be similar to the existing transmission lines and consistent with the existing character of the landscape in this area, the visual changes associated with the Project are expected to be unnoticeable to most viewer groups (BLM 2016b). Therefore, EFSC can find that the Project will have limited visual effect on state park visitors, and minimal adverse impact on this important recreation resource.
- Bear Creek Greenway Trail. As reported in Exhibit R (Section 5.1.1), it is extremely unlikely that any viewers on the Greenway would actually be able to see or notice any Project structures. Therefore, EFSC can find that the Project would have no visibility from the Greenway, and no adverse visual effect on this important recreation resource.
- Rogue River Greenway Trail. As noted above, Project features may be visible in some Greenway locations within Valley of the Rogue State Park, at a distance of approximately 3 miles, and will likely be screened from view by vegetation or structures in other locations. Viewshed analysis results reported in Exhibit R for the I-5 alignment indicate that visitors the Project facilities might be visible in the foreground along about 6 continuous miles of planned Greenway Trail segments parallel to I-5 west of the City of Rogue River. Because the new Project structures will be similar to the existing transmission lines and consistent with the existing character of the landscape in this area, the visual changes associated with the Project are expected to be unnoticeable to most viewer groups (BLM 2016b). Therefore, EFSC can find that the Project will have limited visual effect on future Greenway users, and minimal adverse impact on this important recreation resource.

5.0 Minimization and Mitigation Measures

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

No significant adverse impacts on important recreational opportunities will result from Project design, construction, and operation. Therefore, no measures are proposed to avoid, reduce, or otherwise mitigate Project impacts.

6.0 Important Recreation Opportunities Map

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

Figure T-1 shows the Analysis Area for recreational opportunities and the recreational opportunities identified as important pursuant to OAR 345-021-0010(1)(t)(A).

7.0 Monitoring Program

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

Because there will be no significant impacts to important recreational opportunities, no monitoring program is proposed.

8.0 References

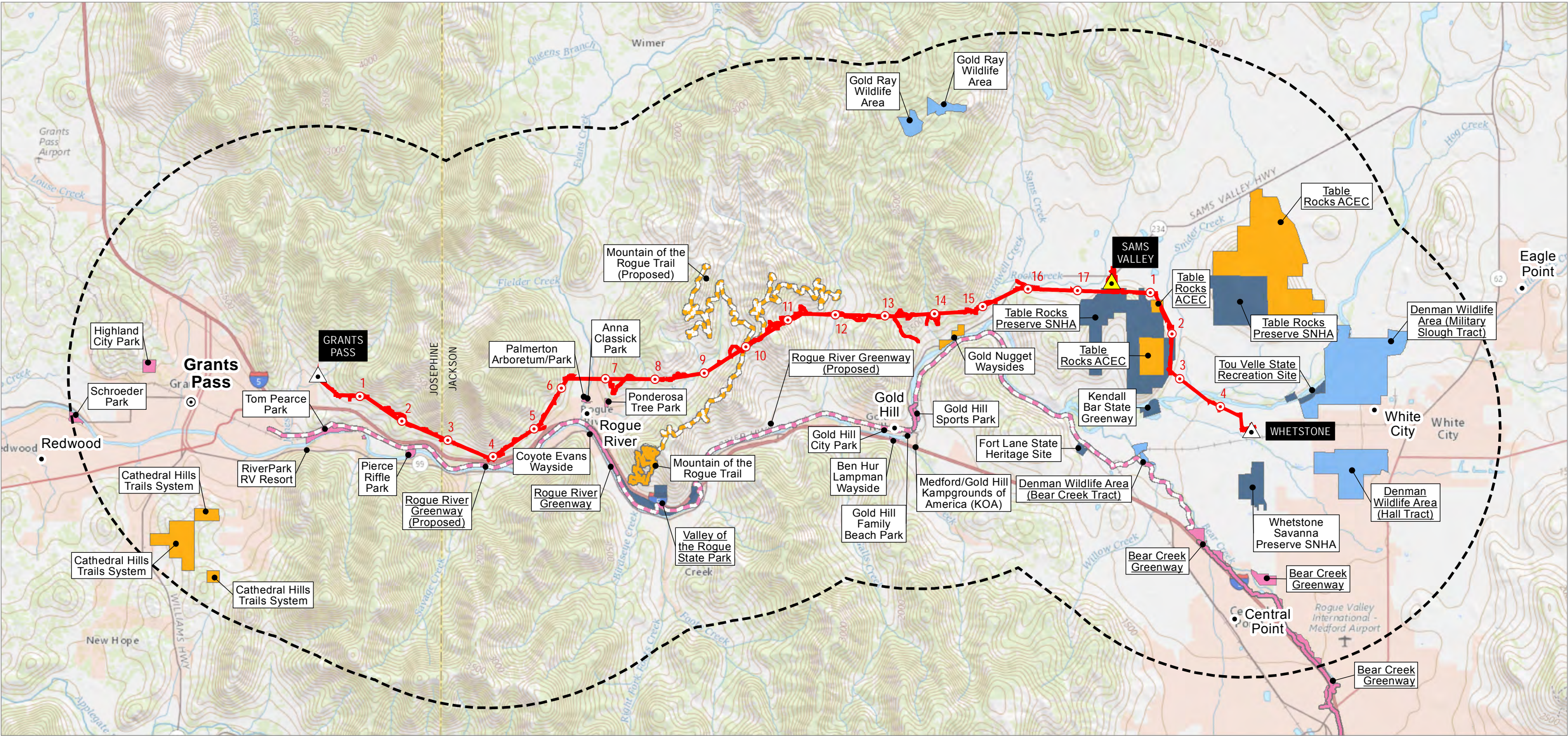
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Figures

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Source(s): BLM, Esri, Jackson County, ODFW, ODOT, OPRD, PacifiCorp

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

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- Inventoried Recreation Opportunities**
- Analysis Area (5-mile buffer of Site Boundary)
 - Important Recreation Area
 - Other Inventoried Recreation Area
- Recreation Areas**
- Bureau of Land Management
 - Local or Other
 - Oregon Department of Fish and Wildlife
 - Oregon Parks and Recreation
- Trails**
- Existing
 - Proposed
- Project Features**
- Site Boundary
 - Mile Marker
- Substations**
- Proposed
 - Existing

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Attachment T-1.
Inventory of Recreational Opportunities
in the Analysis Area

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Inventory of Recreational Opportunities in the Analysis Area

Recreational Opportunity	Responsible Entity	Distance from Site Boundary (miles)	Description	Importance Factors					Important Recreation Resource?
				Special Designation	Demand	Outstanding or Unusual Qualities	Rareness	Replaceability	
Federal									
Table Rocks Area of Critical Environmental Concern (ACEC)	U.S. Bureau of Land Management (BLM)	Crossed	Table Rocks are rare remnant volcanic "islands" standing alone in the center of the Rogue Valley, which have important natural systems or processes—specifically vernal pools, ecology, a rare plant (<i>Limnanthes floccosa</i> ssp. <i>pumila</i>), and geology. The BLM-designated ACEC includes parts of Upper and Lower Table Rocks, with 2,105 acres. The BLM and The Nature Conservancy collaboratively manage the Table Rocks properties, which total approximately 4,864 acres. The ACEC is managed for natural, scenic, and cultural values. There are trailheads with parking up to the top plateaus for scenic vistas and sightseeing, including wildflower observation/study and bird watching.	ACEC	Moderate/High; combined use of the Table Rocks ACEC was estimated at 45,000 visitors in 2010 (The Nature Conservancy & BLM 2013). Demand is higher for Upper Table Rock because the trail to the top is shorter and not as steep.	The upper 180 feet of the Table Rock mesas are capped with an andesite lava flow which accounts for its unique ecology. The Table Rocks are visually prominent and have been local landmarks since the valley's settlement. Native Americans used the rocks for refuge and ceremonies.	Rare.	Irreplaceable.	Yes
Mountain of the Rogue Trail System	BLM	Crossed	Mountain of the Rogue is a mountain biking single track loop trail system approximately 7 miles long. The trail system is located within a BLM special recreation management area (SRMA) of 5,069 acres (BLM 2016).	Special Recreation Management Area (SRMA)	Moderate	The Mountain of the Rogue Trail System provides a range of trail opportunities that are optimized for mountain bikes. BLM identifies it as one of the top 20 MTB trail opportunities on BLM nationwide (BLM, 2017).	Common; there are other mountain bike trails near Grants Pass and surrounding communities.	Replaceable.	No
Cathedral Hills Trail System	BLM	3.3	The Cathedral Hills Trail System is located just outside the City of Grants Pass and provides opportunities for hiking, mountain biking, and horseback riding enthusiasts. The trail system is located within an SRMA of 546 acres, which overlaps with a 400-acre Josephine County park designation that includes many loop trails and natural areas (BLM 2016).	SRMA/County Park	Moderate	The park provides hiking and mountain biking close in a forested setting to an urban area.	Common; there are other trail systems near Grants Pass and surrounding communities.	Replaceable	No
Gold Nugget Waysides	BLM	0.2	The wayside on the Rogue River northeast of Gold Hill includes a short river trail and accessible recreational gold mining site, within an SRMA of 49 acres (BLM 2016).	Special Recreation Management Area	Low/Moderate	The wayside provides river access for fishing and the opportunity to mine for gold.	Common; there are many Rogue River access sites.	Replaceable.	No
State									
Tou Velle State Recreation Site	Oregon Parks and Recreation Department (OPRD)	0.8	The approximately 57-acre day-use park provides opportunities to picnic, fish, launch boats, swim, hike, and watch wildlife (OPRD 2017a).	State Park	Moderate	The park provides access to the Rogue River; it is near the Table Rocks and adjacent to the Denman Wildlife Area.	Common; there are many Rogue River access sites.	Somewhat Irreplaceable	Yes

Inventory of Recreational Opportunities in the Analysis Area

Recreational Opportunity	Responsible Entity	Distance from Site Boundary (miles)	Description	Importance Factors					Important Recreation Resource?
				Special Designation	Demand	Outstanding or Unusual Qualities	Rareness	Replaceability	
Denman Wildlife Area (Military Slough, Bear Creek and Hall Tracts)	Oregon Department of Fish and Wildlife (ODFW)	3.2	The Ken Denman Wildlife Area was established in 1954 when 1,760 acres were conveyed to the Oregon Game Commission from the United States General Services Administration by means of a restrictive deed specifying that the land be used for the purpose of wildlife conservation. Additional land acquisitions since that time have increased the size of the area to 1,858 acres. (ODFW 2006).	State Wildlife Area	Moderate/High; use of the wildlife area has been estimated at 31,300 visitor use days annually (ODFW 2006).	The wildlife area is along the Rogue River and has nine habitat types including vernal pools and riparian while the smallest are oak woodland and freshwater aquatic/large pool.	Uncommon; 9 different habitat types including vernal pools are present, and the area provides hunting and fishing opportunities close to urban areas.	Somewhat Irreplaceable.	Yes
Valley of the Rogue State Park	OPRD	0.8	Highly developed recreation site with extensive overnight and day-use facilities, including a large campground with river access, boat ramp and ADA-accessible restroom and trails.	State Park	Very High; annual use reported as 103,000 for overnight use and 1.8 million for day use (OPRD 2017c)	Provides large camping capacity along the Rogue River. The park includes a 3-mile segment of the Rogue River Greenway trail, with connections to adjacent segments. High accessibility, with location adjacent to I-5.	Uncommon; there are many Rogue River access sites, but relatively few provide camping sites and none have similar capacity.	Replaceable.	Yes
Coyote Evans Wayside/ Fleming Memorial Park	ODFW/CORR	0.9	Day use park with river access, boat ramp and restrooms.	None	Moderate	Provides access to the Rogue River.	Common	Replaceable	No
Local									
City of Grants Pass Parks & Recreation Sites	City of Grants Pass	0.7	The City of Grants Pass Parks and Recreation Division manages 507 park acres at 32 sites. Of these, 24 sites support playgrounds, sports courts, picnic shelters, trails and a variety of other recreation amenities and facilities. The remaining eight sites are well-placed undeveloped park reserves that represent future recreation opportunities for the growing community (City of Grants Pass 2010).	None.	High	Typical urban neighborhood, special use, and community parks.	Common	Replaceable	No
Palmerton Park	City of Rogue River	0.4	Palmerton Park is a 5 acre park with an arboretum that has paved walkways throughout, a duck pond, playground, and picnic area.	None.	Moderate	The park's arboretum includes over 80 species of trees from many remote places in the world and a year-round walking bridge constructed of cable, which spans Evans Creek connecting it to Anna Classick Bicentennial Park (City of Rogue River 2017).	Fairly common; there is an arboretum in Ashland.	Replaceable.	No
Anna Classick Bicentennial Park	City of Rogue River	0.4	This is a day use park, with tennis courts, a handball court, horseshoe pits, half basketball court, picnic and play area, and a restroom. There is also an old log cabin, the oldest house in Rogue River, built by Mr. Robertson following the Civil War, circa 1876 (City of Rogue River 2017).	None.	Moderate	Typical city park, except for log cabin.	Common; one of only 3 City parks in City of Rogue River, but one of many city parks in the Analysis Area.	Replaceable.	No

Inventory of Recreational Opportunities in the Analysis Area

Recreational Opportunity	Responsible Entity	Distance from Site Boundary (miles)	Description	Importance Factors					Important Recreation Resource?
				Special Designation	Demand	Outstanding or Unusual Qualities	Rareness	Replaceability	
Ponderosa Memorial Park	City of Rogue River	0.1	Undeveloped park property.	None	Low	Wooded hillside	Common	Replaceable	No
Ben Hur Lampman Park	City of Gold Hill	2.0	Named in honor of the Editor of <i>The Gold Hill News</i> from 1912 to 1916, Ben Hur Lampman Park is a shady park alongside the scenic Rogue River (City of Gold Hill 2017).	None.	Moderate	City park with Rogue River access.	Common	Replaceable	No
Gold Hill Sports Park	City of Gold Hill	1.3	The Gold Hill Sports Park includes a boat launch, covered picnic area, ADA bathrooms, basketball court, tennis court, and over 3 miles of paved walking/biking paths meandering along the Rogue River (City of Gold Hill 2017).	None.	Moderate	Access for varied recreational opportunities along the river, and provides sports facilities for local community access.	Common	Replaceable.	No.
Gold Hill Family Beach Park	City of Gold Hill	1.8	Rogue River beach area adjacent to the bridge and railroad trestle (City of Gold Hill 2017).	None.	Moderate	River access and beach area.	Common	Replaceable.	No.
City of Central Point Parks	City of Central Point	2.4	The City of Central Point currently has approximately 122 acres of developed and undeveloped park and open space lands distributed among 31 parks, special facilities and open space areas. This system of parks supports a range of active and passive recreation experiences including a skate park and access to approximately 4.9 miles of trails within its parks and along the Bear Creek Greenway (Central Point 2017)	None.	High	Typical urban neighborhood, special use, and community parks.	Common	Replaceable	No
Pierce Riffle Park	Josephine County	0.4	Pierce Riffle Park is a day-use facility located along the Rogue River. The park offers a boat ramp, picnic site, a vault toilet, parking and hiking trails through a natural river wetland (Josephine County 2017).	None.	Moderate	River access for boating and water-oriented use, with trails through wetlands.	Common	Replaceable.	No.
Schroeder Park	Josephine County	4.8	County campground and day-use fee park with river access, picnic areas, beach, boat ramp, and fishing platform (Josephine County 2017).	None.	Moderate	River access, with boat ramp and beach, plus a fishing platform.	Common	Replaceable.	No.
Tom Pearce County Park	Josephine County	0.5	Tom Pearce Park is a day-use park located along the Rogue River, close to Grants Pass, with barbecues, restrooms, an 18-hole disc golf course, hiking/nature trail, picnic areas, and river access (Josephine County 2017).	None	Moderate	Provides access to the River and is the site for some community events throughout the year.	Common	Replaceable	No
Non-Governmental Organizations									

Inventory of Recreational Opportunities in the Analysis Area

Recreational Opportunity	Responsible Entity	Distance from Site Boundary (miles)	Description	Importance Factors					Important Recreation Resource?
				Special Designation	Demand	Outstanding or Unusual Qualities	Rareness	Replaceability	
Bear Creek Greenway Trail	Bear Creek Greenway Foundation	2.1	The Bear Creek Greenway Trail is a 20-mile, paved, multi-use trail that links the cities of Ashland, Talent, Phoenix, Medford and Central Point. The greenway provides a separated route from cars, with only two at-grade road crossings. The trail parallels I-5, Highway 99, and Bear Creek, providing Rogue Valley residents and visitors to the area a close-in spot for bird watching and wildlife viewing, as well as exercise and general recreation. The Greenway Foundation collaborates with Jackson County and the multiple cities noted above (Bear Creek Greenway Foundation 2017).	None	Moderate/High, depending on section of the trail	The land between the trail and the creek provides a buffer between development and the creek and attracts a variety of wildlife including beaver, otter, raccoons and turtles. The trail connects multiple jurisdictions and parks providing varied passive and active recreational opportunities in the region.	Uncommon	Somewhat Irreplaceable	Yes
Table Rock SNHA	Nature Conservancy	Crossed	In 1979, The Nature Conservancy bought and set aside 751 acres of land on Lower Table Rock as Lower Table Rock Preserve, with the intent of protecting its ecological diversity. Over the next 30 years, the Conservancy acquired a total of 1,911 acres, and holds a conservation easement on 795 acres. TNC manages the Preserve in collaboration with the BLM.	Significant Natural Heritage Area	Moderate/High; combined use of the BLM/TNC Table Rocks area was estimated at 45,000 visitors in 2010 (BLM & Nature Conservancy 2013).	See above entry for Table Rocks ACEC	Rare	Irreplaceable	Yes
Rogue River Greenway Trail	Rogue River Greenway Foundation	2.0	A multi-use, paved trail along the Rogue River between Grants Pass and Central Point that will eventually connect to the Bear Creek Greenway Trail. Only portions of this trail have been constructed to date. The Greenway Foundation collaborates with OPRD, Oregon Department of Transportation, Jackson County, Josephine County, and the Rogue Valley Council of Governments (Rogue River Greenway Foundation 2017).	None.	Moderate on completed segments	When completed, will provide a paved, multi-use trail along the Rogue River connecting many parks, waysides and communities along the River.	Uncommon	Somewhat Irreplaceable	Yes.
Private									
RiverPark RV Resort	RiverPark RV Resort	1.2	RV park with 700 feet of river frontage, 47 full hook-up paved RV sites (RiverPark 2017).	None	Moderate	Highly developed RV camping facility along the Rogue River	Uncommon	Replaceable	No
Medford/Gold Hill Kampgrounds of America (KOA)	Kampgrounds of America	2.0	The KOA has tent sites, camping cabins, RV hook-ups, a pool, playground, horseshoes, basketball court and rec room with video games and pool table (Kampgrounds of America 2017)	None	Moderate	Highly developed campground with various types of overnight accommodations and ancillary facilities.	Uncommon	Replaceable	No
1. The Cities of Grants Pass and Central Point contain several other mini, neighborhood, special use, and community parks/neighborhood parks; however, these parks are typical to an urban environ, intended for use by the surrounding neighborhoods, and given their distance from the Project, the topography and urban environment between the parks and the Project (including being on the other side of Interstate 5 from the Project), they are neither important recreational resources, nor would they be impacted by the Project.									

Exhibit U

Availability of Public and Private Providers to Provide Services

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

ADT	average daily traffic
AMR	American Medical Response
EFSC	Energy Facility Siting Council
I-5	Interstate 5
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
OR-99	Oregon Highway 99
OR-234	Oregon Highway 234
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects
RFA4	Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line
RV	recreational vehicle
TSP	Transportation System Plan

1.0 Introduction

The Energy Facility Siting Council (EFSC; Council) previously approved the Eugene-Medford 500 kV Transmission Line Project (EFSC 1990) and found that PacifiCorp dba Pacific Power (PacifiCorp) appropriately identified permits required for construction and operation. In this Request for Amendment No. 4, PacifiCorp seeks to expand the EFSC-certificated facility boundary to include the Grants Pass-Sams Valley transmission line and the Sams Valley Substation for the Sams Valley Reinforcement Projects (Project). The analysis in this exhibit focuses on the Project described in *Request for Amendment No. 4 Project Description and OAR Division 27 Compliance* (referred to herein as RFA 4).

However, for Exhibit U, Oregon Administrative Rule (OAR) 345-001-0010(59)(b) defines the analysis area for public services as extending 10 miles from the Site Boundary. The Analysis Area encompasses portions of two Oregon counties, Jackson and Josephine (Figure U-1). The Analysis Area includes seven cities: Grants Pass, Jacksonville, Medford, Central Point, Eagle Point, Gold Hill, and Rogue River, and a number of unincorporated rural communities, including Redwood and White City.

Exhibit U was prepared to meet the submittal requirements for the Project, per OAR 345-021-0010(1)(u), related to public services. Exhibit U demonstrates that the construction and operation of the Project, taking into account mitigation, is not likely to result in significant adverse impacts to the provision of the public services listed in OAR 345-022-0110.

2.0 Applicable Rules and Standards

Under OAR 345-022-0110, EFSC must find through appropriate study that:

(1) Except for facilities described in sections (2) and (3), to issue a site certificate, 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.

To demonstrate compliance with this standard, and in accordance with OAR 345-021-0010(1)(u), Exhibit U must include information about significant potential adverse impacts resulting from the construction and operation of the Project on the ability of public and private providers in the Analysis Area to provide the services listed in the standard.

3.0 Analysis

3.1 Methods

The following analysis was primarily based on secondary data compiled from federal, state, and local government agencies. State and local governments were also contacted directly for data on potentially affected public services. The potential effects of the Project were evaluated with respect to the ability of public and private providers within the Analysis Area to provide sewers and sewage treatment, water, stormwater drainage, solid waste management, housing, traffic safety, police and fire protection, health care, and schools. Key Project-related variables used in this analysis include projected construction and operations employment, traffic volumes, and waste generation.

3.2 Information Required by OAR 345-001-0010(1)(u)

3.2.1 Assumptions Used to Evaluate Potential Impacts – OAR 345-001-0010(1)(u)(A)

OAR 345-021-0010(1)(t) 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 345-022-0110. The applicant shall include:

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

3.2.1.1 Construction

The expected construction start date for the substation portion of the Project is April 2019, and construction would continue for 9 months, ending in December 2019. The new transmission line construction is planned to start in January 2020 and continue for 12 months, ending in December 2020.

During construction, crews would start working at the new Sams Valley Substation until its completion, and then would work on the transmission lines. PacifiCorp anticipates using a local contractor, and that construction workers would commute (travel to and from the job site on a weekly or monthly basis) to the worksite from distant locations including from out of state, depending on where the contractor would be based. If construction workers from outside of the local area were employed on the Project, they would require temporary lodging during construction. The number of construction workers coming from outside the local area is expected to be limited because the numbers of workers onsite any given time will be small. Non-local workers would be in the area on a short-term basis (approximately 3-4 months during construction), and their demand for temporary accommodations is expected to be distributed between Jackson and Josephine counties.

3.2.1.2 *Operations and Maintenance*

Existing PacifiCorp staff will be responsible for operations and maintenance of the transmission line and associated facilities. No existing employees will be required to relocate to the area.

Other assumptions used to evaluate potential impacts are identified in the following sections, as appropriate.

3.2.2 *Affected Public and Private Service Providers – OAR 345-001-0010(1)(u)(B)*

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

3.2.2.1 *Population*

Jackson County is the larger of the two counties in the Analysis Area, and includes 11 cities, the largest of which are Medford and Ashland. Josephine County includes two cities, Grants Pass and Cave Junction, with Grants Pass being the larger of the two (BLM 2016). In 2016, Jackson County had a population of 216,527 (U.S. Census Bureau 2017) and Josephine County had a population of 85,904 (U.S. Census Bureau 2017). Both counties have a combined 2016 population of 302,431, which is about 7.4 percent of the state's population of 4,093,465 (U.S. Census Bureau 2017). From 2010 to 2016, the population growth rate of Jackson County was similar (6.6 percent) to the growth rate of Oregon (6.8 percent) and the growth rate of Josephine County was much less (3.9 percent).

The overall 2010 population density of Jackson and Josephine counties was 73 people per square mile and 50.4 people per square mile, respectively. However, the transmission line corridor is located in rural areas with low population densities (BLM 2016).

3.2.2.2 *Sewer and Water Services*

Sewer, sewage treatment, and municipal water supply services are typically provided by incorporated communities. The proposed Project would be located in rural areas that are not served by sewage or water service providers. However, the proposed Project passes through portions of the city of Rogue River, which provides sewer and water utility service to city residents.

3.2.2.3 *Stormwater Drainage*

The proposed Project would not receive stormwater drainage services. The proposed Project does not cross any incorporated areas other than small portions of the city of Rogue River. The proposed new transmission line will parallel an existing transmission line that does not cross public stormwater drainage facilities. The substation will be graveled and graded to prevent sediment transport by stormwater. Stormwater management is described in Exhibits I and V.

3.2.2.4 *Solid Waste Management*

The solid waste system in Jackson and Josephine counties includes waste reduction, collection of refuse and recycling, and transfer of waste to a landfill. Waste generated in Jackson County is typically disposed of via the county in accordance with the Jackson County Solid Waste Franchising and Nuisance Abatement Ordinance (Jackson County 2017a). Waste generated in Josephine County is typically disposed of via the county in accordance with the Josephine County Solid Waste and Nuisance Abatement Ordinance (Josephine County 2017a).

Recycling and garbage collection services are provided by private companies through franchise agreements that are regulated by the counties and cities (Jackson County 2017b). Only these organizations are authorized to pick up, haul, and dispose of solid waste within the counties. Collected waste is delivered to multiple transfer stations and hauled to the Dry Creek Landfill in Jackson County. There are no other landfills located in Jackson or Josephine counties.

3.2.2.5 *Housing*

Data compiled for 2015 indicate that there are housing resources available for rent in Jackson and Josephine counties. The total number of housing units in Jackson County is estimated to be 91,782 units. Of the total, 83,487 units are estimated to be occupied leaving 8,295 units vacant. In Josephine County, the total number of housing units is estimated to be 38,028 units. Of the total, 34,527 units are estimated to be occupied leaving 3,501 units vacant. Rental housing vacancy rates were estimated at 4.3 percent for Jackson County and 5.1 percent for Josephine County (U.S. Census Bureau 2015).

Hotel and motel accommodations are abundant within the Analysis Area. There are approximately 40 hotels in Medford, Grants Pass, Eagle Point, and Central Point, all of which are within the Analysis Area. HVS Consulting (2016) prepared a study for the city of Medford summarizing hotels in the region (hotels within 30 miles of Medford that report to Smith Travel Research) by class and number of rooms available (Table U-1).

Table U-1. Regional Hotels by Class and Available Rooms (HVS Consulting 2016)

Class	Hotels	Rooms	Percentage of Rooms
Economy Class	12	907	27%
Midscale Class	13	1,100	33%
Upper Midscale Class	10	744	23%
Upscale Class	4	457	14%
Luxury Class	1	92	3%
Total	40	3,300	–

Temporary accommodations in the form of campsites and recreational vehicle (RV) parking sites are available in the Project's vicinity. There are at least 40 camping and RV establishments located within commuting distance of the Project in Jackson and Josephine counties (RVParking 2014).

3.2.2.6 Traffic Safety and Operations

Public roadways in the Analysis Area are operated and maintained by state and local government entities, including the Oregon Department of Transportation (ODOT) and Jackson and Josephine counties. Responsibilities for traffic safety are shared among ODOT and the respective county and municipal law enforcement agencies.

The Project is located north of Interstate 5 (I-5) and Oregon Highway 99 (OR-99; also known as the Rogue River Highway), and is crossed by Oregon Highway 234 (OR-234) and East Evans Creek Road. Between the cities of Grants Pass and Gold Hill, I-5 and OR-99 travel east-west along the Rogue River. OR-234 originates near the city of Gold Hill and follows a southwest-northeast route through Sams Valley, and is designated as the Rogue-Umpqua Scenic Byway. The Project crosses OR-234 near Lower Table Rock and runs parallel (approximately 0.25 miles away) to the highway for about 2 miles. East of Lower Table Rock, the Project runs parallel to Table Rock Road for approximately 1.3 miles before crossing the Rogue River. The Project terminates at the existing Whetstone Substation off of Kirtland Road (BLM 2016).

I-5, OR-99, OR-234, Table Rock Road, and Kirtland Road would be used to transport most of the equipment and materials used for Project construction. Most of the access roads originate from I-5 and OR-234. Between the East Grants Pass Interchange (U.S. Highway 199) and the city of Gold Hill, the annual average daily traffic (ADT) on I-5 is 35,700 vehicles (ODOT 2015). Between the Rogue River Highway-Rock Point Interchange and the other end of the Project near Sams Valley Road, the annual ADT volume on OR-234 is approximately 2,800 vehicles (ODOT 2015).

Jackson County recently completed its updated Transportation System Plan (TSP) in March 2017. The TSP includes a transportation financing plan to help Jackson County identify future unfunded transportation needs and potential revenue sources. However, the TSP does not include information regarding current transportation uses (Jackson County and Kittleson and Associates 2017).

The Josephine County Rural TSP from June 2004 establishes the County's goals, policies and action strategies for developing the transportation system outside of the Grants Pass and Cave Junction Urban Areas. The TSP is intended to serve as a blueprint or master plan to guide transportation decisions to address both short and long term needs. Like the TSP for Jackson County, the Josephine County Rural TSP does not include information on current traffic uses (Josephine County and Parametrix 2004).

3.2.2.7 Police and Fire Protection

Three police departments and four fire departments have jurisdiction over the Analysis Area: the Jackson County Sheriff's Department, the Josephine County Sheriff's Department, the Rogue River Police Department, Jackson County Fire District #3, Rural Metro Fire in Grants Pass, and the Rogue River Fire District #1.

Police

The Jackson County Sheriff's Office and Josephine County Sheriff's Office are the primary law enforcement agencies responsible for unincorporated areas in the counties, including areas crossed by the proposed Project. The Rogue River Police Department has jurisdiction over a small portion of the Project area that crosses through city limits.

The Jackson County Sheriff's Office has three K9 teams, a SWAT team, a traffic unit, and a search and rescue team with 135 volunteers (Jackson County 2017c). The Josephine County Sheriff's Office has a Patrol Division with one deputy and one sergeant to patrol rural Josephine County (Josephine County 2017b). Additionally, the County has a marine unit that responds to calls for assistance on the waterways in the County.

The Rogue River Police Department has jurisdiction over the city of Rogue River and could be called to support the Jackson and Josephine county sheriff departments if needed. The Rogue River Police Department employs one Chief, four fulltime officers, and one reservist officer (Rogue River 2017).

Fire

Four fire departments have jurisdiction over the area crossed by the Project: the Jackson County Fire District #3, Rural Metro Fire in Grants Pass, Rogue River Fire District #1, and the Grants Pass Fire/Rescue within the Department of Public Safety.

Jackson County Fire District #3's jurisdiction includes the eastern part of the Project (east of Rogue River). There are eight fire stations within this district located in the towns of Central Point (3), Eagle Point (3), Gold Hill (1), and White City (1). The fire district employs approximately 20 full-time fire fighters. Additional support is provided by a staff of volunteer fire fighters (Jackson County 2017d).

The Rural Metro Fire District jurisdiction includes the western part of the Project (west of Rogue River). There are three staffed stations within this district, each manned by two personnel, in addition to the Fire Chief who is on duty every day. Each staffed station has an engine, a water tank, and rescue capabilities. Rural Metro is an American Medical Response (AMR) company and AMR is the ambulance provider (Shay pers. comm. October 6, 2017).

The Rogue River Fire District #1 provides fire and ambulance service to the city of Rogue River and, if needed, can aid the fire districts of Jackson and Josephine counties. The Rogue River Fire District #1 has 12 career employees and 12 volunteers. They are usually staffed with about six people, 24-hours a day. The District has three fire engines, two water tankers, a brush vehicle for off-road firefighting, and three ambulances (Price pers. comm. October 4, 2017). Although its three ambulances serve the city, Rogue River Fire District #1 can provide supplemental services to Jackson County (which has three ambulance services) and Josephine County (which has two ambulance services).

Grants Pass Fire/Rescue has three fire stations (Hillcrest Public Safety Center, Parkway Public Safety Center, and Redwood Public Safety Center) and operates 24 hours a day. The department

provides three engines and a ladder truck that are staffed at all times, and also a couple of brush trucks and an operating technical rescue team. They provide automatic aid to the Rural Metro Fire District (which operates on the outskirts of Grants Pass) and the Rogue River Fire District. The Grants Pass department does not directly provide ambulance service, but contracts with AMR in Josephine County to provide ambulance service within the city (Delisle pers. comm. October 4, 2017).

3.2.2.8 Health Care

The Asante medical facilities in Grants Pass and Medford are the closest hospitals to the Project. Asante operates three hospitals in the region (Grants Pass, Medford, and Ashland), as well as three urgent care facilities in the Grants Pass and Medford service area. Rogue Regional Medical Center, located in Medford, is the largest facility, with 378 beds. Three Rivers, located in Grants Pass, is the second largest facility, with 125 beds. The two hospitals combined have approximately 7,500 staff members. Asante provides an Intensive Care Unit, a Critical Care Unit, and a helipad. Two local vendors provide helicopter services under contract. The Asante hospitals do not have a burn treatment facility, but they can stabilize patients at their hospitals and then fly the patient to the nearest burn center location (Ott pers. comm. October 6, 2017).

Providence Medford Medical Center is located in Medford and includes multiple clinics throughout the region, the closest clinics to the Analysis Area are located in Eagle Point and Central Point. It does not appear to offer 24-hour emergency services (Providence 2017).

3.2.2.9 Schools

In general, primary and secondary education in the Analysis Area is provided by local school districts based in the respective cities. Grants Pass School District serves the city of Grants Pass, which operates 10 schools with a total of 6,136 students for the 2017-2018 school year. The rural areas of Grants Pass are served by the Three Rivers School District, which operates 16 schools and has a total of 4,537 students for the 2017-2018 school year. The city of Medford is served by the Medford School District, which operates a combined total of 23 schools with 13,301 students for 2017-2018 school year. Rogue River School District serves the city of Rogue River, which operates two schools with 810 students for the 2017-2018 school year. The city of Central Point is served by the Central Point School District, which operates 10 schools with a total of 4,793 students for the 2017-2018 school year. The city of Eagle Point is served by the Jackson County School District, which operates 11 schools with a total of 4,258 students for the 2017-2018 school year.

3.2.3 Potential Impacts on Public and Private Providers – OAR 345-001-0010(1)(u)(C)(D)

(C) A description of any likely adverse impact to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0110.

(D) Evidence that adverse impacts described in (C) are not likely to be significant, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.

3.2.3.1 Sewer and Water Services

Sewer and water services are not provided in the unincorporated areas crossed by the proposed Project. The Project is not expected to affect the ability of public and private providers to provide sewer and sewage treatment services. As described in Exhibit V, temporary sanitation during construction activities would consist of portable toilets located at construction sites. Portable toilets would be provided by a subcontractor, who would be responsible for servicing the facilities at regular intervals and disposing of wastewater in accordance with local jurisdictional regulations. Operation of the Project would not generate any sanitary wastewater and would not require a sanitary wastewater connection.

As described in Exhibit O, only 50,000 gallons of water is estimated under worst case water scenario. The sources may also include local municipalities but no direct connection to any water line will be made at any point in the construction effort. The Project is not expected to affect the ability of public and private providers to provide water services.

Prior to construction, any existing utility lines (including water and sewage) and individual septic systems that could be crossed by the proposed Project will be located and marked to ensure that these utilities are not impacted by Project construction activity.

The permanent Project operational facilities, including the transmission lines and the Sams Valley substation, would be unmanned, therefore no toilets, sinks, or bathrooms would be provided. As a result, operation of the Project is not expected to affect local sewer and water service providers. Information about anticipated water use and wastewater can be found in Exhibits O and V, respectively.

3.2.3.2 Stormwater Drainage

Construction and operation of the Project would not require expansion or modification of any existing public stormwater drainage facilities. Any damage to private properties during Project construction (e.g., rutting of soils, broken agricultural drain-tiles, etc.) would be repaired by the contractor during completion and restoration of the construction area.

Following construction, affected areas would be graded and restored to pre-construction conditions to the extent practical. Grading would attempt to mimic the existing terrain in order to minimize potential effects to existing drainage patterns. The existing roads are graveled and will be improved

for construction and maintained during operations, resulting in minimal stormwater runoff containing sediments. The Project will be constructed under a NPDES 1200-C Construction General Stormwater permit issued by the Oregon Department of Environmental Quality. The substation will be graveled and graded to provide infiltration and prevent sediment transport by stormwater. Stormwater management is described in Exhibits I and V.

3.2.3.3 *Solid Waste Management*

Construction of the Project would result in the production of minimal vegetative and non-hazardous solid construction waste. Attachment V-1 provides an estimate of solid waste quantities for the Project.

Some construction debris would be recycled, including building materials such as insulation, nails, electrical wiring, and rebar, as well as waste originating from site preparation such as dredging materials, tree stumps, timber, brush, refuse, and rubble resulting from the clearing of land and from construction of the Project. Waste that cannot be recycled would be disposed of at the Subtitle D waste area at the Dry Creek Landfill. Solid waste will be collected for disposal by a licensed solid waste collector. PacifiCorp will coordinate solid waste disposal activities with the counties and Dry Creek Landfill. The landfill operator indicated the facility has the capacity to take the waste from the proposed Project (Fortier pers. comm. October 4, 2017).

3.2.3.4 *Housing*

Construction

The non-local construction workforce is expected to peak in Project Months 4 - 7 (July through September 2019), with upwards of 35 workers temporarily relocating to the Analysis Area. As indicated in Section 3.2.2.5, there is sufficient rental housing in the Analysis Area's communities to accommodate this projected demand. Hotels and motels are also available in the Analysis Area, as are RV and other camping sites.

Table U-2. Work Crew Type and Size

Crew Type	Crew Size (People)	Duration of Work (Months)
Substation		
Civil	5 – 10	2 – 4
Line	10 – 15	3 – 6
Substation/Relay Techs	3 – 5	2 – 3
Maximum On-Site Personnel ¹	30	–
Transmission Line		
Line	10 – 15	Entire Project duration
Pier/Civil	3 – 5	First 2 – 4 months for drill rig

Crew Type	Crew Size (People)	Duration of Work (Months)
		Periodic presence as outages become available
Maximum On-Site Personnel ¹	10	–
1. If crews overlap during any particular period. This would be a worst-case number, and not a typical work day.		

Because most construction workers would commute on a weekly/monthly basis, and there is available housing for those that would temporarily move to the area, the temporary impact on local populations and housing would be insignificant (BLM 2016).

Operations and Maintenance

Current PacifiCorp staff will be primarily responsible for operations and maintenance of the new transmission line and associated facilities. No current employees would be required to relocate to the area. Therefore, no impacts would occur to housing during operations and maintenance of the Project.

3.2.3.5 Traffic Safety and Operations

Construction

The Project has the potential to result in short-term impacts on transportation from increased traffic generated by construction vehicles, as well as disruptions to traffic from single lane closures during line work. For each transmission structure, one four to six man crew, each operating between one to large construction vehicles (e.g., pickup trucks, 2-ton trucks, bucket trucks, or smaller cranes) would access the Project area via existing access roads and county, state, or private roads. Transport of construction materials and equipment into the Project area from labor and material source locations would primarily occur on I-5, OR-99, OR-234, Table Rock Road, and Kirkland Road. The temporary volume of construction-related traffic would represent a small increase in daily traffic compared to the ADT volumes for roads in the Project area, and traffic impacts are therefore expected to be low (BLM 2016).

Operations and Maintenance

Current PacifiCorp staff will be primarily responsible for operations and maintenance of the new transmission line and associated facilities. No current employees would be required to relocate to the area. Therefore, no impacts would occur to traffic safety and operations during operations and maintenance of the Project.

3.2.3.6 *Police and Fire Protection*

Police

The Project is not expected to have significant adverse impacts on the short-term demand for police service during the construction period. The temporary peak increase in the local population during construction, as a result of non-local construction workers temporarily relocating to the area, is estimated to be approximately 30 transient residents. That figure is equivalent to less than 0.1 percent of the current population for Jackson and Josephine counties, and is not sufficient to represent a measurable change in the need for police service.

Current PacifiCorp staff will be primarily responsible for operations and maintenance of the new transmission line and associated facilities. No current employees will be required to permanently relocate to the area. Therefore, the Project would have a negligible long-term effect on the local population, and would not generate demand for additional law enforcement resources or facilities.

The sheriff's offices for Jackson and Josephine counties are the primary law enforcement agencies for the Project area. The sheriff's offices did not respond to a request for information.

Fire

Rural Metro Fire, Jackson County Fire District #3, and Rogue River Fire District #1 are the primary fire departments for the Project area. These local fire protection districts were contacted in order to solicit their input regarding the potential effect that construction and operation of the Project could have on their ability to serve the community. The fire marshal for Rural Metro Fire and the fire chief for Rogue River Fire District #1 indicated that their departments could handle fire and rescue services potentially needed by the Project. The Jackson County Fire District did not return requests for information.

The relatively small number of workers expected to temporarily relocate to the Analysis Area during Project construction are not expected to place significant new demands on the fire protection districts that serve the area.

3.2.3.7 *Health Care*

Construction and operation of the Project is not expected to have an adverse effect on health care providers or hospitals. Project construction workers suffering minor injuries would be treated at local medical facilities or emergency rooms. Workers suffering more serious injuries, were they to occur, would be taken to one of the major hospitals in the Project's vicinity. Based on the existing service capacity of the local health care providers, the relatively small size of the construction labor force, and the temporary duration of the construction activity, there is no reason to expect that Project construction would result in a significant increase in service demand experienced by the local providers.

3.2.3.8 Schools

Non-local construction workers are expected to temporarily relocate to the Analysis Area from June to October 2019 (Project Months 2 to 6), with non-local employment peaking in August through September (Project Month 4 through 7). None of the workers would be expected to relocate school aged children for a project with task specific timelines of such short duration

Current PacifiCorp staff will be primarily responsible for operations and maintenance of the new transmission line and associated facilities. No current employees would be required to relocate to the area. Therefore, the Project would have a negligible long-term effect on schools in the area.

3.2.4 Proposed Monitoring Programs – OAR 345-001-0010(1)(u)(E)

(E) The applicant's proposed monitoring program, if any, for impacts to the ability of the providers identified in (B) to provide the services listed in OAR 345-022-0110.

The Applicant is not proposing a monitoring program related to the potential impacts described above, because the impacts to public service providers are not expected to be significant.

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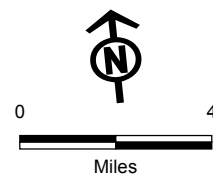
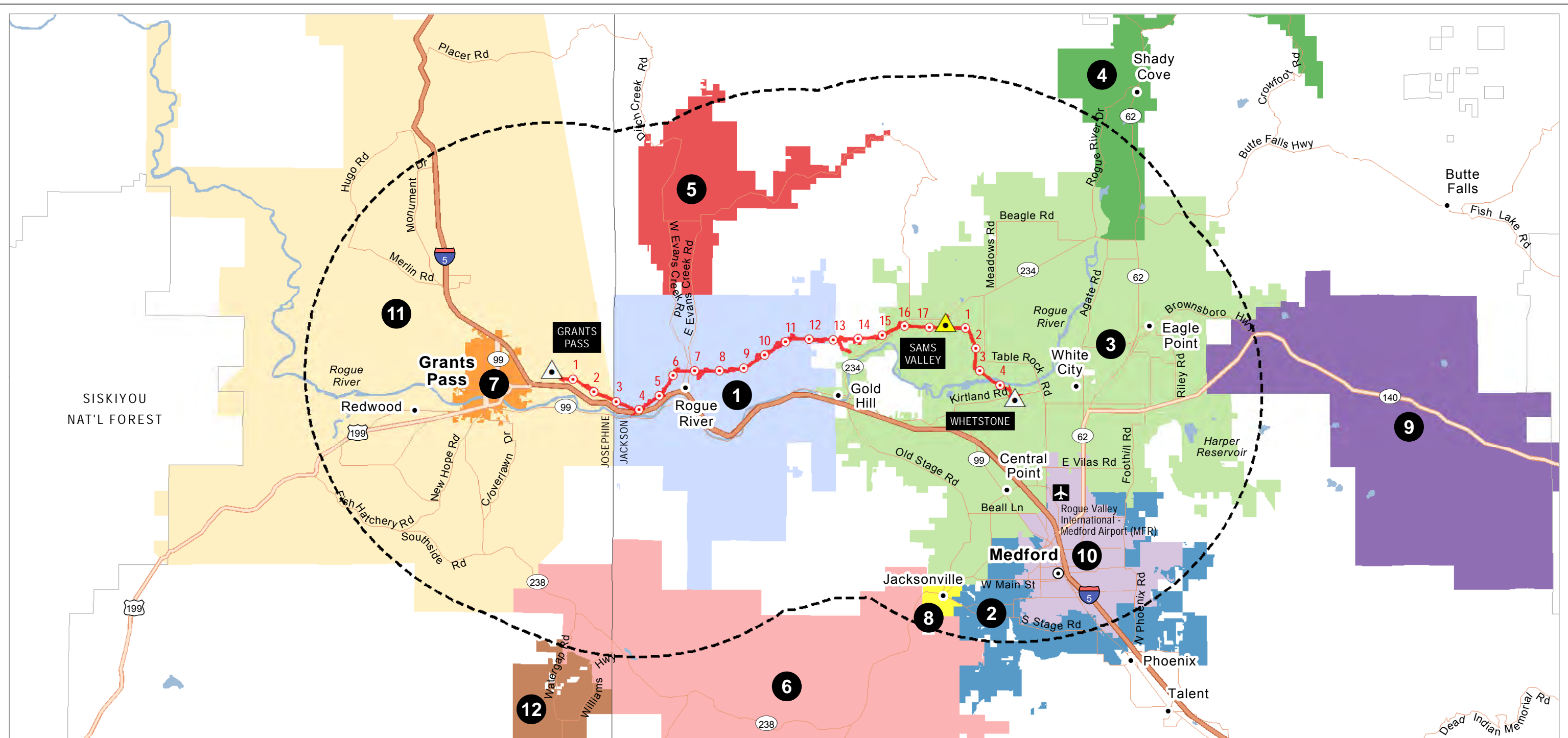
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Figures

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Map Area

Source(s): BLM, City of Grants Pass, City of Jacksonville, City of Medford, Esri, Jackson County, PacifiCorp, USGS

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit U_Public Services\FIG U-1_Public Services.mxd
December 2017

Public Services

Analysis Area (10-mile buffer of Site Boundary)

Fire Protection Areas within Analysis Area

- 1 - Fire District #1
- 2 - Fire District #2
- 3 - Fire District #3
- 4 - Fire District #4
- 5 - Fire District #6
- 6 - Fire District #9

- 7 - Grants Pass Dept of Public Safety
- 8 - Jacksonville Fire Dept
- 9 - Lake Creek Fire District
- 10 - Medford Fire Dept
- 11 - Rural Metro Fire Dept
- 12 - Williams RFPD

Transportation

Airports

Interstates

Highways

Major Roads

Site Boundary

Site Boundary

Mile

Substations

Proposed

Existing

Other Features

Cities or Towns

County Seat

Other



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

Public Services
Figure U-1

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Exhibit V

Generation of Solid Waste and Wastewater

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

BMP	Best Management Practices
ESCP	Erosion and Sediment Control Plan
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
Project	Sams Valley Reinforcement Projects

1.0 Introduction

Exhibit V was prepared to meet the submittal requirements for the Sams Valley Reinforcement Projects (Project), per Oregon Administrative Rule (OAR) 345-021-0010(1)(v), related to the generation of solid waste and wastewater. The analysis in this exhibit focuses on the Project as described in the *Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line*.

2.0 Site Certificate Condition Compliance

No existing Site Certificate conditions apply to this resource. PacifiCorp proposes the following new condition per OAR 345-021-0010(1)(v)(B-D):

- **Waste Management Condition 1:** Prior to construction, the site certificate holder shall develop a Construction Waste Management Plan, which addresses:
 - a. The number and types of waste containers to be maintained at construction sites and construction yards;
 - b. Waste segregation methods for recycling or disposal;
 - c. Names and locations of appropriate recycling and waste disposal facilities, collection requirements, and hauling requirements to be used during construction;
 - d. During construction, the site certificate holder shall conduct all work in compliance with the Construction Waste Management Plan referenced above.
 - e. During construction, the site certificate holder shall provide to the department a report on the implementation of the Construction Waste Management Plan referenced above in the 6-month construction report required pursuant to OAR 345-026-0080(1)(a).

3.0 Description of Solid Waste and Wastewater Generation – OAR 345-021-0010(1)(v)(A)

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:

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.

3.1 Solid Waste

3.1.1 Solid Waste Produced During Construction

Upon completion of construction, PacifiCorp would dispose of all timber, brush, refuse, and materials resulting from the clearing of land or from construction of the Project. Solid wastes would be generated during the construction phase of the Project in quantities consisting of:

- Vegetative waste from clearing of the right-of-way, estimated at less than 50 cubic yards.
- Non-hazardous construction waste, including cardboard, wood, metal, and plastic used for the protection of materials/equipment shipped to the site. The amount of each material is estimated at less than 1 cubic yard of cardboard, 10 cubic yards of wood, 1 cubic yard of metal, and 0.5 cubic yards of plastic.

3.1.2 Solid Waste Produced During Operation

There would be no continual generation of either hazardous or non-hazardous solid waste during the operation of the Project.

3.1.3 Solid Waste Produced During Decommissioning

The Project is designed to have an indefinite useful life. In general, PacifiCorp designs, constructs, and operates its transmission system on the assumption that the system's transmission lines will not be retired. If retirement of the transmission line is required, PacifiCorp would do so in accordance with a retirement plan approved by the Energy Facility Siting Council, as required by OAR 345-027-0020(9) and OAR 345-027-0110. Retirement and site restoration activities would also be in full compliance with all applicable statutes and regulations in effect at the time of retirement.

Wire and structures are removed in a similar fashion to how they are constructed, except in reverse. Vibration dampers would be removed from the conductors, all wire would be put into stringing sheaves at each insulator attachment, and the wire would be removed and placed onto reels. The towers would be unbolted and removed by a crane or helicopter. Removal of the foundations for each tower to a depth of at least 2 feet below grade, depending on ground slope. Any foundations in Exclusive Farm Use-zoned lands would be removed to a depth 3 feet below grade. The removed foundation area would then be filled with soil or gravel.

The majority of the material generated at retirement is recyclable. All steel, aluminum, and copper would be salvaged or recycled if their condition allows. Likewise, all recyclable hardware would be recycled, and the remainder disposed of at the county landfill. Optical ground wire would be recycled for aluminum, steel, and alloy materials as practical. The labor involved with separating the glass portions from the metal portions of insulators makes recycling likely unfeasible; therefore, insulators would be disposed of as solid waste.

3.2 Wastewater

3.2.1 Sanitary Wastewater

Temporary sanitation during construction activities would consist of portable toilets located at construction sites. Portable toilets would be provided by a subcontractor, who would be responsible for servicing the facilities at regular intervals and disposing of wastewater in accordance with local jurisdictional regulations. The construction contractor would ensure that a sufficient number of toilets is provided and that the portable restroom company complies with applicable regulations; uses holding tanks for biological waste that conform to Oregon Department of Environmental Quality (ODEQ) regulations at OAR Chapter 340, Division 71; and transports waste in accordance with Oregon Revised Statute Chapters 465 and 466.

3.2.2 Construction Wastewater

As described in Exhibit O, approximately 15,000 gallons of water will be used for dust control and restoration which will infiltrate into the ground or evaporate into the atmosphere. The amount of water used for dust control will be sufficiently small that runoff will not occur outside of the Site Boundary. Approximately 5,000 gallons will be used for concrete foundations and will remain in the concrete mix. After concrete is placed at a construction site, limited concrete washout is expected to be performed at or in the vicinity of the concrete placement. Concrete washout is defined as “water rinsing” of the chute of the concrete truck, the hopper of the concrete pump truck, and any tools or other equipment used to move or form concrete that must be washed out to prevent the residual concrete from hardening on and in the equipment. Some foundations may require slurry to stabilize foundation shafts during drilling. Slurry fluids will be recycled to the extent practicable. Excess and degraded slurry fluids will be disposed of at off-site location(s). The disposal will be in strict accordance with local, state, and federal environmental, and pollution laws and ordinances.

Dust control water would be sprayed onto disturbed areas to moisten the surface.

3.2.3 Operation Wastewater

Operation of the Project would not generate wastewater. The Project would not generate any sanitary wastewater and would not require a sanitary wastewater connection.

3.2.4 Retirement Wastewater

Project retirement wastewater would be limited mainly to dust abatement water, applied to unpaved disturbed areas to minimize generation of blowing dust. Retirement wastewater would be applied in quantities that would minimize surface runoff. Wastewater used for dust abatement would be allowed to evaporate or infiltrate into the native soil.

4.0 Description of Waste Management and Disposal Structures, Systems and Equipment – OAR 345-021-0010(1)(v)(B)

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.

During construction, waste materials would be disposed of at the Dry Creek Landfill in Jackson County if it cannot be recycled. All recyclable materials will be disposed of via PacifiCorp's existing recycling contracts. Vegetative waste will be disposed of as composting materials. Waste will be accumulated within temporary construction areas prior to transport to the recycling facility or landfill, so there will be no impact to surrounding or adjacent areas. There would be no continual generation of either hazardous or non-hazardous solid waste during the operation of the Project.

The construction contractor would ensure that the portable restroom company complies with applicable regulations; uses holding tanks for biological waste that conform to Oregon Department of Environmental Quality (ODEQ) regulations at OAR Chapter 340, Division 71; and transports waste in accordance with Oregon Revised Statute Chapters 465 and 466.

Washing of the inside of the concrete trucks is not expected to be done at the placement site. The truck chute, pump truck hopper, and other tools may be rinsed on-site with the wastewater being collected in eco-buckets or similar approved collection devices.

Concrete washout would be performed only in designated areas in accordance with the Erosion and Sediment Control Plan (ESCP), which will be completed prior to construction as required by the National Pollutant Discharge Elimination System (NPDES) 1200-C Construction Stormwater Permit issued by ODEQ. The Best Management Practices (BMP) to manage concrete washout are identified in the ESCP presented in Exhibit I (see Soil Protection Condition 2).

An example BMP for conducting on-site washing includes using an "eco-bucket." The eco bucket is suspended from the bottom of the concrete truck chute to catch wastewater, which is then pumped or dumped back into the concrete drum when full, or into other approved sites that are located away from surface waters. A concrete washout area can be a lined pit or bermed area large enough to contain the liquid and solid waste, and prevent release of wastewater and/or sediments into streams and waterways. Alternatively, prefabricated concrete washout facilities may be provided; these facilities can be carried on a trailer or fitted with wheels to move from site to site as needed.

Washout areas would be inspected daily during active construction periods to prevent overrun and to ensure that they are situated in an environmentally prudent manner. Waste material (e.g., ecobuckets or similar) would be removed to an appropriate disposal site as soon as reasonably possible. Construction operators would be closely monitored to ensure proper management of concrete washout. With these safeguards in place, concrete washouts would be covered by the Project NPDES 1200-C permit that would be obtained from ODEQ prior to construction. All excess

concrete would be sent back to the batch plant for recycling along with hardened concrete in designated washout areas.

The amount of water used for dust control would be sufficiently small that it would not create runoff, but instead would infiltrate into the ground or evaporate.

5.0 Actions or Restrictions to Reduce Consumptive Water Use – OAR 345-021-0010(1)(v)(C)

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.

The amount of water for sanitary waste, will be controlled by the volume of water that portable toilets can hold. The amount of water for concrete mixing is controlled by the need for a proper water-cement ratio to provide adequate concrete strength and is therefore relatively fixed, although water reducing additives will generally be incorporated into the concrete mix design. Drilling slurry fluids for stabilization of drilled shaft foundations will be recycled to the extent practicable. Water for dust abatement will be minimized to prevent surface water migration and accompanying erosion or sediment transport, and to maximize the efficiency of the water trucks used to control dust. Water used at concrete washout stations is typically provided by the concrete truck, and it is in the interest of drivers to conserve water to minimize water fill-ups.

6.0 Minimization and Recycling Plans – OAR 345-021-0010(1)(v)(D)

OAR 345-021-0010(1)(v)(D) The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A).

The construction contractor will determine the number and types of waste containers to be maintained at construction sites, staging areas, and the substation and solid waste to be segregated for recycling or disposal, as well as collection and hauling requirements.

The amounts of waste materials and wastewater generated during operations are expected to be minimal. Wastes derived during operations will likely be recycled or disposed of off-site by individual operations and maintenance crews.

7.0 Waste-Related Impacts

7.1 Description of Impacts – OAR 345-021-0010(1)(v)(E)

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.

No adverse impacts are expected during construction and operations from the Project accumulation, storage, disposal, and transport of solid waste, wastewater, or stormwater. Project waste will be stored only on a temporary basis, and then disposed of or recycled off-site at solid waste landfills and recycling facilities.

Concrete washout will occur at dedicated concrete washout stations. Water for dust abatement will be applied in quantities sufficient to minimize dust from construction vehicles, but not sufficient to result in runoff. Other construction water will be used to produce Portland cement concrete, and where soil conditions necessitate drilling slurry required to maintain excavations for drilled shaft foundation construction, which will stay in place. Stormwater and erosion will be managed via the 1200-C permit and ESCP (see Exhibit I). The effects of wastewater will be minimal.

7.2 Evidence that Impacts are Minimal – OAR 345-021-0010(1)(v)(F)

OAR 345-021-0010(1)(v)(F) Evidence that adverse impacts described in (D) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts.

Generation of wastes from construction will be minimized by estimating materials needs and employing efficient construction practices. Waste generated during construction, operation, or retirement of the Project will be recycled when feasible.

Water will be used primarily for concrete mixing and dust control. Water will be transported to the Project via water trucks and will be used only as needed. No on-site sewage treatment system is proposed. Based on the summary above, material adverse impacts from Project waste are not expected.

7.3 Proposed Monitoring Plan – OAR 345-021-0010(1)(v)(E)

OAR 345-021-0010(1)(v) (G) The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts.

Because there would be no continual generation of waste or wastewater, no monitoring program is proposed.

8.0 Conclusion

PacifiCorp's solid waste and wastewater plans minimize generation of solid waste and wastewater in the construction, operation, and retirement phases of the Project. As described above, generation of solid wastes and wastewater would be minimal and short term, and primarily limited to the construction phase. When solid waste or wastewater is generated, it would be recycled immediately, reused, or properly disposed of. No accumulation or storage of solid wastes or wastewater is proposed. For these reasons, there would be no significant adverse impacts to surrounding or adjacent areas, and no monitoring program will be necessary for solid waste or wastewater management.

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Exhibit W

Facility Retirement and Site Restoration

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

OAR	Oregon Administrative Rule
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects

1.0 Introduction

Exhibit W was prepared to demonstrate that the Sams Valley Reinforcement Projects (Project) complies with the approval standard in Oregon Administrative Rule (OAR) 345-022-0050(1) based on information provided pursuant to OAR 345-021-0010(1)(w), paragraphs (A) through (E).

OAR 345-022-0050 Retirement and Financial Assurance

To issue a site certificate, the Council must find that:

- (1) The site, taking into account mitigation, can be restored adequately to a useful, non-hazardous condition following permanent cessation of construction or operation of the facility.*
- (2) The Applicant has a reasonable likelihood of obtaining a bond or letter of credit in a form and amount satisfactory to the Council to restore the site to a useful, non-hazardous condition.*

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:

- (A) The estimated useful life of the proposed facility.*
- (B) Specific actions and tasks to restore the site to a useful, non-hazardous condition.*
- (C) An estimate, in current dollars, of the total and unit costs of restoring the site to a useful, non-hazardous condition.*
- (D) A discussion and justification of the methods and assumptions used to estimate site restoration costs.*
- (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.*

2.0 Site Certificate Condition Compliance

The existing Site Certificate does not include conditions related to retirement of the facility and site restoration after retirement. The Site Certificate does include a warranty that PacifiCorp *dba* Pacific Power (PacifiCorp), formerly known as PP&L, would have the financial resources to retire the transmission line. The Project will comply with the warranty as documented in Exhibit M.

PacifiCorp understands that per OAR 347-027-0020 Mandatory Conditions in Site Certificates, the following condition will be added to the Amended Site Certificate:

- **OAR 347-027-0020(9):** The certificate holder shall retire the facility if the certificate holder permanently ceases construction or operation of the facility. The certificate holder

shall retire the facility according to a final retirement plan approved by the Council, as described in OAR 345-027-0110. The certificate holder shall pay the actual cost to restore the site to a useful, non-hazardous condition at the time of retirement, notwithstanding the Council's approval in the site certificate of an estimated amount required to restore the site.

Note that OAR 345-022-0050(2) requires only that the PacifiCorp demonstrate "that it has a reasonable likelihood of obtaining a bond or letter of credit" to restore the site. Given the extremely long lifespan anticipated for these facilities, PacifiCorp has not obtained a bond or letter of credit for their retirement. Rather, PacifiCorp has adequate financial resources to guarantee the costs of retirement in current dollars. It is also likely that PacifiCorp or its successors will have adequate financial resources to retire the facilities in the foreseeable future, given the large number of generation and transmission assets it owns. For these reasons, the Energy Facility Siting Council (EFSC) can find that PacifiCorp has financial resources sufficient to satisfy OAR 345-022-0050(2).

3.0 Estimated Useful Life of the Project

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:

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

In general, transmission projects are planned as part of a larger system to be operated, in order to provide reliable and safe transmission capacity, for an indefinitely long duration. Therefore, transmission lines, such as the Project, are designed and maintained to remain in service (with necessary upgrades) in perpetuity. In addition, given the demand for transmission services, the limited number of transmission facilities, the high cost of building new transmission lines and the intrinsic value of existing transmission rights-of-way, older transmission facilities are typically repaired or upgraded rather than retired. Over time, transmission line components and related facilities maybe rebuilt, reconfigured, and modified and may use new materials and hardware. While retirement of the Project facilities is, in theory, possible, the need for electricity and electricity transmission, and supporting facilities is expected to increase into the foreseeable future. Therefore, based on currently operating transmission lines in Oregon and in consideration of when they began operation, PacifiCorp estimates that the useful life of the Project is in excess 100 years.

4.0 Actions to Restore the Site

(B) Specific actions and tasks to restore the site to a useful, non-hazardous condition.

Hazardous materials associated with the Project would largely be limited to oils in transformers and backup fuel supplies at substations. The substations are designed with ancillary containment facilities for both transformer oil leakage and potential fuel leakage. If leakage occurs, material would be captured in the ancillary containment system, and removed.

The proposed facility will not have any underground storage tanks or on-site bulk storage of hazardous materials. Small quantities of lubricants, vehicle fuel and herbicides might be transported over and across the site during operation, and minor leaks, spills and improper handling of these materials could occur. Given the small amounts of such materials used on the site, soil contamination is unlikely. Therefore, it is not expected that the site would become hazardous.

As discussed above, retirement of the facility is not anticipated. If PacifiCorp is required to retire the Project—that is, to permanently remove from service the transmission line and relinquish the rights to the transmission line corridor—it will do so in accordance with an EFSC-approved retirement plan, as required by OAR 345-027-0020(9), or according to whatever applicable requirements exist at that time.

The retirement plan would include, pursuant to OAR 345-027-0110(5), the following information:

5) In the proposed final retirement plan, the certificate holder shall include:

(a) A plan for retirement that provides for completion of retirement without significant delay and that protects public health, safety and the environment.

(b) A description of actions the certificate holder proposes to take to restore the site to a useful, non-hazardous condition, including information on how impacts to fish, wildlife and the environment would be minimized during the retirement process.

(c) A current detailed cost estimate and a plan for ensuring the availability of adequate funds for completion of retirement.

(d) An updated list of the owners of property located within or adjacent to the site of the facility, as described in OAR 345-021-0010(1)(f).

Specific actions to be taken to restore the site, provided in the retirement plan, will include, among others:

- **Removal of all facilities.** For the transmission line, these facilities include all support structures, conductors, and overhead shield wires.
- **Removal of foundations.** If required, the removal of any line structure foundations for any existing support structure will be done to a depth of at least 2 feet below grade, depending on ground slope. Any foundations in Exclusive Farm Use zoned lands will be removed to a depth 3 feet below grade. For all foundation area, the area will then be filled with soil or gravel.
- **Site Restoration.** Restoration of all line structure locations and access roads to a useful, condition consistent with site zoning, including Exclusive Farm Use (EFU) and Forest Resource (FR) Use zoning. This restoration will include restoring the site to a condition suitable for uses comparable with the surrounding land uses, intended land use, and then-current technologies.
- **Revegetation:** Vegetation will be restored to the maximum extent practicable and all areas disturbed by construction shall be landscaped in a manner compatible with the

surroundings and proposed use. In forested areas, the area would either be reforested or allow to regrow naturally.

5.0 Total Costs, Estimating Methods, and Assumptions

(C) An estimate, in current dollars, of the total and unit costs of restoring the site to a useful, non-hazardous condition.

PacifiCorp estimates that the total costs of restoring the site to a useful, non-hazardous condition is between \$3,000,000 and \$5,000,000 4th Quarter 2017 dollars; the average cost per transmission line mile is approximately \$125,000 and the estimated total to remove the Sams Valley substation is about \$2,800,000. Please note, however, that due to the very long predicted useful life of the facilities (in excess of 100 years), it is extremely difficult to predict with any certainty the actual costs that might be incurred if and when the facilities are ever retired. This is due to factors such as changed in construction costs, technology, and inflation rates over such a long timescale.

(D) A discussion and justification of the methods and assumptions used to estimate site restoration costs.

Given the long, potentially indefinite useful life of the Project facilities, new transmission line retirement and site restoration, decommissioning cost estimates at this time may be of limited relevance. In the very unlikely event, and at such time, that the Project's facilities have to be removed from service, PacifiCorp will provide a detailed retirement and restoration cost estimate.

The costs are based on the application of EFSC guidelines for transmission facility retirement and include the following assumptions among others:

- Mobilization and demobilization costs is estimated to be approximately 5 percent of the overall contractor's costs to remove wire, towers, and foundations and complete project restoration.
- Unit costs were generally developed by determining a loaded crew rate per hour for the given activity. Loaded crew rates include wages and benefits, per diem, equipment rates, contractor overheads, and profit. Hours or days per removal of a given unit were then established for the removal of wire, structures, and foundations. Crew rates and wages were developed from MS Means standard crews.
- Several other miscellaneous costs have been approximated, including permits, engineering, signage, fencing, traffic control, communication station removal, utility disconnects, etc. In the context of the overall estimate, these are incidental costs making up around 5 percent of the total.

6.0 Monitoring Plan

(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.

In the event that PacifiCorp elects to retire the transmission line, the site could be restored to a useful, condition consistent with site zoning, including Exclusive Farm Use (EFU) and Forest Resource zoning. The existing facilities could be removed without significant risk of contamination. The Project is not expected to cause site contamination with hazardous materials, and no contamination monitoring plan is proposed.

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Exhibit X

Noise

Sams Valley Reinforcement Projects December 2017

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Attachment X-1. Tabulated Summary of Acoustic Modeling Results by Receptor Location

Acronyms and Abbreviations

BPA	Bonneville Power Administration
CadnaA	Computer-Aided Noise Abatement Program
dBA	A-weighted decibel
dB	Linear decibel
EFSC	Energy Facility Siting Council
EPRI	Electric Power Research Institute
Hz	Hertz
ISO	International Organization for Standardization
kV	kilovolt
L ₁	the sound level exceeded 1% of the time
L ₁₀	the sound level exceeded 10% of the time
L ₅₀	the sound level exceeded 50% of the time
L _p	sound pressure level
L _w	sound power level
MVA	Megavolt ampere
NEMA	National Electrical Manufacturers Association
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODOE	Oregon Department of Energy
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects
ROW	Right-of-way
USGS	U.S. Geological Survey

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1.0 Introduction

The Energy Facility Siting Council (EFSC; Council) previously approved the Eugene–Medford 500 kilovolt (kV) Transmission Line Project (EFSC 1990) and found that PacifiCorp dba Pacific Power (PacifiCorp) appropriately addressed the requirements for noise. PacifiCorp seeks to expand the EFSC-certificated facility boundary to include the Grants Pass–Sams Valley Transmission Line and the Sams Valley Substation for the Sams Valley Reinforcement Projects (Project). The analysis in this exhibit focuses on the Project described in the *Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line*.

Exhibit X provides an analysis of potential significant adverse impacts of the Project to the existing acoustic environment and noise sensitive receptors (NSRs). This exhibit demonstrates that the Project complies with the approval standards in Oregon Administrative Rule (OAR) 340-035-0035 and the submittal requirements in (OAR) 345-021-0010(1)(x).

This exhibit analyzes potential impacts at NSRs associated with construction and operation of the Sams Valley Substation and Project transmission line. The subsequent sections present the applicable noise criteria, a review of existing conditions, a description of the acoustic modeling methodology, results, and compliance assessment with the noise criteria.

2.0 Site Certificate Condition Compliance

PacifiCorp proposes the new following additional site certificate condition:

- **Noise Control Regulation Condition 1:** PacifiCorp shall design and build the Sams Valley Substation to adhere to the applicable approval standards in OAR 340-035-0035. Supplementary analysis, which may include (but not be limited to) collection of field data, will be conducted as necessary, to adequately demonstrate compliance with the standards.

3.0 Regulatory Environment

This section described the noise-related requirements that may be applicable to the Project at the federal, state, county and local levels. The acoustic assessment described in Exhibit X is limited to that of off-site receptors and not potential on-site noise exposure as regulated by the United States Occupational Health and Safety Administration.

3.1 Federal Noise Regulations

There are no federal regulatory requirements in the United States that specifically refer to transmission lines as noise sources.

3.2 State Noise Regulations

OAR Chapter 340, Division 35 prescribes noise regulations applicable throughout the State of Oregon, with specific requirements in OAR 340-035-0035, “Noise Control Regulations for Industry and Commerce.” This standard provides guidance for new noise sources on a previously used site:

OAR 340-035-0035(1)(b)(A) New Sources Located on Previously Used Sites. No person owning or controlling a new industrial or commercial noise source located on a previously used industrial or commercial site shall cause or permit the operation of that noise source if the statistical noise levels generated by that new source and measured at an appropriate measurement point, specified in subsection (3)(b) of this rule, exceed the levels specified in Table 8, except as otherwise provided in these rules. For noise levels generated by a wind energy facility including wind turbines of any size and any associated equipment or machinery, subparagraph (1)(b)(B)(iii) applies.

Table X-1 gives statistical noise limits as summarized below. All limits are presented in terms of A-weighted decibels (dBA). The L_{50} is the median sound level (50% of the measurement interval is above this level, 50% is below). The noise limits apply at “appropriate measurement points” on “noise sensitive property.” The noise limits apply at “appropriate measurement points” on “noise sensitive property.”¹ The appropriate measurement point is defined as whichever of the following is farther from the noise source:

- 25 feet toward the noise source from that point on the noise sensitive building nearest the noise source; or
- The 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 above criteria in more than an incidental manner.”

Table X-1. New Industrial and Commercial Noise Standards

Statistical Descriptor	Maximum Permissible Statistical Noise Levels (dBA)	
	Daytime (7:00 a.m. – 10 p.m.)	Nighttime (10 p.m. – 7 a.m.)
L_{50}	55	50
L_{10}	60	55
L_1	75	60
Source: OAR 340-035-0035, Table 8		

¹ OAR 340-035-0035(3)(b)

The standard also provides guidance for new noise sources on a previously unused site, which is defined in OAR 340-035-0015(47) as property which has not been used by any industrial or commercial noise source during the 20 years immediately preceding commencement of construction of a new industrial or commercial source on that property. The standard reads as follows:

OAR 340-035-0035(1)(b)(B)(i) No person owning or controlling a new industrial or commercial noise source located on a previously unused industrial or commercial site shall cause or permit the operation of that noise source if the noise levels generated or indirectly caused by that noise source increase the ambient statistical noise levels, L_{10} or L_{50} , by more than 10 dBA in any one hour, or exceed the levels specified in Table 8, as measured at an appropriate measurement point, as specified in subsection (3)(b) of this rule, except as specified in subparagraph (1)(b)(B)(iii).

OAR 340-035-0035(1)(b)(B)(ii) The ambient statistical noise level of a new industrial or commercial noise source on a previously unused industrial or commercial site shall include all noises generated or indirectly caused by or attributable to that source including all of its related activities. Sources exempted from the requirements of section (1) of this rule, which are identified in subsections (5)(b) - (f), (j), and (k) of this rule, shall not be excluded from this ambient measurement."

In accordance with the regulatory definitions in OAR Chapter 340-035, the analysis presented in this Exhibit X assumes that the transmission line will constitute an industrial or commercial use located on predominantly previously unused sites and therefore, to demonstrate compliance with OAR 340-035-0035(1)(b)(B)(i), the Project would demonstrate that as a result of operation, the ambient statistical noise level must not be increased by more than 10 A-weighted decibels (dBA) in any one hour. In the absence of actual ambient sound data, previously the Oregon Department of Energy (ODOE) has allowed applicants to assume a default rural background sound level of 26 dBA, resulting in an effective limit of 36 dBA at the farthest appropriate measurement point. PacifiCorp has conservatively modeled all locations and reserves the right to argue that portions of the Project constitute new sources located on previously used sites, to not exceed the absolute limits provided in Table 8 or as per OAR 340-035-0035(1)(b)(A).

3.2.1 Exemptions to State Noise Regulations

OAR 340-035-0035(5) specifically exempts construction activity from the state noise standards and regulations, as indicated below. This section also provides an exemption for maintenance of capital equipment, the operation of aircraft (such as helicopters used in Project construction), and sounds created by activities related to timber harvest.

OAR 340-035-0035(5) Exemptions:

Except as otherwise provided in subparagraph (1)(b)(B)(ii) of this rule, the rules in section (1) of this rule shall not apply to:

[section abridged for brevity]

- (b) Warning devices not operating continuously for more than 5 minutes;*
- (g) Sounds that originate on construction sites.*
- (h) Sounds created in construction or maintenance of capital equipment;*
- (j) Sounds generated by the operation of aircraft and subject to pre-emptive federal regulation. This exception does not apply to aircraft engine testing, activity conducted at the airport that is not directly related to flight operations, and any other activity not pre-emptively regulated by the federal government or controlled under OAR 340-035-0045;*
- (k) Sounds created by the operation of road vehicle auxiliary equipment complying with the noise rules for such equipment as specified in OAR 340-035-0030(1)(e);*
- (m) Sounds created by activities related to the growing or harvesting of forest tree species on forest land as defined in subsection (1) of ORS 526.324.*

OAR 340-035-0035(6) allows for some exceptions to the state noise regulations:

OAR 340-035-0035 (6) Exceptions:

Upon written request from the owner or controller of an industrial or commercial noise source, the Department may authorize exceptions to section (1) of this rule, pursuant to rule 340-035-0010, for:

- (a) Unusual and/or infrequent events;*
- (b) Industrial or commercial facilities previously established in areas of new development of noise sensitive property;*
- (c) Those industrial or commercial noise sources whose statistical noise levels at the appropriate measurement point are exceeded by any noise source external to the industrial or commercial noise source in question;*
- (d) Noise sensitive property owned or controlled by the person who controls or owns the noise source;*
- (e) Noise sensitive property located on land zoned exclusively for industrial or commercial use.*

3.3 County and Municipal Noise Regulations

The Project is located within Jackson and Josephine counties in Oregon. The discussion of noise in the Jackson County Code of Ordinances is limited to noise nuisances and is strictly qualitative, not prescribing any numerical decibel limits. Similarly, Josephine County does not prescribe any numerical decibel limits applicable to the Project.

4.0 Existing Conditions

A wide range of noise settings occur within the acoustic Analysis Area. The background sound level will vary spatially and is related to various physical characteristics such as topography, land use, proximity to transportation corridors and terrain coverage including extent and height of exposed vegetation. The acoustic environment will also vary due in part to surrounding land use and population density. Areas in proximity to major transportation corridors such as interstate highways and areas with higher population densities and are expected to generally have higher existing ambient sound levels as compared to open and rural lands. Table X-2 shows the relative A-weighted noise levels of common sounds measured in the environment and industry.

Table X-2. Sound Pressure Levels (LP) and Relative Loudness

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (Perception of Different Sound Levels)
Jet aircraft takeoff from carrier (50 ft.)	140	Threshold of pain	64 times as loud
50-hp siren (100 ft.)	130		32 times as loud
Loud rock concert near stage Jet takeoff (200 ft.)	120	Uncomfortably loud	16 times as loud
Float plane takeoff (100 ft.)	110		8 times as loud
Jet takeoff (2,000 ft.)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 ft.)	90		2 times as loud
Garbage disposal Food blender (2 ft.) Pneumatic drill (50 ft.)	80	Loud	Reference loudness
Vacuum cleaner (10 ft.)	70	Moderate	1/2 as loud
Passenger car at 65 mph (25 ft.)	65		
Large store air-conditioning unit (20 ft.)	60		1/4 as loud
Light auto traffic (100 ft.)	50	Quiet	1/8 as loud
Quiet rural residential area with no activity	45		
Bedroom or quiet living room Bird calls	40	Faint	1/16 as loud
Typical wilderness area	35		
Quiet library, soft whisper (15 ft.)	30	Very quiet	1/32 as loud
Wilderness with no wind or animal activity	25	Extremely quiet	

Table X-2. Sound Pressure Levels (LP) and Relative Loudness

Noise Source or Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (Perception of Different Sound Levels)
High-quality recording studio	20		1/64 as loud
Acoustic test chamber	10	Just audible	
	0	Threshold of hearing	
Adapted from: Bolt, Beranek and Newman, Inc., 1988 and EPA, 1971.			

For the purposes of the acoustic analysis and regulatory compliance assessment, the Project elected to complete a baseline sound monitoring program, to provide further information as necessary to demonstrate compliance with OAR 340-035-0035(1)(b)(B)(i), which establishes criteria incrementally relative to existing conditions. The baseline sound monitoring program has not been completed at this time but results will be shared with the ODOE upon its completion and the data collected will be used to reassess existing conditions and Project compliance.

In the absence of actual ambient sound data, previously the ODOE has allowed applicants to assume a default rural background level of 26 dBA, which PacifiCorp will apply until the baseline noise measurements are completed.

5.0 Predicted Noise Levels – OAR 345-021-0010(1)(x)(A)

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 340-35-0035. The applicant shall include:

OAR 345-021-0010(1)(x)(A) Predicted noise levels resulting from construction and operation of the proposed facility

5.1 Construction Noise Assessment

Noise generated during Project construction will include sound sources associated with both transmission line and substation construction as well as potential activities associated with blasting and helicopter operations. While potential noise impacts are considered, according to OAR 340-035-0035(5)(g) sound originating from construction sites is exempt from state noise regulations.

5.1.1 Transmission Line Construction

Overhead transmission line construction is typically completed in the following stages, but various construction activities may overlap, with multiple construction crews operating simultaneously:

- Site access and preparation;
- Installation of structure foundations;
- Erecting of support structures; and
- Stringing of conductors, shield wire and fiber optic ground wire.

Work in proximity of any single NSR will likely last no more than a few weeks, as construction activities move along the corridor. Therefore, no one NSR will be exposed to significant noise levels for an extended period of time.

Construction of the Project will require the use of heavy equipment that will be periodically audible outside the immediate transmission line right-of-way. Construction may generate noise levels that exceed the ambient levels and has the potential to cause a temporary and short term disturbance. The Project will make reasonable efforts to minimize the impact of noise resulting from construction activities. The following sections address three specific construction techniques that are a potential noise source.

5.1.2 Blasting

Transmission tower foundations will normally be installed using drilled shafts or piers; however, if hard rock is encountered within the planned drilling depth, blasting may be required to loosen or fracture the rock in order to reach the required depth to install the structure foundations. Locations where blasting may be required will be identified during the geotechnical engineering study.

Blasting is a short duration event as compared to rock removal methods such as using track rig drills, rock breakers, jack hammers, rotary percussion drills, core barrels, and/or rotary rock drills. Blasting creates a sudden and intense airborne noise potential as well as local ground vibration. Modern blasting techniques include electronically controlled ignition of multiple small explosive charges in an area of rock. The detonations are timed so that the energy from individual detonations destructively interferes with each other, which is called wave canceling. The total duration of a typical blast event is approximately 3/10 of a second. Impulse (instantaneous) noise from blasts could reach up to 140 dBA at the blast location, attenuating to approximately 90 dBA at a distance of 500 feet from the blast.

Blasting will be limited to between sunrise and sunset, if blasting is necessary during construction. Blasting plans will be required of all contracted blasting specialists, demonstrating compliance with all Oregon Department of Environmental Quality (ODEQ) state and local blasting regulations, including the use of properly licensed personnel and obtaining all necessary permits and authorizations.

5.1.3 Helicopter Operation

Access roads are generally required to each tower site for construction, operation and maintenance activities, but there may be areas where access roads are limited in width, grade, or availability and require assistance by helicopters during construction. Project construction activities that could be facilitated by helicopters may include delivery of construction laborers, equipment, and materials to structure sites; structure placement; hardware installation; and wire stringing operations. Air-cranes and/or heavy-lift helicopters are sometimes used for foundation construction and tower erection in areas with difficult access. The primary sources of wideband acoustic energy from air-cranes are the main and tail rotor. Helicopters generally fly at low altitudes; therefore, potential temporary increases to ambient sound levels would occur in the area where helicopters are operating as well as along their flight path.

5.1.4 Implosive Devices

At the tangent and small angle structures, the conductors will be attached to the insulators using clamps to “suspend” the conductors from the bottom of the insulators. At the larger angle dead-end structures, the conductors cannot be pulled through and so are cut and attached to the insulator assemblies at the structure “dead ending” the conductors. There are two primary methods to attach the conductor to the insulator assembly at the dead end structure. The first method, hydraulic compression fittings, uses a large press and pump that closes a metal clamp or sleeve onto the conductor. This method requires heavy equipment and is time consuming. The second method, implosive fittings, uses explosives to compress the metal together. The implosive type sleeve is faster to install and results in a very secure connection between the conductor and the sleeve. Implosive fittings do not require heavy equipment, but do create noise similar to a loud explosion when the primer is struck. Implosive sleeves may be used for the Project.

5.1.5 Substation Construction

Modification of existing and development of the Sams Valley Substation will include construction and installation of equipment. New permanent access roads may be required as well as clearing of all vegetation and grading the site until it is essentially flat. Secure fencing and a grounding system must also be in place prior to the foundation installation. The substation equipment such as the transformers and circuit breakers can then be mounted directly to the foundations. The control building is constructed and high voltage conductors are installed. Construction equipment and resulting received sound levels are expected to be similar to that produced during transmission line construction.

Construction work on the substations will generally occur in one or more of the following phases depending on the extent of site work required:

- Site clearing;
- Site grading and compaction;
- Trenching and foundations;

- Equipment pads; and
- Equipment installation.

Equipment utilized for construction will differ from one phase to another. In general, heavy equipment (bulldozers, dump trucks, cement mixers) will be used during excavation and concrete pouring activities.

5.1.6 Anticipated Construction Noise Levels - OAR 345-021-0010(1)(x)(A)

Noise levels from overhead transmission line construction were evaluated using a screening-level analysis approach. The calculation methodology requires the input of the number and type of construction equipment by phase as well as typical noise source levels associated with that equipment. The results of this evaluation are estimated composite sound levels at a distance of 50 feet and 1,000 feet. Table X-3 summarizes results for the five conceptual construction phases. The composite noise levels take into account the estimated time that equipment is in operation.

Table X-3. Construction Phase Noise Levels for Overhead Line Construction

Phase No.	Construction Phase	Example Construction Equipment	Equipment Noise Level at 50 feet, dBA	Composite Noise Level at 50 feet, dBA	Composite Leq Noise Level at 1000 feet, dBA
1	Site Access and Preparation	Bulldozer Grader Roller – Compactor Loader Water Truck Dump Truck	86 82 73 78 80 80	85	51
2	Installation of Structure Foundations	Bulldozer Loader Backhoe-Loader Fork Lift Mobile Crane Mobile Crane Auger Rig Drill Rig Compressor Pump Portable Mixer Jackhammer Cement Mixer Truck Dump Truck Slurry Truck	86 78 80 80 82 82 85 87 81 83 82 90 80 80 80	91	56

Table X-3. Construction Phase Noise Levels for Overhead Line Construction

Phase No.	Construction Phase	Example Construction Equipment	Equipment Noise Level at 50 feet, dBA	Composite Noise Level at 50 feet, dBA	Composite Leq Noise Level at 1000 feet, dBA
		Specialty Truck	75		
		Water Truck	80		
3	Erecting of Support Structures	Forklift	80	95	60
		Mobile Crane	82		
		Compressor	81		
		Flatbed Truck	75		
		Flatbed Truck	75		
		Water Truck	80		
		Heavy Lift Helicopter	95		
4	Stringing of Conductors, Shield Wire and Fiber Optic Ground Wire	Tracked Dozer	86	93	58
		Backhoe-Loader	80		
		Compressor	81		
		Line Puller	81		
		Mixed Trucks	80		
		Specialty Truck	75		
		Specialty Truck	75		
		Water Truck	80		
		Light Helicopter	92		
Data compiled in part from the following sources: FHWA, 1992, 2006; Bolt, Beranek and Newman, Inc., 1977. Note: Table of results is subject to revision. Data is provided for illustrative purposes only and may not be representative of final equipment used during Project construction.					

Construction of the Sams Valley Substation will generate noise that will temporarily affect offsite NSRs. Average site sound levels for each phase of substation construction are presented in Table X-4 below. The composite noise levels take into account the estimated time that equipment is in operation.

Table X-4. Construction Phase Noise Levels for Substation Construction

Phase No.	Construction Phase	Example Construction Equipment	Equipment Noise Level at 50 feet, dBA	Composite Noise Level at 50 feet, dBA	Composite Leq Noise Level at 1000 feet, dBA
1	Site Clearing	Brush Cutters Tracked Dozer Wheeled Tractor Wheeled Loader Wood Chipper Water Truck	81 88 80 80 91 80	91	56
2	Site Grading and Compaction	Scraper Tracked Dozer Grader Roller-Compactor Wheeled Loader Backhoe-Loader Water Truck	85 88 82 75 80 80 80	88	53
3	Trenching and Foundations	Excavator Backhoe-Loader Skid-Steer Loader Wheeled Loader Auger Rig Tracked Dozer Cement Mixer Truck Water Truck	80 80 70 80 85 88 80 80	87	53
4	Equipment Pads	Wheeled Loader Mobile Crane Forklift Flatbed Truck Dump Truck Cement Mixer Truck Water Truck	80 82 80 75 80 80 80	84	49
5	Equipment Installation	Compressor Mobile Crane Forklift Wheeled Loader	81 82 80 80	84	49

Table X-4. Construction Phase Noise Levels for Substation Construction

Phase No.	Construction Phase	Example Construction Equipment	Equipment Noise Level at 50 feet, dBA	Composite Noise Level at 50 feet, dBA	Composite Leq Noise Level at 1000 feet, dBA
		Dump Truck	80		
		Specialty Truck	75		
		Water Truck	80		
<p>Data compiled in part from the following sources: FHWA, 1992, 2006; Bolt, Beranek and Newman, Inc., 1977.</p> <p>Note: Table of results is subject to revision. Data is provided for illustrative purposes only and may not be representative of final equipment used during Project construction.</p>					

5.2 Operational Noise Assessment

Noise generated during Project operation will include sound sources associated with both transmission line and substation operation. Transmission line sound sources will primarily consist of corona noise in addition to Aeolian noise, and noise associated with maintenance activities.

5.2.1 Corona Noise

Corona noise is caused by the partial electrical breakdown of the insulating properties of air around the electrical conductors and overhead power lines. Audible noise generated by corona on transmission lines has two major components. The higher frequencies of the broadband component distinguish it from more common outdoor environmental noise. The random phase relationship of the pressure waves generated by each corona source along a transmission line results in a characteristic sound commonly described as crackling, frying, or hissing. The second component is a lower-frequency sound that is superimposed over the broadband noise. The corona discharges produce positive and negative ions that, under the influence of the alternating electric field around alternating current (AC) conductors, are alternately attracted to and repelled from the conductors. This motion establishes a sound-pressure wave having a frequency twice that of the voltage; i.e., 120 hertz (Hz) for a 60-Hz system. Higher harmonics (e.g., 240 Hz) may also be present, but they are generally of lower significance (EPRI 2005). Corona activity increases with increasing altitude, and with increasing voltage in the line, but is generally not affected by system loading. The relative magnitude of hum and broadband noise may be different depending on weather conditions at the line. According to the Electric Power Research Institute (EPRI), when the line is wet (such as during rainy weather conditions), the broadband component typically dominates; however, under icing conditions the lower frequency components may be more prevalent.

Corona noise levels during precipitation may vary over a wide range. During the initial stages, when the conductors are not thoroughly wet, there may be considerable fluctuation in the noise level as the precipitation intensity varies. When the conductors are thoroughly wet, the noise fluctuations

will often be less significant, since even as the intensity of precipitation diminishes the conductors will still be saturated, which can result in corona discharge. The variation in noise levels during rain depends greatly on the condition of the conductor surface and on the voltage gradient at which the conductors are operating. At high operating gradients, the audible noise is less sensitive to rain rate than at low gradients. Consequently, the variation in noise levels is less for the higher gradients. In different weather conditions the relative magnitudes of random noise and hum may be different. Noise levels in fog and snow usually do not attain the same magnitude as compared to rain, and elevated noise levels during fog and snow are usually for a shorter duration in proportion to the event (EPRI, 1982).

During fair weather conditions, corona occurs only at scratches or other imperfections in the conductor surface or where dust has settled on the line. These limited sources are such that the corona activity is minimal, and the audible noise generated is very low. Generally, the fair-weather audible noise of transmission lines cannot be distinguished from ambient noise at the edge of the right-of-way.

Corona noise is not generally an issue at substations. The presence of equipment such as circuit breakers, switches, and measuring devices reduces the electromagnetic field gradient on the buses to a great extent. In addition, the distance from most of the buses to the perimeter of the substation is considerable (on the average, greater than 100 m). Consequently, low levels of corona noise would likely not be readily detectable immediately outside the substation fence line (EPRI, 1982).

5.2.1 Aeolian Noise

In addition to corona noise, wind blowing across power lines and power poles can generate noise when airflow is non-laminar or turbulent. Aeolian, or wind noise is produced when a steady flow of wind interacts with a solid object, such as a tower. The interaction produces oscillating forces on the object which in turn can radiate sound as a dipole source at a given frequency.

The occurrence of Aeolian noise is dependent on several factors and is difficult to predict. Wind noise from a stationary source requires perfect conditions: the wind must blow in a specific direction at a specific speed, and for a sufficient amount of time in order to produce any sound; a slight deviation in either the direction or intensity would disrupt the conditions necessary to produce noise. Wind can create a variety of sounds, ranging from a low hum to a snapping sound to a high whistle. Aeolian noise is not considered a significant contributor to noise disturbance, and has not been considered further in the acoustic analysis.

5.2.2 Vegetation Maintenance

Right-of-way vegetation maintenance may require the use of chain saws. The amount of sound energy generated by a chainsaw depends on several factors including size rating, manufacturer, and equipment condition. Typically, a larger chainsaw necessitates a larger engine due to stronger friction force and this effect may result in a somewhat higher sound source level. Chain sawing activities would occur in many different locations throughout the Analysis Area but all of these locations would not be known until site clearance and maintenance activities begin. Assuming a 110

dBA sound power level (L_w) for a typical chainsaw, at a linear distance of 50 feet, sound would attenuate to approximately 78 dBA. Chainsaw activities would be limited to daytime periods only.

5.2.3 General Maintenance

Routine Project inspections and maintenance will occur annually, but are not expected to result in significant noise generation. Traffic noise generated during Project maintenance and inspection will be of short duration and is not expected to result in adverse noise impacts. General maintenance would include on-site component repair or replacement.

5.2.4 Substations

The primary ongoing noise sources at substations are the transformers, which generate sound generally described as a low humming. There are three main sound sources associated with a transformer: core noise, load noise and noise generated by the operation of the cooling equipment. The core vibrational noise is the principal noise source and does not vary significantly with electrical load.

Transformer noise varies with transformer dimensions, voltage rating, and design, and attenuates with distance. The noise produced by substation transformers is primarily caused by the load current in the transformer's conducting coils (or windings) and consequently the main frequency of this sound is twice the supply frequency (60 Hz). The characteristic humming sound consists of tonal components generated at harmonics of 120 Hz. Most of the acoustical energy resides in the fundamental tone (120 Hz) and the first 3 or 4 harmonics (240, 360, 480, 600 Hz).

Circuit-breaker operations may also cause audible noise, particularly the operation of air-blast breakers, which is characterized as an impulsive sound event of very short duration, and expected to occur no more than a few times throughout the year. Because of its short duration and infrequent occurrence, circuit breaker noise was not considered in this analysis.

5.3 Acoustic Modeling Analysis

Two programs were used for the Project acoustic analysis, the Corona and Field Effects Program Version 3 (Corona 3) and CadnaA. Further details pertaining to these two programs are given in the following subsections.

5.3.1 Corona and Field Effects Program

Transmission line corona sound levels were evaluated using the Corona and Field Effects Program Version 3 (Corona 3), a DOS-based computer model developed by the Bonneville Power Authority (BPA), (BPA 1991). The Corona 3 program uses the algorithms developed by BPA to predict a variety of outputs including electric and magnetic fields and audible noise. The inputs to the Corona 3 model are line voltage, load flow (current), and the physical dimensions of the line (number of phases, conductor diameter, spacing, height, and subconductor configuration) and site elevation.

The BPA method of calculating audible noise from transmission lines is based on long-term statistical data collected from operating and test transmission lines. This method calculates the L_{50} noise level during rainy conditions of 1 mm/hr. Long-term measurements show that L_{50} audible noise levels occur at this rain rate. Results during fair weather conditions are also evaluated. Additional details regarding the Corona 3 program are provided in Exhibit AA.

5.3.2 *CadnaA*

DataKustic GmbH's CadnaA, a computer-aided noise abatement program (version 2017 MR1) was used for the acoustic modeling analysis of the substation operations. CadnaA is a comprehensive 3-dimensional acoustic software model that conforms to the International Organization for Standardization (ISO) standard (ISO, 1996). The engineering methods specified in this standard consist of full (1/1) octave band algorithms that incorporate geometric spreading due to wave divergence, reflection from surfaces, atmospheric absorption, screening by topography and obstacles, ground effects, source directivity, heights of both sources and receptors, seasonal foliage effects, and meteorological conditions.

ISO 9613 was used to calculate propagation and attenuation of sound energy with distance, surface and building reflection, and shielding effects by equipment, buildings, and ground topography. Offsite topography was determined using U.S. Geological Survey (USGS) digital elevation data for the study area. Ground absorption rates are described by a numerical coefficient. For pavement and water bodies, the absorption coefficient is defined as $G = 0$ to account for reduced sound attenuation and higher reflectivity. In contrast, ground covered in vegetation, including suburban lawns, are acoustically absorptive and aid in sound attenuation, i.e., $G = 1.0$. For the acoustic modeling analysis, multiple absorption rates were used. The areas within the project fence line were set to $G = 0$. As a measure of conservatism, the remaining offsite areas were set to the $G = 0.5$. No credit was taken for tree cover and foliage effects, thereby assuming worst case wintertime defoliate conditions.

The effects of wind gradients on outdoor sound propagation can cause variations in the sound level of a distant facility. Similar effects are caused by temperature changes in the atmosphere and resulting variation in the sound speed profile. The sound level variations caused by wind and temperature gradients are most pronounced for large separation distances. Calculations were completed for meteorological conditions corresponding to moderate downwind propagation (i.e. moderate downward refraction). This condition results in efficient outdoor sound propagation between a source and receptor and is consistent with the ISO 9613-2 standard (ISO, 1996). Lower sound levels are expected in other directions dependent on wind velocities, speed, direction, and gustiness.

CadnaA allows for three basic types of sound sources to be introduced into the model: point, line, and area sources. Each noise-radiating element was modeled based on its noise emission pattern. Line sources assume sound emission along their length, which were used to represent transmission lines in the model. Larger dimensional sources, such as the transformer walls, were modeled as area sources. Transformers, firewalls, and onsite buildings were modeled as solid structures

because diffracted paths around and over structures tend to reduce noise levels in certain directions. The interaction between sound sources and structures was also taken into account with reflection loss. The reflective characteristic of the structure is quantified by its reflection loss, which is typically defined as smooth façade from which the reflected sound energy is 2 dB less than the incident sound energy.

5.3.3 Acoustic Modeling Input Parameters

5.3.3.1 Transmission Line

Audible noise levels are dependent upon the configuration of the transmission line and there are three different configurations being analyzed as part of the Project; the existing 230 kV single circuit line, the proposed 230/115 kV double circuit line, and a section of the transmission line where the 230 kV single circuit and 230/115 kV double circuit transmission lines are adjacent to one another. As described in Exhibit AA, the following assumptions were made when modeling the 230/115 kV double circuit line using Corona 3:

- The transmission structure will be a double circuit single pole design for 230 kV on each side. One side will hold the 230 kV circuit and the other the 115 kV circuit.
- Each phase of the 230-kV three-phase circuit will be composed of one conductor. The proposed conductor for the 230-kV line is 1272 ACSR “Bittern.”
- Each phase of the 115-kV three-phase circuit will be composed of one conductor. The conductor for the 115-kV line is 395.5 ACSR “Ibis.”
- A minimum ground clearance of 22.4 feet was used for the lowest phase conductor.
- A maximum voltage of 230-kV and 1445 A/phase (summer) and 1869 A/phase (winter) was used for the 230 kV conductor.
- A maximum voltage of 115-kV and 697 A/phase (summer) and 896 A/phase (winter) was used for the 115 kV conductor.

PacifiCorp is also planning to reductor a 4.7-mile section of 230-kV between the new Sams Valley Substation and existing Whetstone Substation; however, since the overall voltage and capacity of that segment will not change, it is expected that operational sound levels will either remain the same or decrease with the use of newer conductors. Since noise impacts at potential NSRs are not anticipated to change, an acoustic analysis was not required along the reducted section of the Project transmission line.

Figure X-1 displays the Corona 3 audible noise modeling results for the 230/115 kV double circuit line in both fair and foul weather conditions. Audible noise levels are given in terms of the L_{50} metric, which corresponds to metric cited in the applicable ODEQ noise regulations. The transmission line is in the center of a 135 right-of-way (ROW). The plot shows that during foul weather conditions, when more corona is generated, received sound levels attenuate to approximately 40 to 41 dBA at the edge of the ROW.

For the existing Grants Pass to Wheatstone 230 kV single circuit line the following assumptions were made:

- The transmission structure is a 230 kV H frame design.
- Each phase of the 230-kV three-phase circuit is composed of one conductor. The proposed conductor for the 230-kV line is 1272 ACSR “Bittern.”
- A minimum ground clearance of 22.4 feet was used.
- A maximum voltage of 230-kV and 1445 A/phase (summer) and 1869 A/phase (winter) was used for the 230 kV conductor.

Figure X-2 displays the Corona 3 audible noise modeling results for the 230 kV single circuit line in both fair and foul weather conditions. The transmission line is in the center of a 125 ROW. The plot shows that during foul weather conditions, when more corona is generated, received sound levels attenuate to approximately 40 to 41 dBA at the edge of the ROW.

In portions of the segment, the new double circuit lines will parallel an existing 230 kV H frame line that runs from Grants Pass to Whetstone. The 230/115 kV double circuit line will be located approximately 130 feet from the 230 kV single circuit line. Figure X-3 displays the Corona 3 audible noise modeling results for that section of the Project where the double circuit lines parallel the existing 230 kV single circuit line. The plot shows that during foul weather conditions, when more corona is generated, received sound levels attenuate to approximately 36 to 37 dBA at the edge of the ROW.

5.3.3.2 *Sams Valley Substation*

The proposed Sams Valley Substation will include four 250 megavolt ampere (MVA) power transformers. The transformer specification for this project include a National Electrical Manufacturers Association (NEMA) rating of 74/76/77 dBA, corresponding to natural cooling, 1st stage and 2nd stage cooling conditions when measured in accordance with IEEE C57.12.90-1999. Measurements involve taking reference sound level measurements using microphones positioned 0.3 m (1 ft.) from a tautly drawn string that encircles the device at a height above grade set at one-half the overall height of the device. The transformer noise output is the average of all measurements taken around the perimeter, incorporating contributions from both cooling fans and auxiliary equipment. The sound power radiated is calculated from the NEMA sound rating with total sound energy integrated over the total surface area of the transformer’s four sides.

The estimated physical transformer dimensions and schematics were provided by PacifiCorp. While the Sams Valley Substation engineering design is only at a conceptual level, it is expected that the transformers installed will exhibit sound source characteristics similar to the sound data used in the acoustic modeling analysis; however, it is possible that the final warranty sound data could vary slightly. It is reasonable to expect that the transformers installed will conform to all relevant NEMA standards. Representative octave band center frequencies were derived from standardized engineering technical guidelines based on measurements from similar equipment types. Source

levels for each potential operational scenario are provided in Table X-5. The overall A-weighted sound power levels when operating at 100 percent load at the given scenario were calculated for modeling purposes.

Table X-5. Transformer Sound Power Levels (L_w) for Three Operational Scenarios

Operational Scenario	Octave Band Sound Power Data (dBL)									Overall dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Scenario 1: Natural Cooling	83	89	91	86	86	80	75	70	63	95
Scenario 2: 1 st Stage Cooling	85	91	93	88	88	82	77	72	65	97
Scenario 3: 2 nd Stage Cooling	86	92	94	89	89	83	78	73	66	98

6.0 Assessment of Compliance with Applicable Noise Regulations – OAR 345-021-0010(1)(x)(B)

OAR 345-021-0010(1)(x)(B) An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-35-0035, including a discussion and justification of the methods and assumptions used in the analysis.

6.1 Transmission Line

The Project has a design goal threshold of 10 dBA above the background level to represent the point where the audibility of Project noise might be characterized as an adverse noise impact per OAR 340-035-0035(1)(b)(B)(i). To analyze transmission line noise emissions and impacts at potential NSRs the following steps were followed:

1. As described in section 5.3.3.1, the Corona 3 program was used to derive the sound source levels of both the existing operational Grants Pass to Whetstone 230-kV transmission line as well as the proposed Project 230/115 kV double circuit transmission line between the new Sams Valley Substation and Grants Pass Substation;
2. Using CadnaA, initial screening level modeling results of the proposed transmission line were compared to a rural background of 26 dBA (representative of near silence). If results of the acoustic modeling analysis show that sound levels will also attenuate to below the 36 dBA threshold cumulatively; and the net increase was determined to be 10 dBA or less, compliance with the OAR ambient degradation test was inferred;
3. The Project modeled sound level was then compared to the modeled sound level from the existing Grants Pass to Whetstone 230-kV transmission line, which was modeled using the same methodology as described to analyze the Project. If the net increase above the

modeled levels from the existing transmission lines was determined to be 10 dBA or less, compliance with the OAR degradation test was inferred;

4. In the event that there were NSRs still indicating an exceedance, ambient sound data collection may be required to better assess existing conditions in the vicinity of those NSRs. Assessment using the OAR ambient degradation would then be completed once again.

Attachment X-1 shows modeling results tabulated by NSRs including unique identification number, the distance to the Project transmission line, and the modeled results in dBA. By using steps 1 through 3, model results indicate that there are no NSRs that are expected to exceed the OAR 10 dBA ambient degradation standard. In addition, Table X-1 presents the statistical limits for the OAR New Industrial and Commercial Noise Standards. Because the transmission line will operate continuously during day and night, the more stringent nighttime permissible sound level will become the controlling limit. Accordingly, the maximum permissible received sound level for any given NSR is L_{50} 50 dBA. No received sound levels at NSRs exceed the 50 dBA limit even during foul weather conditions likely to generate corona. Therefore, operation of the Project 230/115 kV double circuit transmission line between Grants Pass and Sams Valley Substations, has demonstrated full compliance with the applicable noise requirements.

6.2 Sams Valley Substation

CadnaA was used to model the operational sound levels associated with the Sams Valley Substation. Sound source details for the four 250 MVA transformers is presented in section 5.3.3.2; however, per PacifiCorp's direction, only three transformers would operate at any given time. A fourth transformers is included onsite in the event that one of the other transformers cannot operate due to needed maintenance. For the purposes of the acoustic modeling analysis it was assumed that the southernmost transformer would not be in operation.

Received sound levels were evaluated within ½-mile of the substation fence line. The resultant sound contour plot displaying operational broadband (dBA) sound levels associated with the Sams Valley Substation are presented as color-coded isopleths in Figure X-4 (natural cooling), Figure X-5 (1st stage cooling) and Figure X-6 (2nd stage cooling). Results from acoustic modeling are projected in 5 dBA increments on scaled USGS orthophotos maps. Results are independent of the existing acoustic environment, representative of Project-generated sound levels only. The sound contour isopleths are plotted at a height of 1.52 meters above ground level, about the height of the ears of a standing person. Sound levels were also calculated at discrete receptor locations at a height of 1.52 meters above ground level, the approximate height of a second story window.

Modeling results show that, assuming the default rural ambient sound level of 26 dBA, that there will be exceedances of the effective 36 dBA limit under all operational scenarios. Once baseline data collection has been completed, compliance will be reevaluated and a noise mitigation assessment will be conducted, if necessary. Final design of the Sams Valley Substation will be specified to comply with all applicable ODEQ noise regulations; OAR Chapter 340, Division 35.

7.0 Measures to Reduce Noise Levels or Impacts to Address Public Complaints – OAR 345-021-0010(1)(x)(C)

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.

The following noise mitigation measures will be considered and incorporated into the Project contract specifications as necessary to minimize Project noise levels to the extent practicable:

- Construction operations will not occur between 8:00 p.m. and 7:00 a.m. on weekdays or Saturday, or at any time on Sunday within 500 feet of an occupied residence.
- Construction site and access road speed limits will be established and enforced during the construction period.
- Electrically-powered equipment will be used instead of pneumatic or internal combustion powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas will be located as far as practicable from NSRs.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, will be for safety warning purposes only.
- No Project-related public address or music system will be audible at any adjacent receptor.
- All noise-producing construction equipment and vehicles using internal combustion engines will be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed “package” equipment (e.g., arc-welders, air compressors) will be equipped with shrouds and noise control features that are readily available for that type of equipment.
- Final transformer specifications and noise warranty data will be reviewed by an acoustic engineer. Transformers installations or upgrades may be specified as NEMA quieted (or low noise), as necessary to meet Project design goals and compliance with OAR Chapter 340, Division 35.
- All construction noise complaints will be logged within 48 hours of issuance. The construction supervisor will have the responsibility and authority to receive and resolve noise complaints. A clear appeal process to the owner will be established prior to the start of construction that will allow for resolution of noise problems that cannot be resolved by the site supervisor in a reasonable period of time.

8.0 Monitoring – OAR 345-021-0010(1)(x)(D)

OAR 345-021-0010(1)(x)(D) Any measures the applicant proposes to monitor noise generated by operation of the facility.

The following Noise Complaint Recording and Resolution process will be used for the Project:

- PacifiCorp will establish and publicly advertise a telephone number dedicated to receiving complaints about the Project.
- All complaints received by PacifiCorp from complainants will be entered into the Project Complaints Database and will include the following information: date and time of complaint; contact information for the complainant to allow response and follow-up; the nature of the noise or other activity that led to the complaint, including the time the noise occurred and its duration; and the action that was taken by PacifiCorp, including any follow-up with the complainant, or if no action was taken, the justification supporting the no action decision. Access to the complaint database will be available to the ODOE for inspection, upon request. In the event that resolution involves collecting measurements of the operational noise levels of the Project, a monitoring protocol will be developed and reviewed by ODOE, and measurements will be provided to ODOE.
- In limited instances and in response to specific complaints, a field representative will travel to the site of the complaint and measure the sound levels to verify and quantify the nature of the problem.

9.0 Owners of Noise Sensitive Property– OAR 345-021-0010(1)(x)(E)

OAR 345-021-0010(1)(x)(E) A list of the names and addresses of all owners of noise sensitive property, as defined in OAR 340-035-0015, within one mile of the proposed Site Boundary.

PacifiCorp requests that ODOE specify that strict application of OAR 345-021-0010(1)(x)(E) should not apply to the Project, and instead require PacifiCorp to provide a list of the names and addresses of all NSRs within 0.5 miles of the Site Boundary for the transmission line and any related and supporting facilities. Alternatively, PacifiCorp requests that EFSC issue an order waiving application of OAR 345-021-0010(1)(x)(E) in this case.

- First, the results of PacifiCorp's investigation demonstrate that operational noise from the Project will not impact NSRs beyond 0.5 miles. On this point, it is important that construction noise is exempted from ODEQ Noise Rules.
- Second, the identification of NSRs along a transmission line is a costly and time-consuming exercise. PacifiCorp has already gone through this process to identify NSRs within 0.5 miles of the Site Boundary. Given that NSRs past 0.5 miles of the Site Boundary will not be

impacted by operational noise from the Project, it would make no sense to require PacifiCorp to go through the process yet a second time.

Exhibit F has a list of the names and addresses of all owners of noise sensitive property within 0.5 miles from the Project Site Boundary, as defined in OAR 340-035-0015.

10.0 References

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Figures

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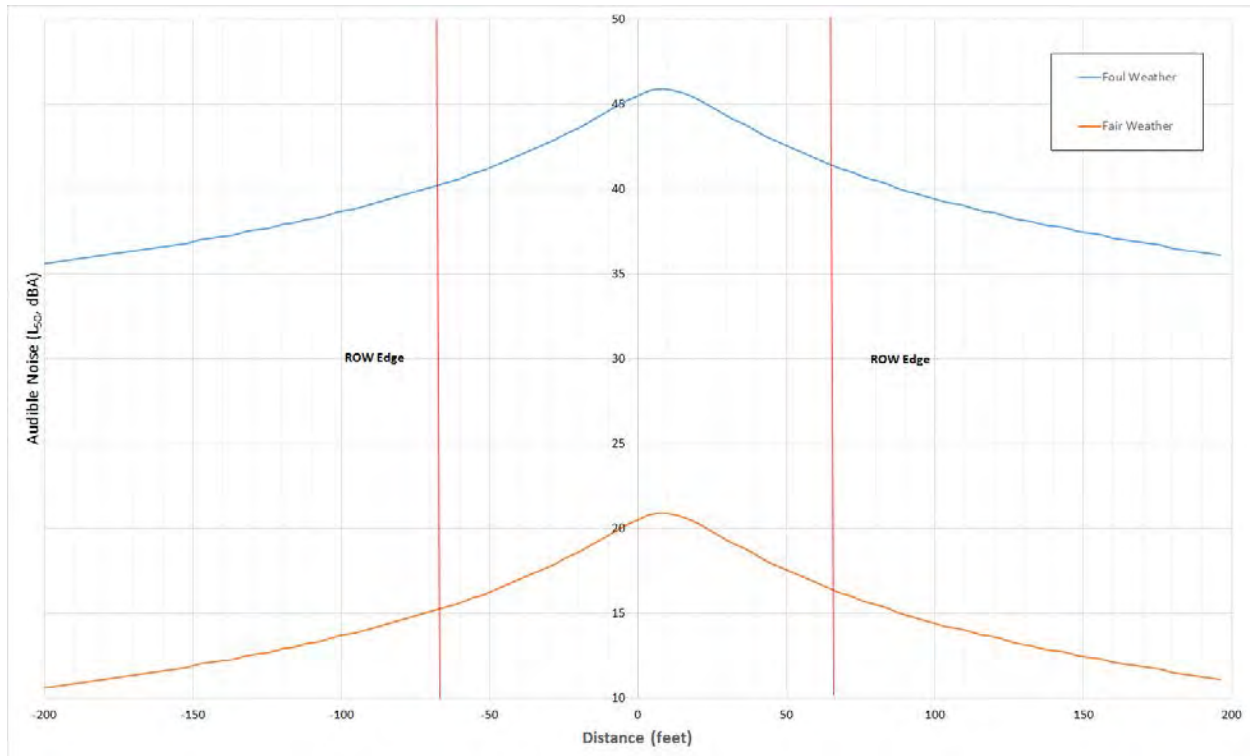


Figure X-1. Audible Noise for Double-Circuit 230/115-kV Single Pole Structures

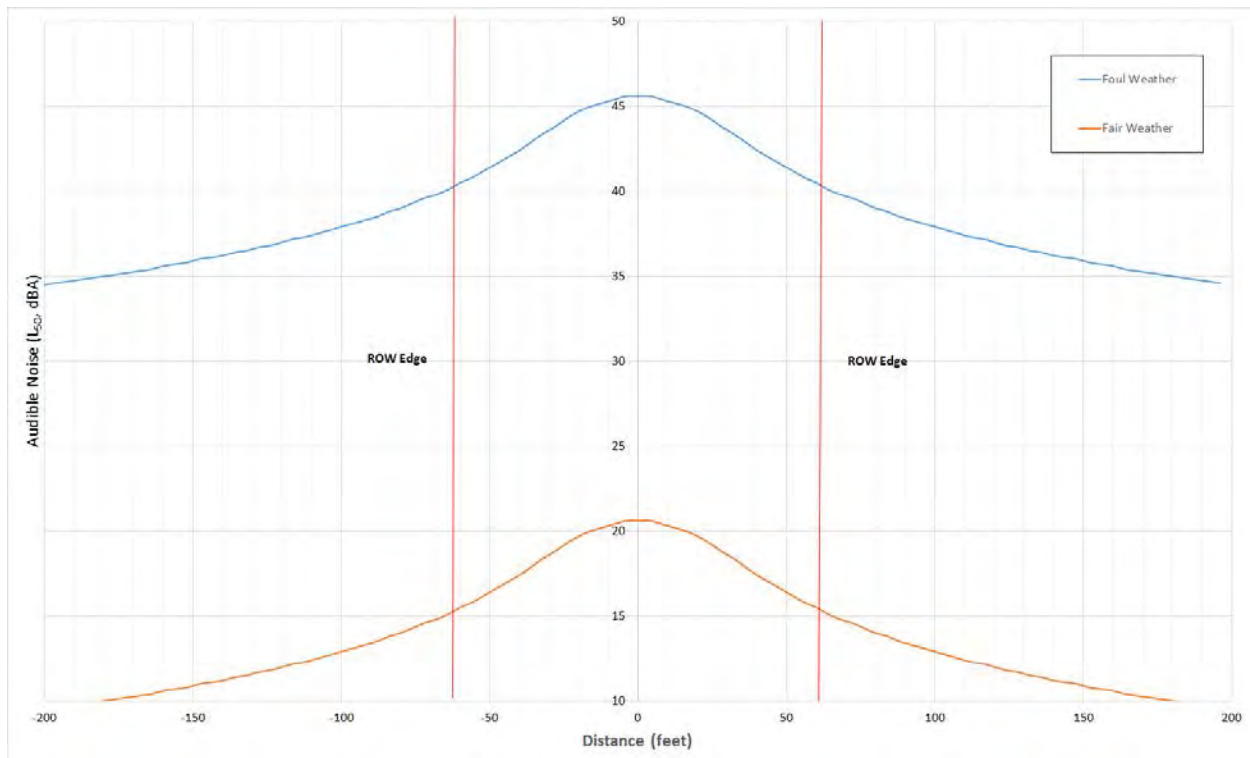


Figure X-2. Audible Noise for Single-Circuit 230-kV H Frame Structures

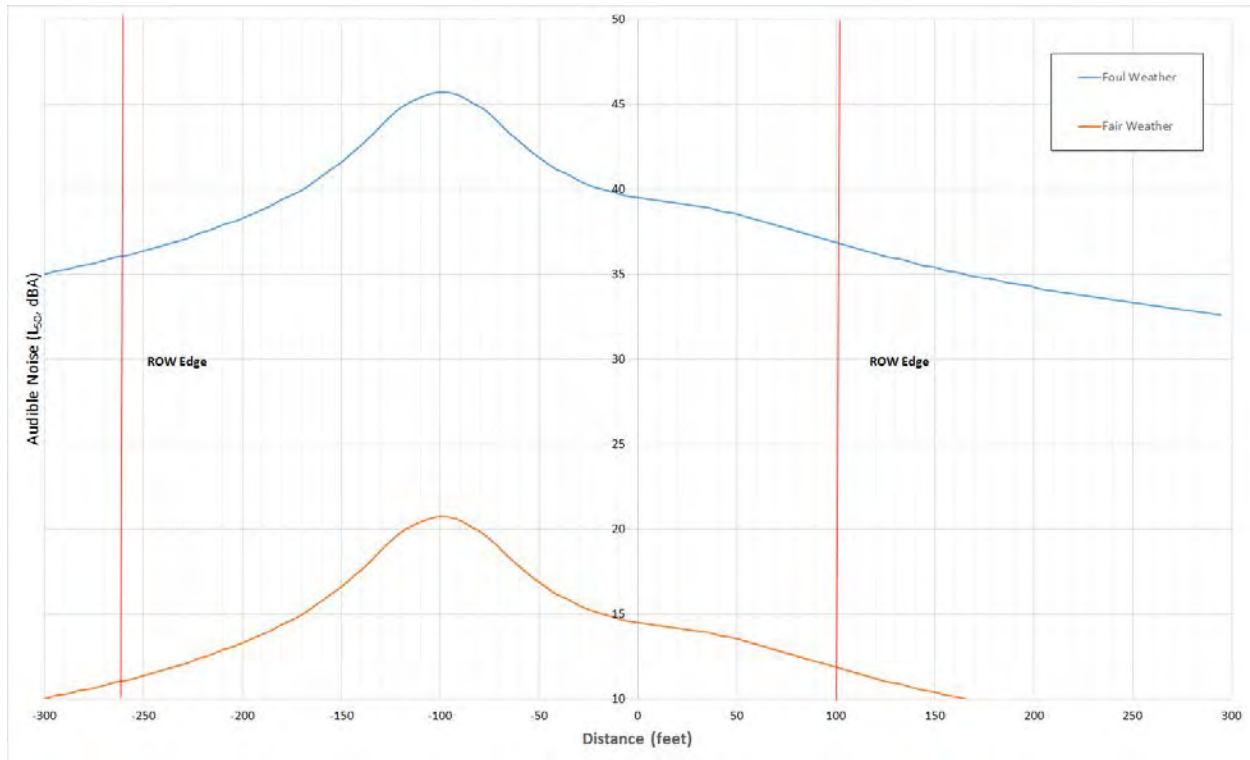
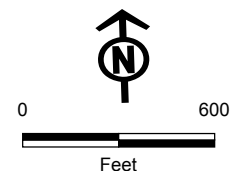
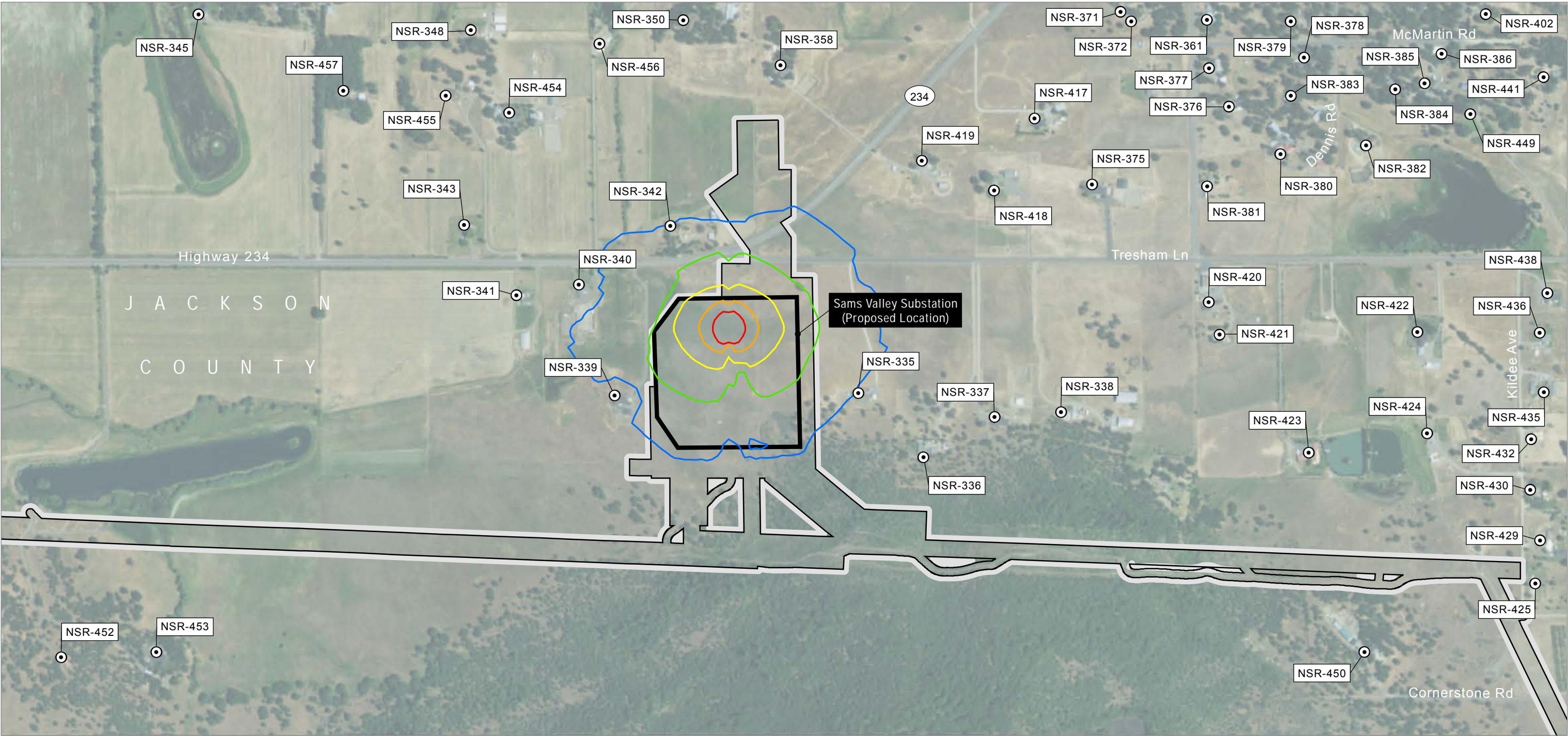


Figure X-3. Audible Noise for Double-Circuit 230/115-kV Single Pole Structures Adjacent to Existing 230 kV H Frame Structures



- Received Sound Levels**
- Potential NSR
 - Sound Contour Level (dBA)
 - 40
 - 45
 - 50
 - 55
 - 60
- Project Features**
- Site Boundary
 - Sams Valley Substation (Proposed Location)



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

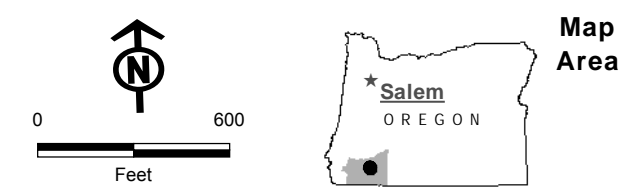
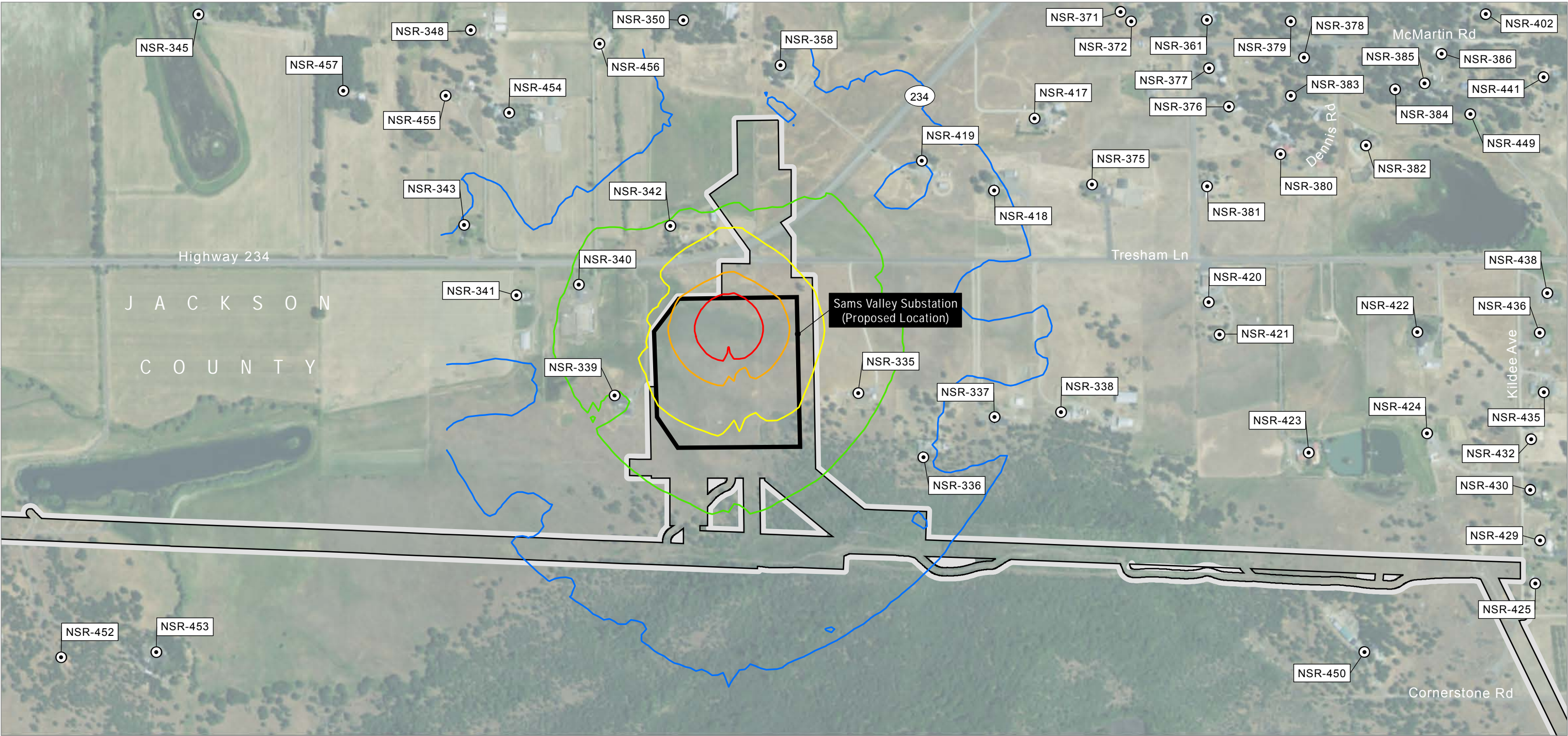
Sams Valley Substation
Received Sound Levels
Natural Cooling

Figure X-4

Source(s): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, PacificCorp

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit X_Noise\FIG X-4 Received Sound Levels - Natural Cooling.mxd December 2017



Source(s): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, PacifiCorp

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit X_Noise\FIG X-5 Received Sound Levels - 1st Stage Cooling.mxd December 2017

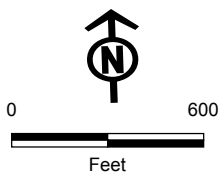
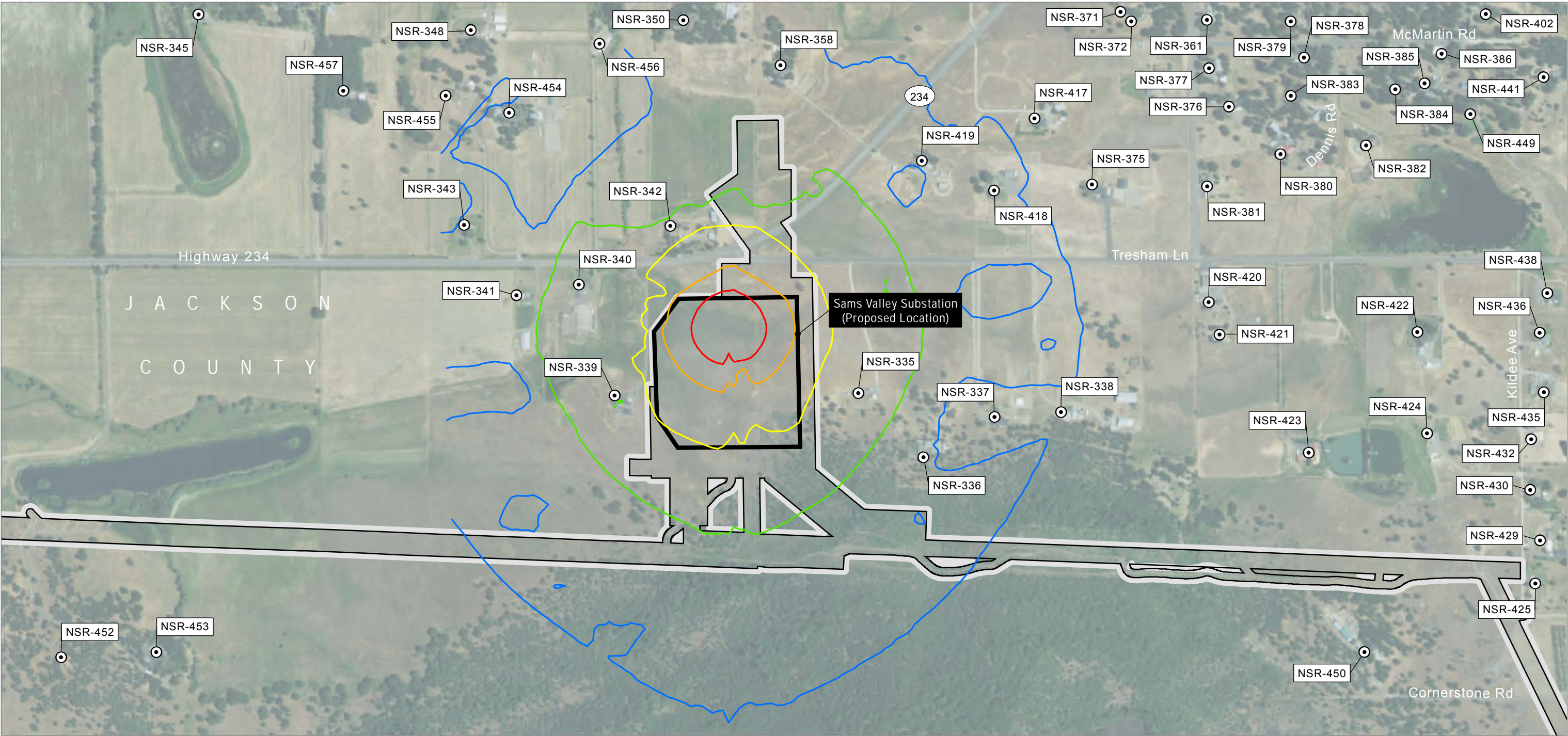
- Received Sound Levels**
- Potential NSR
 - Sound Contour Level (dBA)
 - 40
 - 45
 - 50
 - 55
 - 60
- Project Features**
- Site Boundary
 - Sams Valley Substation (Proposed Location)

PACIFICORP
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Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

Sams Valley Substation
Received Sound Levels
1st Stage Cooling

Figure X-5



- Received Sound Levels**

 - Potential NSR
 - Sound Contour Level (dBA)
 - 40
 - 45
 - 50
 - 55
 - 60
- Project Features**

 - Site Boundary
 - Sams Valley Substation (Proposed Location)



Sams Valley Reinforcement Projects
Josephine and Jackson Counties
Amendment #4

Sams Valley Substation
Received Sound Levels
2nd Stage Cooling

Figure X-6

Source(s): Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, PacifiCorp

Disclaimer: No warranty is made as to the accuracy or completeness of the data shown, and its use is not intended for other than the stated purpose.

Z:\UtilServ\Sams Valley\Reports\Exhibit X_Noise\FIG X-6 Received Sound Levels - 2nd Stage Cooling.mxd December 2017

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Attachment X-1. Tabulated Summary of Acoustic Modeling Results by Receptor Location

(Supplied as Excel file)

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Exhibit Y

Carbon Dioxide Emissions

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Oregon Administrative Rule (OAR) 345-021-0010(1)(y) requires proponents to provide information demonstrating that any proposed facilities that emit carbon dioxide (CO₂), such as a base load gas plant or a fossil fuel-burning power plant, will comply with applicable carbon dioxide emissions standards. For non-generating energy facilities, the requirements of OAR 345-021-0010(1)(y) apply only if the proposed facility will emit CO₂.

The Sams Valley Reinforcement Projects (Project) does not include any proposal to construct any CO₂ emitting facilities; therefore, the Project is exempt from the requirements of OAR 345-021-0010(1)(y).

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Exhibit Z

Evaporative Cooling Tower Requirements

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Oregon Administrative Rule (OAR) 345-021-0010(1)(z) requires proponents to provide information about the cooling tower plume, if the proposed project includes an evaporative cooling tower.

The Sams Valley Reinforcement Projects (Project) is exempt from the requirements of OAR 345-021-0010(1)(z), since the Project does not include the development or use of evaporative cooling towers.

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Exhibit AA

Electromagnetic Frequencies from Transmission Lines

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

A/phase	amps per phase
AC	alternating current
Amended Project Order	First Amended Project Order, Regarding Statutes, Administrative Rules and Other Requirements Applicable to the Proposed Sam's Valley to Whetstone Transmission Line
BPA	Bonneville Power Administration
dB	decibels
EFSC or Council	Energy Facility Siting Council
ELF	extremely low frequency
EMF	electric and magnetic fields
EMR	electromagnetic radiation
EPRI	Electric Power Research Institute
FCC	Federal Communications Commission
GHz	gigahertz
GPS	Global Positioning System
Hz	hertz
IARC	International Agency for Research on Cancer
ICES	International Committee on Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEEE	Institute of Electrical and Electronics Engineers
kHz	kilohertz
kV	kilovolt
kV/m	kilovolt per meter
m	meter
μV/m	microvolt per meter
mG	milligauss
MHz	megahertz
MP	milepost
NESC	National Electrical Safety Code

NIEHS	National Institute of Environmental Health Sciences
NRC	National Research Council
NRPB	National Radiological Protection Board of Great Britain
OAR	Oregon Administrative Rules
Project	Sam's Valley Reinforcement Project

1.0 Introduction

Exhibit AA was prepared to meet the submittal requirements for the Sams Valley Reinforcement Projects (Project), per Oregon Administrative Rule (OAR) 345-021-0010(1)(aa), related to electric and magnetic fields (EMF). Exhibit AA's analysis focuses on two of the Project segments: the Grants Pass-Sam's Valley Transmission Line and the Sams Valley-Whetstone Reconductoring. This Exhibit shows how the Project will be designed, constructed, and operated to ensure public health and safety with EMFs in mind.

The Specific Standards for Transmission Lines under Oregon Administrative Rule (OAR) 345-024-0090 provide PacifiCorp must demonstrate it:

- (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;*
- (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.*

1.1 EMF Background Information

EMFs occur both naturally and as a result of the generation, transmission, and use of electric power. The earth itself generates steady-state magnetic and electric fields. Electromagnetic fields are present around any conductors or devices that transmit or use electrical energy; as a result, exposure to EMF is common from an array of electrical appliances and equipment, building wiring, and electric distribution and transmission lines. The electrical power system in the United States is an alternating current (AC) system operating at a frequency of 60 hertz (Hz)¹, resulting in "power frequency" or "extremely low frequency (ELF)" EMF.² While electric and magnetic fields are often referred to and thought of collectively, each arises through a different mechanism and can have differing effects.

Electric fields around transmission lines are produced by the presence of an electric charge, 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 strength of the electric field is inversely proportional to the square of distance from the conductors; the electric field strength declines as the distance from the conductor increases. The strength of the electric

¹ Hertz is a measure of cycles per second. In a 60-Hz transmission system, the charge and direction of current flow on each conductor will cycle from positive to negative and back to positive 60 times per second. The direction of force in the electric and magnetic fields will also cycle in direct relation to the charge and direction of flow on the conductor.

² The electric transmission system in the U.S. operates at 60 Hz, while in Europe and other parts of the world, the systems operate at 50 Hz; both produce fields that are referred to as power frequency or ELF EMF.

field is measured in units of kilovolts (kV) per meter (m) or kV/m. Electric fields are readily weakened or blocked by conductive objects such as trees or buildings. The direction of force within the electric field alternates at a frequency of 60 Hz, in direct relation to the charge on each conductor. However, the overall transmission line voltage, and therefore the overall strength and reach of the electric field, remains practically steady and is not affected by the common daily and seasonal fluctuations in usage of electricity by customers.

Magnetic fields around transmission lines are produced by the movement of electrical charge, measured in terms of amperage, through the conductors. Like the electric field, the magnetic field alternates at a frequency of 60 Hz. Magnetic field strength is expressed in units of milligauss (mG).³ The magnetic field strength is directly proportional to the amperage; that is, increased current flow resulting from increased power flow through the line produces a stronger magnetic field. As with electric fields, the magnetic field is inversely proportional to the square of the distance from the conductors, declining in strength as the distance from the conductor increases. Magnetic fields are not blocked or shielded by most materials. Unlike voltage, the amperage and the resulting magnetic field around a transmission line fluctuate daily and seasonally as the usage of electricity varies and the resulting amount of current flow varies.

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 is out of sync with the other two phases by 120 degrees, or one-third of the 360 degree cycle. The fields from each of these conductors tend to cancel each other out because of this phase difference. However, since the conductors are separated from each other, when a person stands under a transmission line, one conductor is somewhat closer than the others and will contribute a net uncanceled field at the person's location.

1.2 EMF Standards

No federal regulations or guidelines apply directly to the EMF levels for the Project's proposed lines in Oregon. The National Institute of Environmental Health Sciences (NIEHS) performed an extensive review of field-related issues in the 1990s that resulted in the decision that regulatory actions are unwarranted (NIEHS 1999).

Although there are no federal regulations on power-frequency EMF in the United States, international recommendations and guidelines exist. Table AA-1 lists power-frequency EMF guidelines recommended by the European Union, the International Committee on Electromagnetic Safety (ICES), and the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which is an affiliate of the World Health Organization (EU 1999, ICES 2002, ICNIRP 2010).

³ Magnetic field strength may also be measured in terms of the Tesla, an International System unit of measurement. 1 Gauss = 0.0001 Tesla, or 1 Tesla = 10,000 Gauss; 1 Gauss = 1,000 mG.

Table AA-1. International Guidelines for Alternating Current Power-Frequency EMF Levels

Agency	Exposure	Electric Field (kV/m)	Magnetic Field (mG)
European Union	General public	4.2	833
ICES ¹	Occupational	20	27,100
	General public	5	9,040
	General public within right-of-way	10	NA
ICNIRP	Occupational	8.3	10,000
	General public	4.2	2,000
Magnetic fields are measured in gauss (G) and milligauss. 1 G = 1,000 mG NA = Not Applicable (no requirements) 1. ICES recommendations have been adopted as standards by the Institute of Electrical and Electronics Engineers (IEEE); see Standard C95.6 -2002 (R2007).			

Transmission line projects in Oregon must comply with the electric field standard found in OAR 345-024-0090, which requires that the applicant design, construct, and operate the proposed transmission line so that AC electric fields do not exceed 9 kV/m at 1 meter above the ground surface in areas accessible to the public. There is no similar Oregon design standard for magnetic fields.

Six other states have adopted limits for electric field strength either at the edge or within the right-of-way of the transmission line corridor. Only Florida and New York currently limit magnetic field levels from transmission lines. The magnetic field levels set in those two states only apply at the edge of the right-of-way and were developed to prevent magnetic fields from increasing beyond levels currently experienced by the public. Table AA-2 shows the AC electric field and magnetic field standards that have been adopted by states in the U.S.

Table AA-2. Other State Alternating Current Power-Frequency EMF Standards

State		Location	Electric Field (kV/m)	Magnetic Field (mG)
Florida	230 to 500 kV lines	Within right-of-way	10	NA
		Edge of right-of-way	2	200 ¹
	230 kV or less	Within right-of-way	8	NA
		Edge of right-of-way	2	150
Minnesota		Within right-of-way	8	NA
Montana		Within right-of-way: road crossing	7	NA
		Edge of right-of-way	1 ²	NA
New Jersey		Within right-of-way	NA	NA
		Edge of right-of-way	3	NA

Table AA-2. Other State Alternating Current Power-Frequency EMF Standards

State	Location	Electric Field (kV/m)	Magnetic Field (mG)
New York	Within right-of-way: open	11.8	NA
	Within right-of-way: public road	7	NA
	Within right-of-way: private road	11	NA
	Edge of right-of-way	1.6	200
North Dakota	Within right-of-way	9	NA
	Edge of right-of-way	NA	NA
Oregon	Within right-of-way	9	NA
	Edge of right-of-way	NA	NA
NA = Not Applicable (no requirements) 1. Magnetic field strength is limited to 250 mG for new double-circuit 500-kV lines constructed on a previously existing right-of-way. 2. Can be waived by landowner.			

In the fall of 2009, the Energy Facility Siting Council (EFSC or Council) commissioned a review of existing information to prepare for the review of several transmission lines under discussion at that time. That review was conducted by Dr. Kara Warner and presented to the Council on November 20, 2009, during a regular Council meeting. The prevailing conclusions were that there is a need to continue to monitor the science on EMF; that low-cost, prudent avoidance measures of public EMF exposure are appropriate; and that health-based limits are not appropriate given the scientific data available (EFSC 2009).

2.0 Site Certificate Condition Compliance

No existing site certificate conditions apply to this resource. PacifiCorp proposes the new following condition per OAR 345-021-0010(1)(aa):

- **Siting Standards for Transmission Lines Condition 1:** During construction, in order to reduce or manage human exposure to electromagnetic fields, the site certificate holder shall construct all aboveground transmission lines in accordance with the requirements of the current edition of the National Electrical Safety Code.
- **Siting Standards for Transmission Lines Condition 2:** During operation, the certificate holder shall take reasonable steps to reduce or manage human exposure to induced currents, including:
 - a. Providing to landowners a map of overhead transmission lines on their property;
 - b. Implementing a safety protocol to ensure adherence to NESC grounding requirements.

3.0 Project EMF – OAR 345-021-0010(1)(aa)(A)

OAR 345-021-0010(1)(aa) Exhibit AA. If the proposed energy facility is a transmission line or has, as a related or supporting facility, a transmission line of any size:

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

3.1 Analysis Area –OAR 345-021-0010(1)(aa)(A)(i)

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

3.1.1 Grants Pass–Sams Valley Transmission Line

The Project involves the replacement of an existing 115 kV single circuit transmission line with a new double circuit 230/115 kV transmission line. This 18-mile segment of the line runs from the Grants Pass Substation to the proposed Sam's Valley Substation. The modification consists of replacing the existing 115 kV single circuit transmission line with a new 230 kV capable double circuit line. One side of the new double circuit structures will be built and operated as a new 230 kV line. The other side of the single pole structures will carry the existing 115 kV line.

In portions of the segment, the new double circuit lines will parallel an existing 230 kV H frame line that runs from Grants Pass to Whetstone. In other portions of the segment, the new double circuit line will be by itself. Both portions of the segment are analyzed in this section.

The existing 115 kV transmission line and the proposed 230/115 kV lines will be located approximately in the middle of the 135-foot right-of-way. Where the existing 230 kV line is parallel to the new double circuit line, the existing line is in the center of its adjoining 125-foot right-of-way.

The analysis area for Exhibit AA is the Site Boundary. For purposes of analyzing the Project's EMFs—specifically the AC electric fields and induced currents—PacifiCorp focused its analysis on the existing 100-foot right-of-way for the 115 kV line. The analysis extends outward from the centerline of the 115 kV right-of-way sufficiently far to identify and analyze impacts to structures that may be located within 200 feet on each side of the centerline of the existing 115 kV transmission line alignment. As discussed herein, the analysis shows that the Project's AC electric fields will meet the relevant AC electric field standard within the right-of-way. Moreover, the effects of AC electric fields and induced currents diminish with the square of the distance, meaning the Project will also meet the AC electric field standard beyond the right-of-way, including throughout the entire Site Boundary, which may exceed the right-of-way.

3.1.2 Sams Valley–Whetstone Reconductoring

The Project involves the modification of an existing 230 kV H frame transmission line. The segment of the line that is being analyzed is the 4.7-mile segment that runs from the proposed Sam's Valley Substation to the existing Whetstone Substation. The modification consists of replacing the existing

electrical conductors with new heavier conductors capable of carrying more current than the existing line. This change in conductor size will allow larger currents to flow on the reconducted line. These higher currents will result in higher magnetic fields from the line. However, since the line voltage will remain at 230 kV, the electric fields produced by the line will not change.

The 230 kV line is located within an existing transmission line corridor that also contains an existing 500 kV transmission line and a 115 kV transmission line. The 230 kV reconducted transmission line was modeled both by itself as a new project and in conjunction with the existing 115 kV and 500 kV lines in the corridor.

The 230 kV transmission line is located approximately in the middle of its 100-foot right-of-way. The 230 kV line right-of-way is adjacent to rights of way for the existing 115 kV and 500 kV lines that parallel the 230 kV line in the corridor. The 500 kV line is centered in a 250-foot right-of-way and the 115 kV line is centered in a 100-foot right-of-way. Together the adjoining rights-of-way occupy a total corridor width of 450 feet. In the northern 0.8-mile segment and in the southern 2.2-mile segment of the corridor the 230 kV line is in the center of the corridor. In the middle 1.7-mile portion of the 4.7-mile corridor that the modeling of the three lines combined was conducted where the higher voltage 500 and 230 kV lines occupy the outer portions of the right-of-way.

The analysis area for Exhibit AA is the Site Boundary. For purposes of analyzing the Project's EMFs—specifically the AC electric fields—PacifiCorp initially focused its analysis on the existing 100-foot right-of-way for the 230 kV line. The analysis extends outward from the centerline of the 230 kV right-of-way sufficiently far to identify and analyze impacts to structures that may be located within 200 feet on each side of the centerline of the existing transmission lines alignment. The project was also modeled outward from the centerline of the 230 kV right-of-way on one side of the corridor and the 500 kV line on the other side of the corridor with the existing 115 kV line in the middle of the corridor sufficiently far to identify and analyze impacts to structures that may be located within 200 feet of the centerlines of these existing transmission line alignments.

As discussed herein, the analysis shows that the Project's AC electric fields and induced currents will meet the relevant AC electric field standard within the right-of-way. Moreover, the effects of AC electric fields diminish with the square of the distance, meaning the Project will also meet the AC electric field standard beyond the right-of-way, including throughout the entire Site Boundary, which may exceed the right-of-way.

3.2 EMF Calculation Methods – OAR 345-021-0010(1)(aa)(iv)

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

The electric field, magnetic field, and audible noise that may be produced by the proposed transmission line was predicted using the Corona and Field Effects Program Version 3 (Corona 3), a DOS-based computer model developed by the Bonneville Power Authority (BPA), (BPA 1991). The Corona 3 program uses the algorithms developed by BPA to predict electric and magnetic fields and

audible noise. The inputs to the Corona 3 model are line voltage, load flow (current), and the physical dimensions of the line (number of phases, conductor diameter, spacing, height, and subconductor configuration) and site elevation.

3.2.1 Modeling Assumptions

The EMF values were calculated at a reference height of 1 meter above ground. The voltage of 230-kV circuit was modeled at the nominal value of 230 kV phase to phase voltage and the 115 kV line at 115 kV.

For the proposed 230/115 kV double circuit Grants Pass–Sams Valley Transmission Line:

- The transmission structure will be a double circuit single pole design for 230 kV on each side. One side will hold the 230 kV circuit and the other the 115 kV circuit.
- Each phase of the 230-kV three-phase circuit will be composed of one conductor. The proposed conductor for the 230-kV line is 1272 ACSR “Bittern.”
- Each phase of the 115-kV three-phase circuit will be composed of one conductor. The conductor for the 115-kV line is 395.5 ACSR “Ibis.”
- A minimum ground clearance of 22.4 feet was used for the lowest phase conductor.
- A maximum voltage of 230-kV and 1445 A/phase (summer) and 1869 A/phase (winter) was used for the 230 kV conductor.
- A maximum voltage of 115-kV and 697 A/phase (summer) and 896 A/phase (winter) was used for the 115 kV conductor.
- The width of the right-of-way is 135 feet.

For the existing 230 kV single circuit line:

- The transmission structure is a 230 kV H frame design.
- Each phase of the 230-kV three-phase circuit is composed of one conductor. The proposed conductor for the 230-kV line is 1272 ACSR “Bittern.”
- A minimum ground clearance of 22.4 feet was used.
- A maximum voltage of 230-kV and 1445 A/phase (summer) and 1869 A/phase (winter) was used for the 230 kV conductor.
- The width of the right-of-way is 135 feet.

For the proposed 230-kV Sams Valley–Whetstone Reconductoring:

- For the Sams Valley–Whetstone Reconductoring, the existing H frame transmission line design was modeled since it will not change with this reconductoring project.
- Each phase of the 230-kV three-phase circuit will be composed of one conductor. The proposed conductor for the reconducted 230-kV line is 1272 ACSR “Bittern.”

- A minimum ground clearance of 22.4 feet was used.
- A maximum voltage of 230-kV and 1445 A/phase (summer) and 1869 A/phase (winter) was used.

For the existing 500-kV line:

- Each phase of the 500-kV three-phase circuit will be composed of a three conductor bundle of 1272 ACSR “Pheasant” conductors.
- A minimum ground clearance of 28.4 feet was used.
- A maximum voltage of 500-kV and 810 A/phase (summer) and 1420 A/phase (winter) was used.

For the existing 115-kV line:

- Each phase of the 115-kV three-phase circuit will be composed of one conductor. The conductor for the 115-kV line is 397 ACSR “Ibis”.
- A minimum ground clearance of 20.1 feet was used.
- A maximum voltage of 115-kV and 140 A/phase (summer) and 787 A/phase (winter) was used.

The Project’s conductor distance above ground is based on the lowest mid span height at normal operating conditions, or the lowest point of the catenary. This is where the electric and magnetic fields will be highest and is the location where the modeling was conducted. For most of the transmission line alignment, the conductors will be higher than this minimum allowable clearance, and resulting EMF levels on the ground will be lower than at mid-span. Accordingly, the modeling results will be worst case for the transmission line alignment.

The level of EMF was predicted with the program Corona 3. The strength and range of EMF near transmission lines is a function of the line design, the voltage, and amperage (also referred to as current or load). The shape or distribution of EMF around transmission lines are a function of the conductor geometry as well as the size of the conductor and its configuration, including if the conductors for each phase are single wires or composed of multiple subconductors or bundles. The electric field strength is proportional to the voltage while the magnetic field strength is proportional to current (amperage). Unlike voltage which is typically stable, the amperage and the resulting magnetic field around a transmission line fluctuate with the amperage or load that the line is carrying. As electrical loads vary, the magnetic field will also vary, and this assessment for the Grants Pass–Sams Valley Transmission Line was based on the design load of 1445 (summer) and 1869 (winter) A/phase for the 230 kV circuit and 697 (summer) and 896 (winter) A/phase for the 115 kV circuit. The Sams Valley–Whetstone Reconductoring assessment was based on the design load of 1445 (summer) and 1869 (winter) A/phase.

Weather and humidity do not influence EMF levels. Weather does, however, affect the level of corona activity which influences the resulting audible noise and level of radio-frequency interference. Corona activity is greater during wet weather and at high altitude. Corona and noise

modeling is discussed in Exhibit X. The contours of the earth or ground elevation may influence the minimum ground clearance, and EMF decreases with increasing distance. The assessment in this Exhibit was based on a minimum ground clearance of 22.4 feet for the Grants Pass–Sams Valley Transmission Line and 22.4 feet for the Sams Valley–Whetstone Reconductoring.

EMF levels may be influenced by other sources of EMF, such as the transmission lines that parallel this line as well as at the crossing of other transmission lines. Within the corridor for the Grants Pass–Sams Valley Transmission Line corridor, those interactions were not evaluated since only the 230/115 kV line is within the corridor, and for the Sams Valley–Whetstone Reconductoring, those interactions were not evaluated since only the 230 kV line is changing with the reconductoring project.

3.2.2 Modeling Results

(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;

3.2.2.1 Grants Pass–Sams Valley Transmission Line

In the 18-mile corridor the 230/115 kV double circuit transmission lines are by themselves for some portion of the route and adjacent to the existing 230 kV line the rest of the corridor. Therefore the electric and magnetic fields from the 230/115 kV line both by itself and together with the existing 230 kV line were modeled.

Transmission Line Only

Using the transmission line design parameters described above, the Corona 3 model predicts electric and magnetic field strength at one meter above ground level, extending to 200 feet either side of the centerline of the transmission line. As noted earlier, the predicted EMF levels are for the mid span point, or the lowest point in the catenary; field strengths would be lower than these predicted values where the conductors are higher off the ground such as at the transmission line structures. The predicted EMF levels out to distances of 200 feet on either side of each proposed transmission line structure type are shown as follows:

Figures AA-1 and AA-2 show electric and magnetic field profiles for the double-circuit 230/115 kV single pole structures by themselves with vertical conductor configuration.

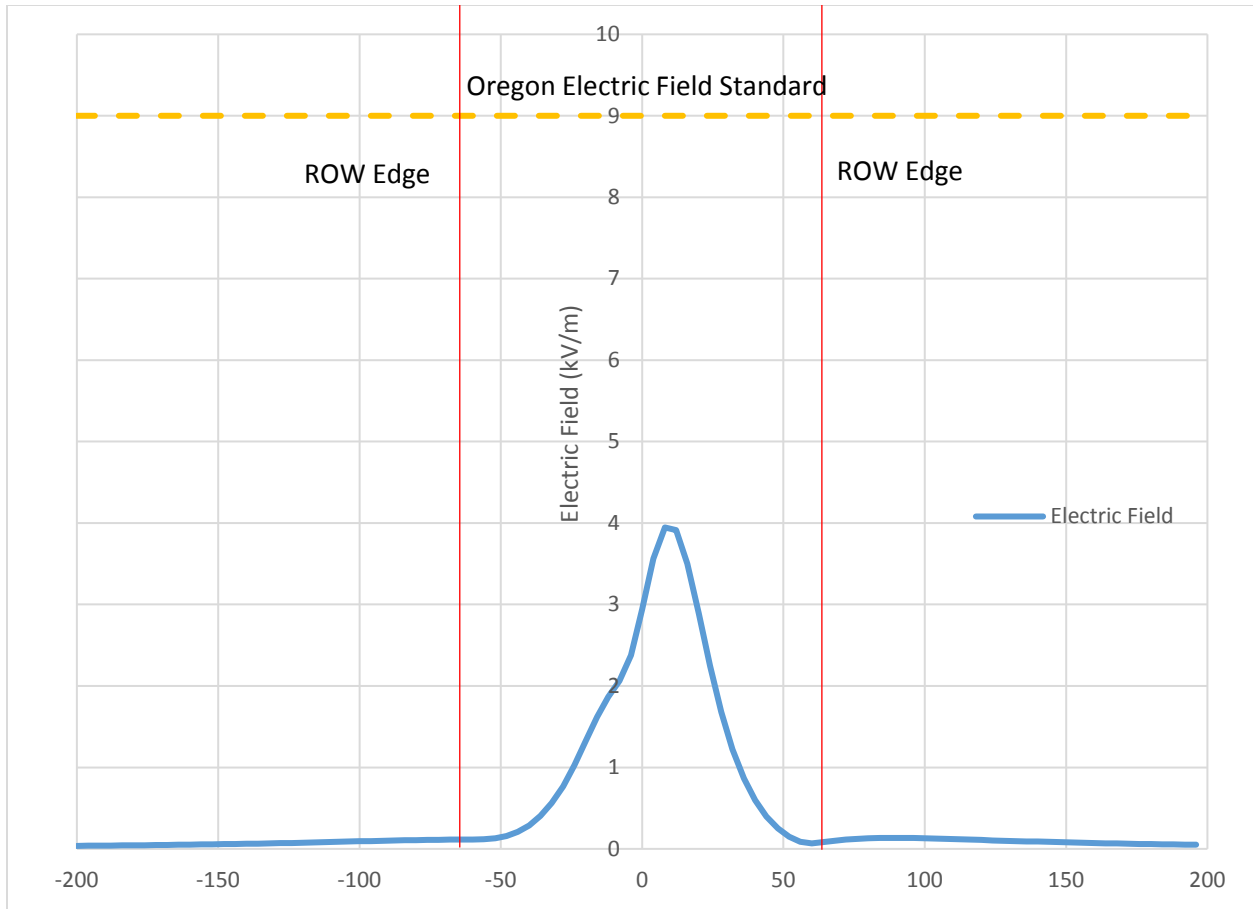


Figure AA-1. Electric Field Profile for Double-Circuit 230/115-kV Single Pole Structures

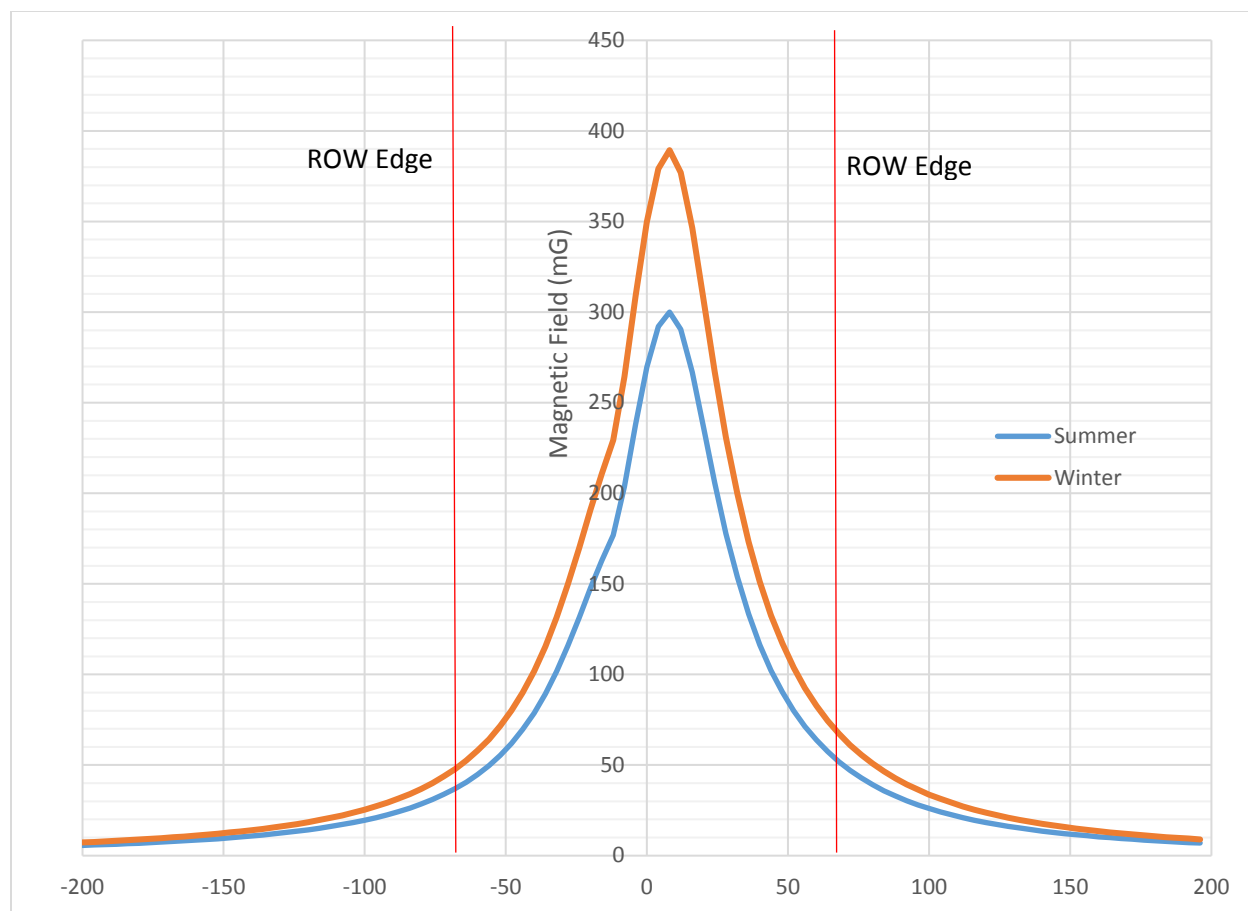


Figure AA-2. Magnetic Field Profile for Double-Circuit 230/115-kV Single Pole Structures

Interaction with Existing Transmission Lines

In portions of the 18-mile corridor the 230/115 kV double circuit transmission line is paralleled by an existing 230 kV H frame line. Fields at either edge of the 230 kV right-of-way may increase or decrease depending on load and phasing of the 230/115 kV line and the load and geometry of the adjacent 230 kV line.

Using the transmission line design parameters described above, the Corona 3 model predicts electric and magnetic field strength at one meter above ground level, extending to 200 feet on either side of the centerline of the new 230/115 kV line on one side of the corridor and the existing 230 kV line on the other. As noted earlier, the predicted EMF levels are for the mid span point, or the lowest point in the catenary; field strengths would be lower than these predicted values where the conductors are higher such as at the transmission structures. The predicted EMF levels out to distances of 200 feet on either side of each transmission line structure type are shown as follows:

Figures AA-3 and AA-4 show electric and magnetic field profiles for the new double circuit 230/115 kV structures and the existing single-circuit 230-kV H frame structures with horizontal conductor configuration.

The electric field levels across the entire corridor will be well below the 9 kV/m Oregon standard and will be close to zero at the right-of-way boundaries. The magnetic fields were highest beneath the existing 230 kV H frame line. The magnetic fields beneath the double circuit line are reduced as a result of the rotated phases of the two lines on the structure inducing phase cancellation of the magnetic fields.

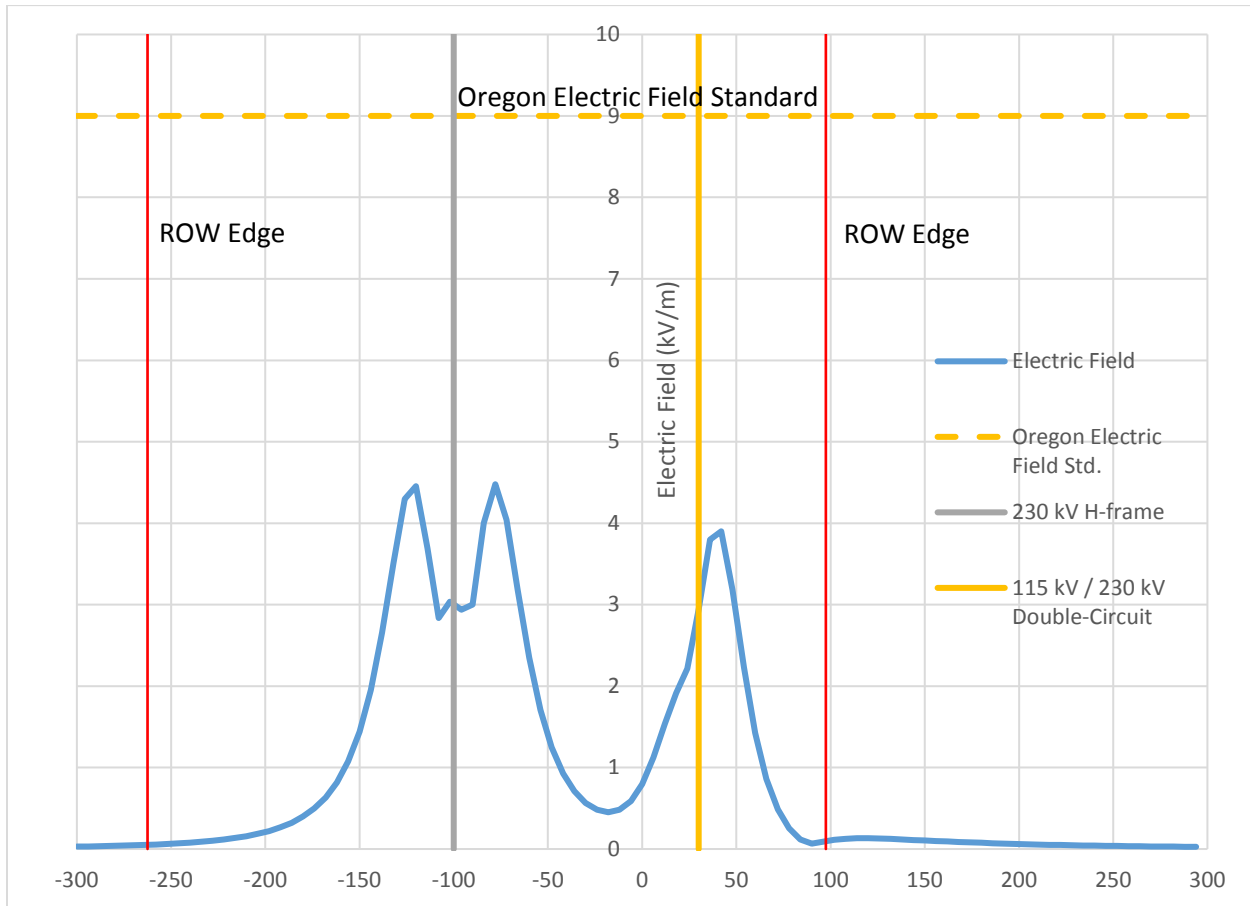


Figure AA-3. Electric Field Profile for Double-Circuit 230/115-kV Single Pole Structures Adjacent to Existing 230 kV H Frame Structures

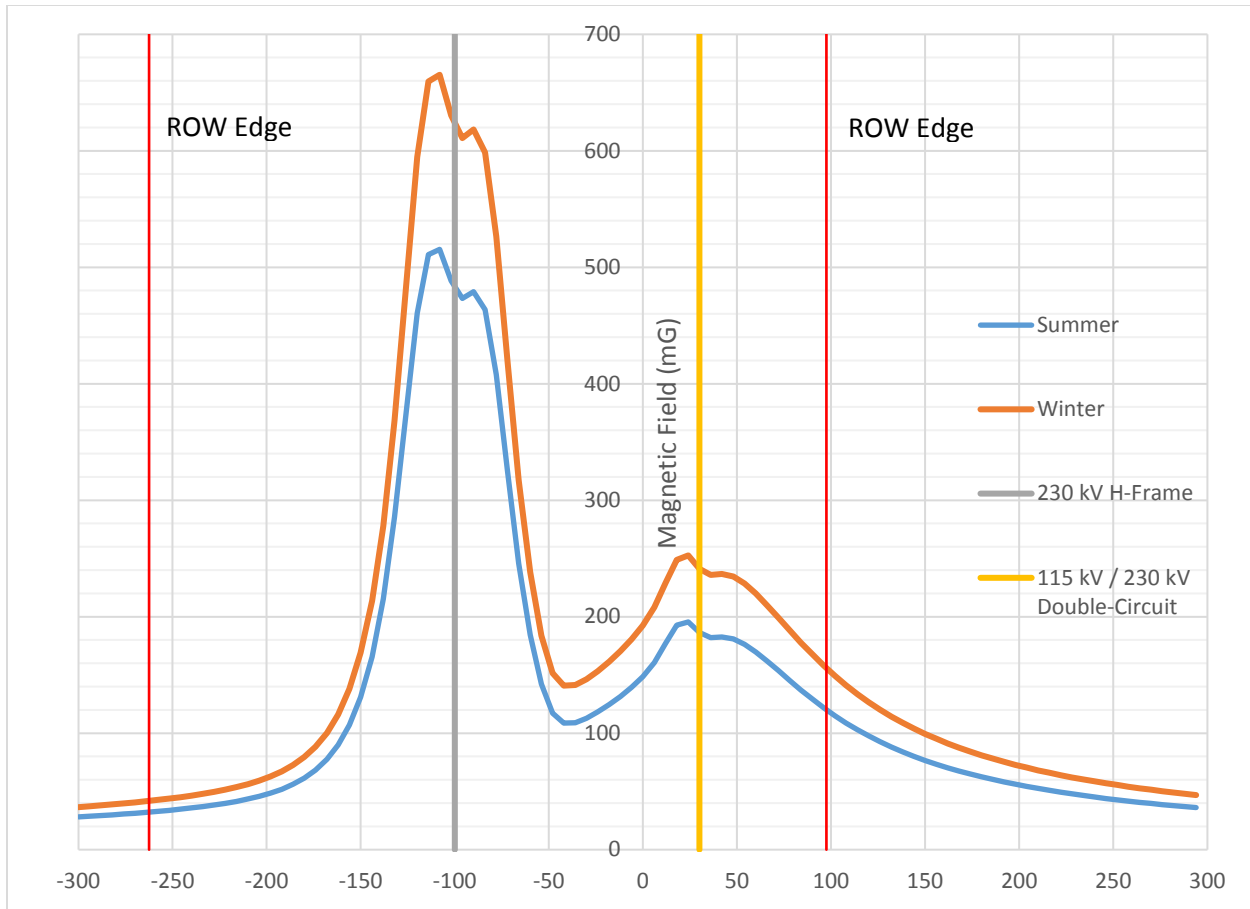


Figure AA-4. Magnetic Field Profile for Double-Circuit 230/115-kV Single Pole Structures Adjacent to Existing 230 kV H Frame Structures

In order to demonstrate compliance with Oregon's electric field limit of 9 kV/m at the edge of the right-of-way, and also to demonstrate consistency with other states' standards and international guidelines, Table AA-3 provides the maximum electric and magnetic field strength within the right-of-way and EMF levels at the edge of the right-of-way. Based on the design and modeling parameters described above, the Project will meet Oregon's electric field standard, and EMF levels within and at the edge of the right-of-way will be lower than standards and guidelines from other states and international organizations.

Table AA-3. EMF Strength for New Double Circuit 230/115 kV Structures Adjacent to Existing 230 kV Structures

Structure Type	Right-of-Way Width (feet)	South/West Right-of-Way Edge	Maximum within Right-of-Way	North/East Right-of-Way Edge
Electric Field Strength		(kV/m)	(kV/m)	(kV/m)
230/115-kV single pole and 230 kV H frame	260	0.05	3.9	0.11
Magnetic Field Strength		mG	mG	mG
230/115-kV single pole and 230 kV H frame	260	42	665	150
Electric and magnetic field strengths calculated at standard height of 1 meter above ground surface.				

3.2.2.2 Sams Valley–Whetstone Reconductoring

In the 4.7-mile corridor the 230 kV reconducted single circuit transmission lines are adjacent to the existing 115 kV line and 500 kV throughout the corridor. The electric and magnetic fields from the 230 kV reconducted line by itself and together with the existing 115 kV and 500 kV lines were modeled.

Transmission Line Only

Using the transmission line design parameters described above, the Corona 3 model predicts electric and magnetic field strength at one meter above ground level, extending to 200 feet either side of the centerline of the transmission line. As noted earlier, the predicted EMF levels are for the mid-span point, or the lowest point in the catenary; field strengths would be lower than these predicted values where the conductors are higher off the ground such as at the transmission line structures. The predicted EMF levels out to distances of 200 feet on either side of each proposed transmission line structure type are shown as follows:

Figures AA-5 and AA-6 show electric and magnetic field profiles for the single-circuit reconducted 230 kV structures by themselves with horizontal conductor configuration.

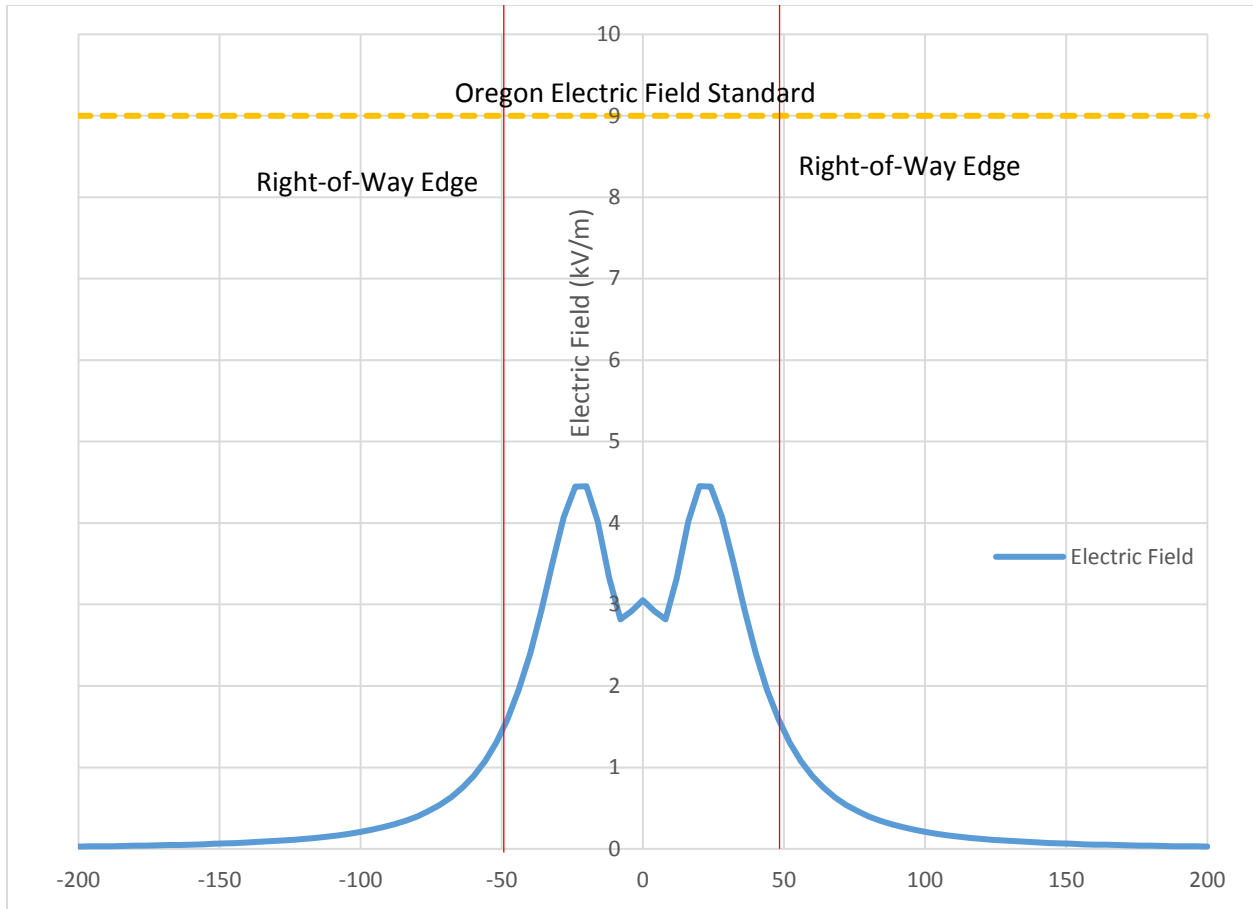


Figure AA-5. Electric Field Profile for Single-Circuit 230-kV Reconductored H Frame Structures

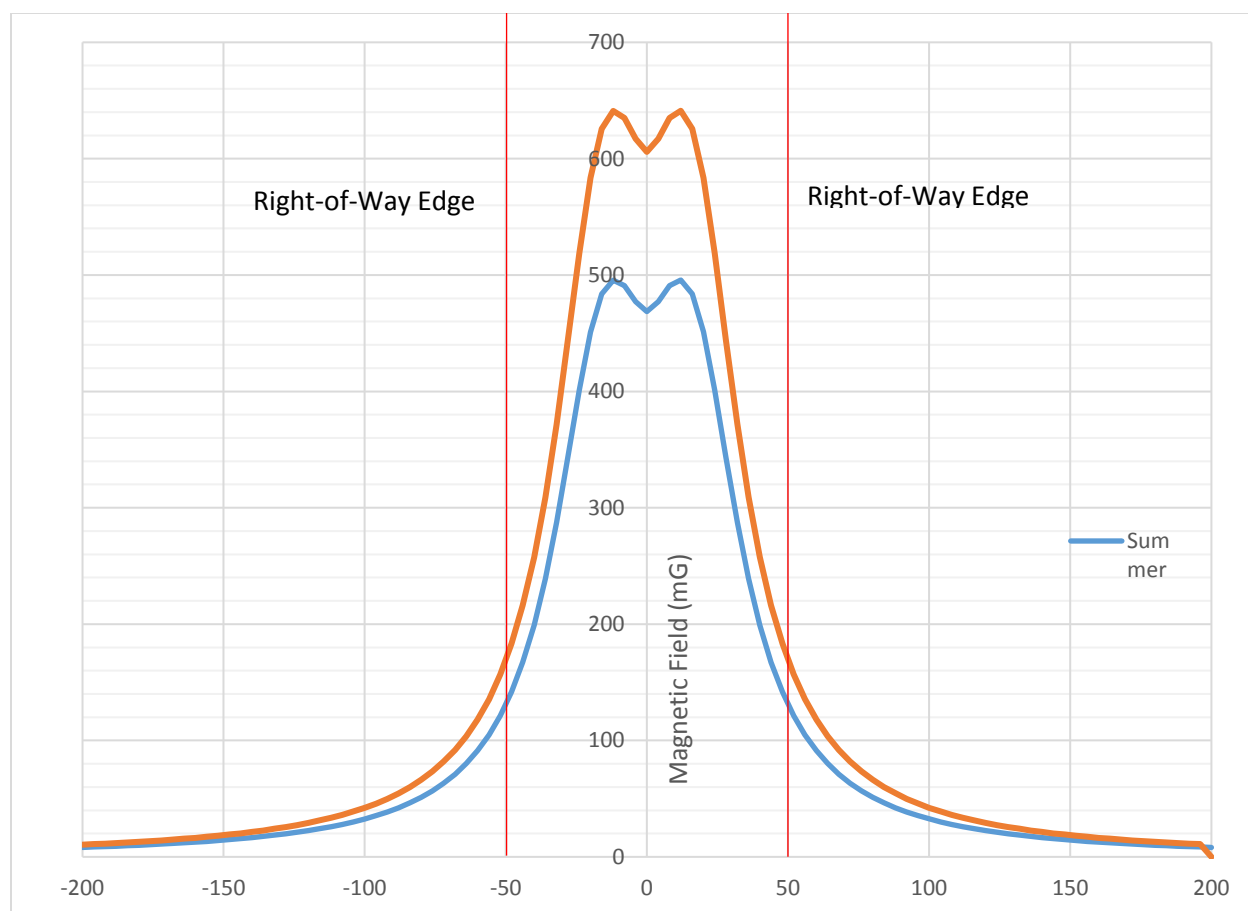


Figure AA-6. Magnetic Field Profile for Single-Circuit 230-kV Reconductored H Frame Structures

Interaction with Existing Transmission Lines

In the entire 4.7-mile corridor evaluated in this study between Sam's Valley and Whetstone the 230 kV transmission line is paralleled by an existing 500 kV and a 115 kV transmission line. Each line is centered within its own right-of-way; the 500 kV line is within a 250-foot right-of-way, the 115 kV line is within a 100-foot right-of-way and the reconductored 230 kV line is within a 100-foot right-of-way. Together these three adjacent rights-of-way constitute a transmission line corridor with a 450-foot total width.

Fields at either edge of the 230 kV right-of-way may increase or decrease depending on load and phasing of the 230 kV line and the load, geometry and arrangement of the adjacent 115 and 500 kV lines. However, since only the 230 kV line is changing as a result of this project, the electric and magnetic fields for the reconductored line alone were first modeled. Then the electric and magnetic field interactions between the three transmission lines and the total electric and magnetic fields at the edge of the three transmission line corridor were also evaluated.

Using the transmission line design parameters described above, the Corona 3 model predicts electric and magnetic field strength at one meter above ground level, extending to 200 feet either side of the centerline of the outer transmission line. As noted earlier, the predicted EMF levels are for the mid span point, or the lowest point in the catenary; field strengths would be lower than these predicted values where the conductors are higher such as at the transmission structures. The predicted EMF levels out to distances of 200 feet beyond either side of the corridor are shown.

Figures AA-7 and AA-8 show electric and magnetic field profiles for the reconductored single-circuit 230-kV H frame structures alongside the existing 115 kV and 500 kV lines. The electric field levels in the corridor will not change with this reconductoring project since the voltages of the existing 115, 230 and 500 kV lines will not change. However, the magnetic fields near the reconductored 230 kV line will increase with the higher current flow on the 230 kV line.

Also, since the field levels at the edge of the corridor depend on the arrangement of the lines across the transmission corridor, the highest fields at the edge of the corridor will occur when the 500 kV and 230 kV lines are at either side of the corridor with the 115 kV line in the center. Since the lines cross each other at places along this segment, the modeling location was selected where this arrangement occurred west of Table Rock Road. The magnetic field levels were calculated for both a peak summer and peak winter loading condition.

The largest electric field was calculated at the west edge of the corridor near Table Rock Road at 1.6 kV/m near the existing 500 kV line. This is well under the allowed Oregon standard of 9 kV/m at the edge of the right-of-way. The highest electric field found within the corridor was beneath the existing 500-kV structure at 10.4 kV/m. These electric field levels are shown in Figure AA-7.

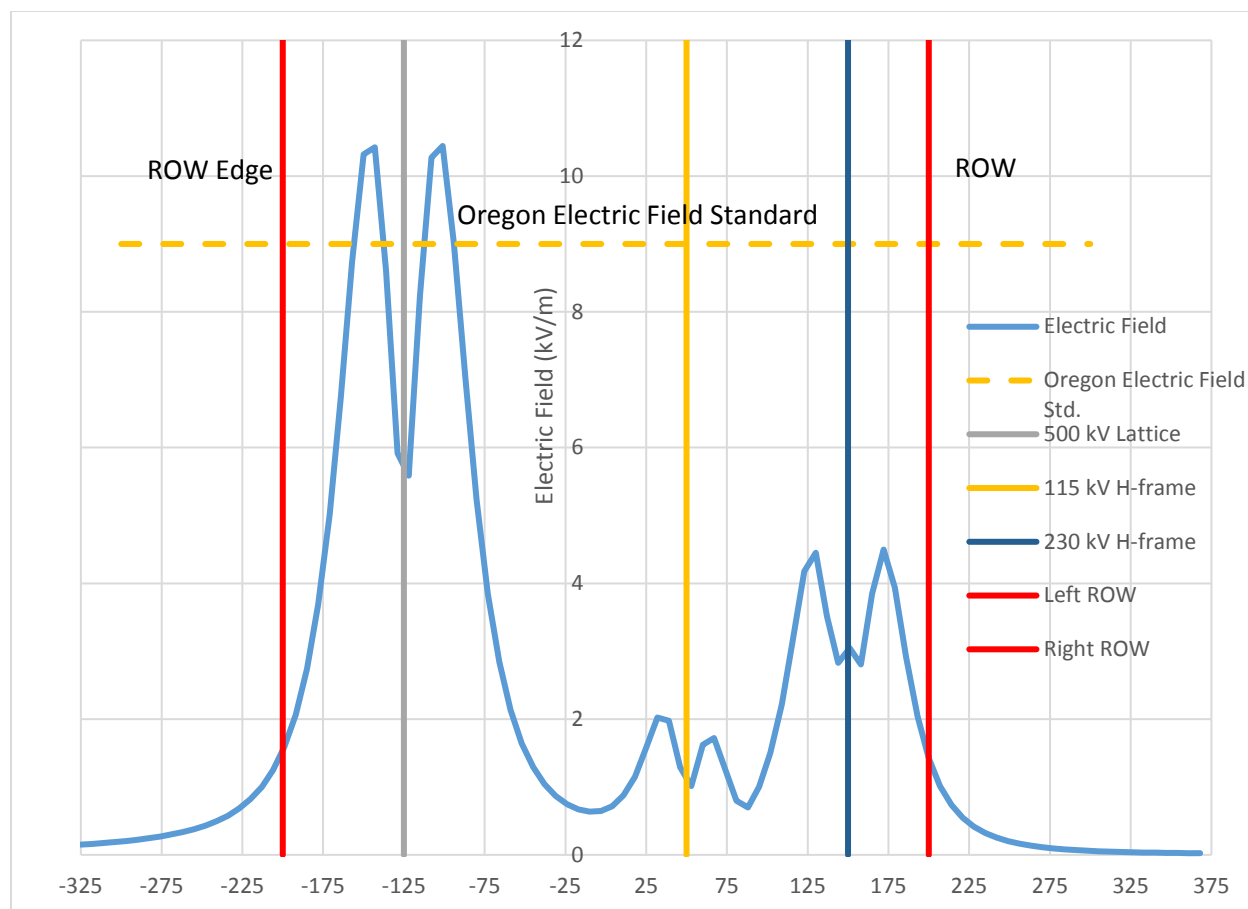


Figure AA-7. Electric Field Profile for Reconductored 230-kV H Frame Structures Adjacent to Existing 115 kV H Frame Structures and 500 kV Lattice Structures

The largest magnetic field at the edge of the corridor was calculated at the eastern edge of the corridor near Table Rock Road at 200 mG. The highest magnetic field found within the corridor was beneath the reconductored 230-kV structure during winter conditions at 703 mG. These magnetic field levels are shown in Figure AA-8.

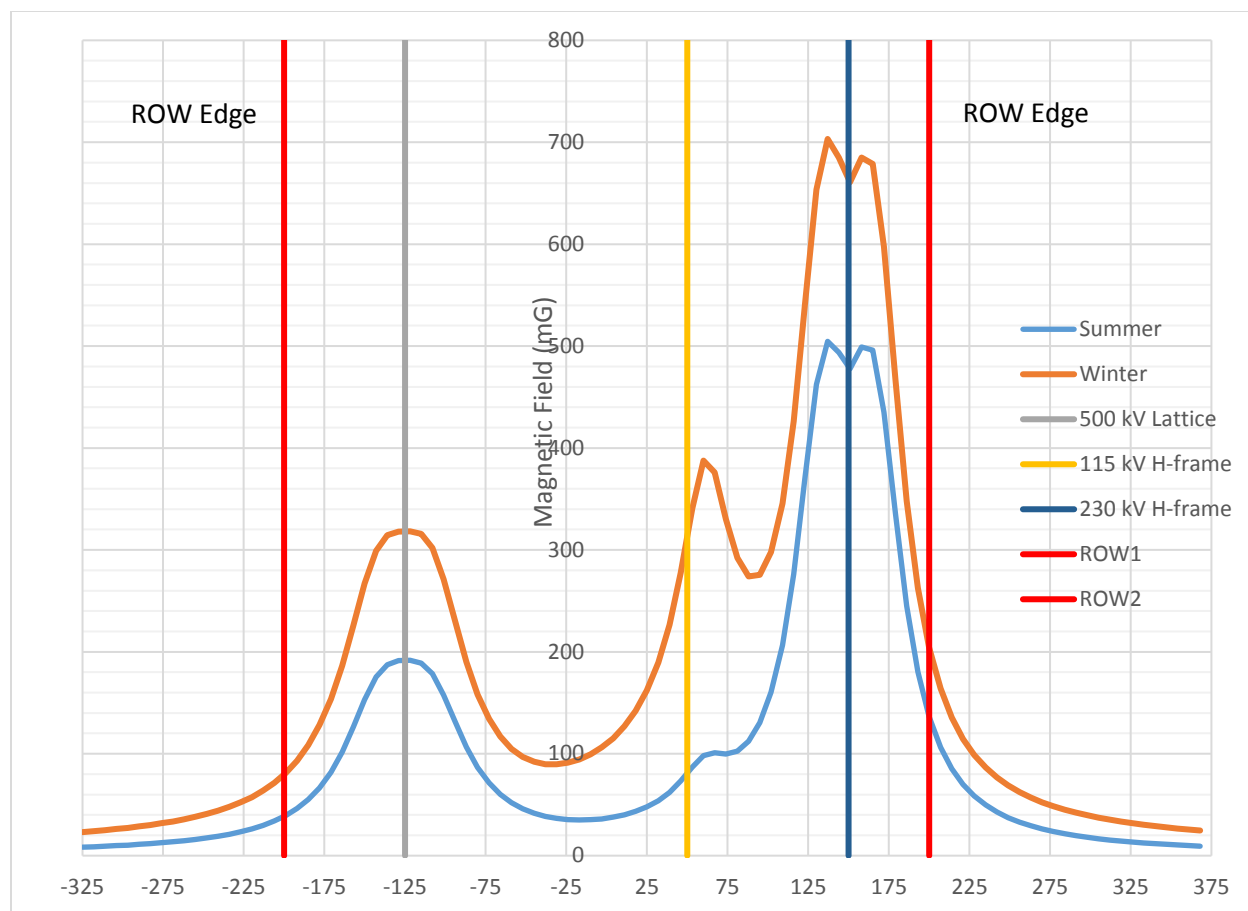


Figure AA-8. Magnetic Field Profile for Reconductored 230-kV H Frame Structures Adjacent to Existing 115 kV H Frame Structures and 500 kV Lattice Structures

In order to demonstrate compliance with Oregon's electric field limit of 9 kV/m at the edge of the right-of-way, and also to demonstrate consistency with other states' standards and international guidelines, Table AA-5 and Table AA-6 provide the maximum electric and magnetic field strength within the corridor and EMF levels at the edge of the corridor. Based on the design and modeling parameters described above, the Project will meet Oregon's electric field standard, and EMF levels within and at the edge of the corridor will be lower than standards and guidelines from other states and international organizations.

Table AA-4. EMF Strength for Reconductored 230 kV Structures Adjacent to 115 and 500 kV Structures

Structure Type	Right-of-Way Width (feet)	South/West Right-of-Way Edge	Maximum within Right-of-Way	North/East Right-of-Way Edge
Electric Field Strength		(kV/m)	(kV/m)	(kV/m)
Reconductored 230 kV H Frame adjacent to 115 kV H Frame and 500 kV Lattice	450	1.6	10.4	1.4
Magnetic Field Strength		mG	mG	mG
Reconductored 230 kV H Frame adjacent to 115 kV H Frame and 500 kV Lattice	450	85	703	200
<p>Electric and magnetic field strengths calculated at standard height of 1 meter above ground surface.</p> <p>1. Under OAR 345-024-0090, the 9-kV per meter threshold is focused on areas accessible to the public. Here, PACIFICORP generally will obtain easements for the lands crossed by the Project, and public access to those lands generally will depend on the policies of the landowners and will not be determined until the time that right-of-way negotiations take place (see Exhibit C, Table C-1 (describing the varying landownerships crossed by the Project)). Even so, as set forth in Table AA-4, the maximum electric field value will be below the 9-kV/m threshold throughout the right-of-way, regardless of whether there will be public access or not.</p>				

3.3 Occupied Structures within 200 Feet of the Transmission Line – OAR 345-021-0010(1)(aa)(A)(ii)(iii)

(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);

3.3.1 Methods for Identifying Occupied Structures

Google Earth satellite imagery gathered on July 7, 2017 was used to identify and classify potential structures within 200 feet of the Project. Analysis of the imagery was then used to identify features of the property such as parked cars, irrigated lawns, etc. that would indicate occupancy of the structure. Occupied structures included in this analysis are defined by OAR 345-021-0010 as including but not limited to residences, commercial establishments, industrial facilities, schools, daycare centers, hospitals, and rest areas. Receptors that were not included as occupied structures consisted of silos, tanks, gravel pits, mines, quarries, and water features.

3.3.2 Identified Structures

Based on review of the July 2017 satellite imagery, PacifiCorp identified 46 possible occupied structures within 200 feet of the Grants Pass–Sams Valley Transmission Line. Since the imagery is only a few months' old, all occupied structures that were observed are presumed to still be occupied. PacifiCorp's findings with respect to each of the 46 identified possible structures are provided in Table AA-5.

Table AA-5. Identified Structures for Grants Pass–Sams Valley Transmission Line

Structure ID	Location	Description	Distance from Centerline ^{1, 2}
Structure 1	At the end of the cul-de-sac on Buysman Way just south of the Grants Pass Substation.	Two structures are seen that appear to be adjoining houses with a shared driveway.	190
Structure 2	On Buysman Way next door to structure 1.	Two structures are seen that appear to be a house with an out building.	190
Structure 3	On Buysman Way next door to structure 2.	Three structures are seen that appear to be a house with two out buildings.	130
Structure 4	On Foothills Road approximately 0.5 miles east of the overpass over Interstate Highway 5.	Three structures are seen that appear to be a house, garage, swimming pool and an outbuilding.	135
Structure 5	On Foothills Road approximately 0.75 miles east of the overpass over Interstate Highway 5.	Two structures are seen that appear to be a house and a garage.	135
Structure 6	On Foothills Road approximately 0.25 miles west of the overpass over Interstate Highway 5 at Rogue Blvd.	Three structures are seen that appear to be a house and a garage and outbuilding.	125
Structure 7	on Foothills Road north of the overpass over Interstate Highway 5 at Rogue Blvd.	Two structures are seen that appear to be a house and a garage. The house and garage are both almost beneath the line.	0
Structure 8	At the western end of 36416 Road.	Two structures are seen that appear to be a house and a garage.	150
Structures 9 – 13	On Lloyellen Drive west of the intersection with W Evans Creek Road.	Five structures are seen that appear to be houses. The houses all back up to the line.	100 – 120
Structures 14 – 15	On a short road one block south of Lloyellen Drive west of the intersection with W Evans Creek Road.	Two structures are seen that appear to be houses with nearby outbuildings. The two houses are located almost beneath the line.	0

Table AA-5. Identified Structures for Grants Pass-Sams Valley Transmission Line

Structure ID	Location	Description	Distance from Centerline ^{1, 2}
Structures 16 – 20	On Lloyellen Drive east of the intersection with W Evans Creek Road.	Five structures are seen that appear to be houses. Four houses back up to the line at a distance of 50 to 100 feet from the line with one house directly beneath the line.	0 – 100
Structures 21 – 22	On a short road one block south of Lloyellen Drive east of the intersection with W Evans Creek Road.	Two structures are seen that appear to be houses with nearby outbuildings. The two houses are located almost beneath the line.	0
Structures 23 – 26	On E Evans Creek Road east of Lloyellen Drive.	Four structures are seen that appear to be houses. Three houses are at a distance of 50 to 100 feet from the line with one house directly beneath the line.	0 – 100
Structures 27 – 30	On Tenney Drive.	Four structures are seen that appear to be houses. Three houses are at a distance of 50 to 100 feet from the line with one house directly beneath the line.	0 – 100
Structure 31	On Loris Lee Rd. north of Tenney Drive.	Two structures are seen that appear to be a house with a nearby outbuilding.	200
Structures 32 – 38	On Ward Creek Road 0.4 miles west of White Oak Drive.	Seven structures are seen and four appear to be houses. The houses are at a distance of 100 to 180 feet from the line with one house directly beneath the line.	0 – 180
Structures 39 – 40	On White Oak Drive 0.1 miles south of Ward Creek Road.	Two structures are seen that appear to be houses. One house is at a distance of 50 feet from the line, with one house directly beneath the line.	0 – 50
Structures 41 – 46	On Ward Creek Road west of White Oak Drive.	Six structures are seen that appear to be houses. The houses are at a distance of 100 to 180 feet from the line with one house directly beneath the line.	0 – 180
<p>1. Distance to closet feature in feet.</p> <p>2. Per definition in OAR 345-021-0010(1)(aa)(A), all structures listed are considered occupied.</p>			

Based on review of satellite imagery taken July 2017, PacifiCorp identified five possible occupied structures within 200 feet of the Sams Valley-Whetstone Reconductoring. PacifiCorp's findings with respect to each of the five identified possible structures are detailed in Table AA-6.

Table AA-6. Identified Structures for Sams Valley–Whetstone Reconductoring

Structure ID	Location	Description	Distance from Centerline ^{1, 2}
Structure 1	On Kildee Avenue just north of Hilo Lane.	A structure is seen that appears to be a house located 200 feet from the line with attached carport and two out buildings. A pickup truck is parked in the well-defined driveway.	200
Structure 2	On Wheeler Road at Cornerstone Road.	This appears to be a parking lot for a recreation area that includes the nearby Lower Table Rock Trail. There is a structure located about 130 feet from the line between the parking lot and the start of the hiking trail which appears to be a restroom facility for the recreation site. A restroom facility would be occupied for short periods by hikers when they are using the facilities but otherwise would be unoccupied.	130
Structure 3	On Wheeler Road 0.17 miles south of Cornerstone Road.	Four structures are seen that appear to be a house and three out buildings, one of which is 150 feet from the line. Several vehicles are parked in the well-defined driveway and roads to the outbuildings.	150
Structure 4	On Wheeler Road 0.45 miles south of Cornerstone Road.	Five structures are seen that appear to be industrial buildings of some sort. The closest is 40 feet from the line. No vehicles are seen but the driveway and roads to the outbuildings are well-defined. Even though there are no vehicles seen, the presence of vehicle traffic is evident from the condition of the roadways.	40
Structure 5	South of Wheeler Road 0.25 miles west of Table Rock Road.	Three structures are seen that appear to be office buildings of some sort located 40 feet from the line. They are adjacent to other smaller buildings and a large parking lot with striped parking spaces and cars parked in several of these spaces.	40
<p>1. Distance to closet feature in feet.</p> <p>2. Per definition in OAR 345-021-0010(1)(aa)(A), all structures listed are considered occupied.</p>			

To address potential concerns regarding electrical fields in proximity to occupied structures, PacifiCorp proposes the Site Certificate Condition 1 (see Section 2).

4.0 EMF Mitigation Measures – OAR 345-021-0010(1)(aa)(A)(v)

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

The modeling results are based on certain minimum ground clearances. To ensure compliance with the AC electric field provisions of the Specific Standards for Transmission Lines, PacifiCorp proposes that EFSC include the conditions listed in Section 2 as part of the amended site certificate. Siting Standard Condition 1 provides that PacifiCorp will comply with the minimum ground clearances used in the modeling and that the Project otherwise meet the 9 kV/m standard (see Section 2).

The National Electric Safety Code (NESC) provides industry standards for transmission line design and operation, including standards for ensuring induced currents are as low as reasonably achievable. During final engineering and construction of the Project, PacifiCorp will identify all wire fences, pipelines, irrigation lines, metal roofs and other objects nearby the right-of-way in which a current could be induced. All such objects will be properly grounded within or as close as practicable to the right-of-way, in order to prevent induced current and nuisance shocks. Accordingly, to ensure compliance with the provisions of the Specific Standards for Transmission Lines, PacifiCorp proposes that EFSC include Siting Standard Condition 2 (see Section 2) to provide that the Project will be constructed consistent with the 2017 version of the NESC, including the induced current provisions.

5.0 EMF Monitoring Program – OAR 345-021-0010(1)(aa)(A)(vii)

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

Post-construction monitoring is not necessary because modeling shows electric fields levels will be below Oregon's 9-kV/m standard. Moreover, EMF levels (both electric and magnetic fields) have been conservatively calculated assuming worst-case conditions of line overvoltage and minimum ground clearance, and therefore, EMF levels likely will be lower than those presented here.

6.0 Radio and TV Interference – OAR 345-021-0010(1)(aa)(B)

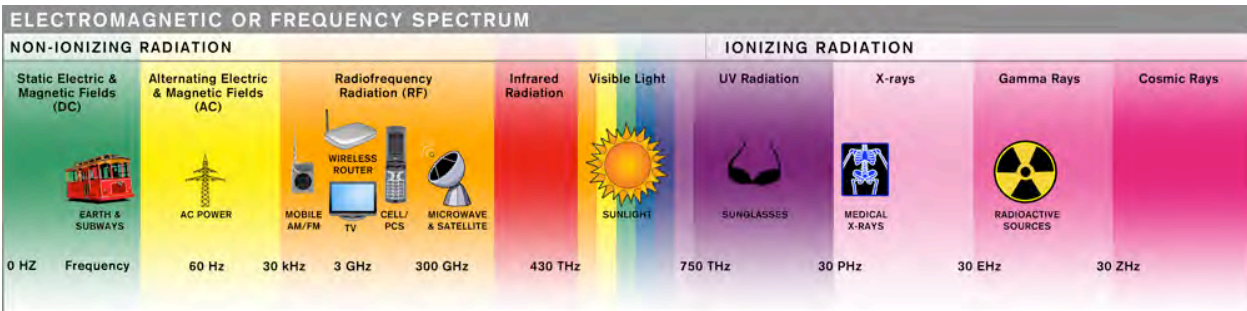
(B) An evaluation of alternate methods and costs of reducing radio interference likely to be caused by the transmission line in the primary reception area near interstate, U.S. and state highways;

6.1 Background

6.1.1 Electromagnetic Interference

Electromagnetic interference from power transmission systems in the U.S. is governed by the Federal Communications Commission (FCC) Rules and Regulations (FCC 1988). A power transmission line is categorized by the FCC as an “incidental radiation device.” It is defined as “a device that radiates radio frequency energy during the course of its operation although the device is not intentionally designed to generate radio frequency energy.” Such a device “shall be operated so that the radio frequency energy that is emitted does not cause harmful interference. In the event that harmful interference is caused, the operator of the device shall promptly take steps to eliminate the harmful interference.” In this case, “harmful interference” is defined as “any emission, radiation or induction which endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radio communication service operating in accordance with this chapter” (FCC 1988). Oregon does not have regulatory standards for either radio or TV interference.

Modern communications systems all rely on electromagnetic radiation (EMR) to transmit information. AM and FM radio, TV, shortwave radio, cellular telephones, radar, Global Positioning System (GPS) devices and satellite communications, cordless telephones, Bluetooth, and wireless computer networks such as Wi-Fi or wireless local area network all utilize a region of the electromagnetic spectrum known as “radio frequency” EMR, which extends from the very low-frequency end at about 30 kilohertz (kHz) up into the high-frequency microwave range at about 300 gigahertz (GHz). Each type of technology uses a specific segment of the electromagnetic frequency spectrum; older technology such as AM radio is at the low-frequency end, while newer technologies such as GPS and Wi-Fi utilize high-frequency signals. Figure AA-9 provides a visual representation of typical communications frequencies.



Source: EMF & Radio Frequency Solutions. Available at: <http://www.emfrf.com/index.php/emf-rf/emf-overview/electromagnetic-spectrum-or-frequency-spectrum.html>.

Figure AA-9. Communications Frequency Spectrum

The level of interference can be partially determined by how similar or different the signal frequency is compared to the noise frequency. In general, there is very little interaction between signals of differing frequency; radio signals, TV signals, cellular phone signals, and GPS signals can all coexist in the same space and time without interfering with each other. For interference to occur, frequencies must be similar.

EMR and resulting interference can be an indirect product of electric transmission lines. EMR arises not from the lines themselves, but from the interaction of the strong electric field at the surface of the conductors and other energized components with the surrounding air. Two types of interactions may occur that create electromagnetic interference: corona discharge and gap discharge.

6.1.1.1 *Corona Discharge*

High-voltage power transmission lines generate a strong electric field at the surface of the conductor, which can be strong enough to split the surrounding air molecules, resulting in the emission of electromagnetic energy in the form of ultraviolet and near-ultraviolet light and broadband radio frequency EMR (corona discharge also produces audible sound, which is addressed in Exhibit X; audible sound is not discussed further in this Exhibit). The former can sometimes be seen by humans under the right conditions or with specialized equipment, while the latter can sometimes be heard as electronic “noise,” or interference with radio signal reception. Broadband corona EMR discharge typically occurs in the frequency spectrum from below 100 kHz to approximately 1,000 megahertz (MHz), which overlaps with the frequencies used for AM and FM radio and some TV signals. With sufficient corona activity, low-frequency radio and TV interference can be noticeable within a few hundred feet of the transmission line. These effects are most pronounced directly underneath the line conductors, and decrease with distance from the transmission line.

Corona on a transmission line conductor depends on several factors such as operating voltage, conductor diameter, overall line geometry, weather conditions, and altitude. Conductor size, line

voltage and line geometry are taken into consideration when designing a transmission line so that the electric fields at the conductor surface are minimized. However, for a high-voltage line, any incidental irregularities on the conductor surface (for example, water droplets, dust, debris, and nicks or scratches in the conductor) act as points where the electric field may be intensified sufficiently to produce corona. Thus, the level of corona activity is elevated during foul weather when raindrops on the conductor surface act as points producing corona.

6.1.1.2 *Gap Discharge*

A gap discharge occurs when current arcs across a gap between two conductive objects. Gap discharges can produce radio noise in the lower frequencies (AM radio frequencies) and well into the microwave range (analog TV frequencies). These discharges can be produced by loose connections, a problem that more commonly occurs on low-voltage distribution lines but rarely occurs on high-voltage transmission lines (Trinh 2012). Unlike corona discharge, which may occur anywhere along a high-voltage transmission line conductor, gap discharge occurs at mechanical connectors and components that are used to hold the conductors in place. Gap discharge is controlled through proper construction and maintenance practices to ensure all mechanical connectors and components are properly assembled. Because gap discharge is an intermittent, temporary, and readily resolved problem, and results only in localized electrical interference issues, the potential for interference with TV signals or higher-frequency communications is not considered a significant problem.

6.1.2 *Radio Interference Effects*

The corona-induced broadband EMR from transmission lines can produce interference to AM signals, such as a commercial AM radio audio signal (i.e., radio noise) or the video portion of an older analog broadcast TV station (i.e., TV noise). Technologies that use frequency modulation, such as FM radio stations and the audio portion of older analog broadcast TV signals, are generally not affected by noise from a transmission line. As digital signal processing has been integrated into these communication systems, the potential interference impact of corona-generated radio noise has decreased.

The level of interference caused by radio noise from a transmission line to the reception of a radio signal depends on the location of the radio transmitter, the radio receiver, and the transmission line. A transmission line that is directly between a radio transmitter and a listener's receiver may be more likely to interfere with that listener's reception, whereas a transmission line behind or beside the listener in relation to the transmitter will not necessarily cause interference, depending on the radio receiver's antennae. The radio noise generated by a transmission line is very low in power and decreases rapidly as distance from the line increases. It is experienced only when in close proximity to the transmission line.

In general, complaints related to corona-generated interference are infrequent. Moreover, the advent of cable and satellite TV service, and the federally-mandated conversion to digital TV broadcast in June 2009 have greatly reduced the occurrence of corona-generated interference.

Low-frequency corona-induced EMR does not interact with the higher-frequency satellite signals or with wired communication systems, while digital TV receivers are equipped with systems to filter out interference. Many radio stations also broadcast in digital, reducing the likelihood of corona-induced EMR interference. Electric power companies are able to operate very effectively under the present FCC rule because harmful interference can generally be eliminated or effectively mitigated.

Radio noise is measured in units of decibels (dB) based on its field strength referenced to a signal level of 1 microvolt per meter (Institute of Electrical and Electronics Engineers [IEEE] 1986). Corona-induced radio noise during fair weather is calculated to be approximately 40 dB (dB-1 microvolt per meter [$1 \mu\text{V/m}$]) at the edge of the right-of-way. This is considered an acceptable level (IEEE 1971). When the transmission line is in proximity to roadways (for example, interstate, U.S., and state highways), such as when it passes over these roadways, radio interference may be experienced for short distances while in proximity to the line. Interference may be more noticeable near the line particularly during foul weather, when corona activity is elevated.

6.1.3 Interference with Other Electronic Communications

Wireless computer network systems, cell phones, GPS units, and satellite receivers operate at high frequencies in the tens to hundreds of MHz or even GHz. These systems also often use FM or digital coding of the signals so they are relatively immune to electromagnetic interference from transmission line corona. GPS units are used in a wide range of activities, including several important agricultural activities such as monitoring pivot irrigation, tracking wheeled and tracked equipment movements during farming operation, and checking the orientation of aerial spraying aircraft. GPS units operate in the frequency range of 1.2 to 1.6 GHz. Satellite receivers operate at frequencies of 3.4 GHz to 7 GHz and have shown no effect from transmission lines unless the receiver was trying to view the satellite through the transmission tower or conductor bundle of the transmission line (Chartier et al. 1986). Repositioning the receiver by a few feet was sufficient to eliminate the obstruction and reduced signal. Mobile phones operate in the radiofrequency range of about 800 MHz to 1,900 MHz or higher. As a result of the high frequencies used by these devices, modulation and processing techniques, and the typically lower-frequency corona-induced EMR, effects from interference are unlikely.

The voltages and currents associated with the transmission line have the potential to induce voltage and current in nearby conductors (e.g., ungrounded metal fences and ungrounded metal irrigation systems). This effect is more likely where ungrounded fences or irrigation systems are parallel and long (1 mile or more). These induced voltages could result in a “nuisance” shock to anyone who touches such a fence or irrigation system. These shocks are known as nuisance or “startle” shocks as they will not physically harm someone, but may be noticed by some people and provoke a startle reaction. An example of an ungrounded metal irrigation system would be a center pivot system on rubber tires. By contrast, the Vermeer-type metal irrigation system is grounded through its metal wheels and therefore presents less of a shock hazard.

A GPS unit in farming equipment should work properly within the vicinity of a transmission line. GPS devices continually pull signals from a number of satellites, not just one and may also utilize a

fixed base station. A signal may be blocked temporarily if the transmission structure is between the receiver and a weak signal, but it will return as the farm equipment moves past the structure. It is also common for GPS receivers to drop and pick up signals even in the absence of transmission lines and structures. If the base station signal is weak or blocked, additional or alternate locations may improve the signal and performance.

Signal interference occurs when other signals at the same frequency as the satellite signal are present. Multipath occurs when objects such as buildings, structures, or tractor parts reflect a GPS satellite signal, causing the satellite signal to arrive at the receiver later than it would have if it followed a straight line from the satellite. A study commissioned by EPRI found that signal interference is “unlikely” based on the design of GPS receivers and their ability to separate the GPS signal from background noise (Silva and Olsen 2002). Another study compared the accuracy of real-time kinematic GPS receivers at different locations to transmission lines and towers (Gibbings et al. 2001). This study concluded that multipath from transmission towers could result in GPS-initialization errors (e.g., the system reports the wrong starting location) 1.1 percent to 2.3 percent of the time. This study also reported that GPS software was able to identify and correct these initialization errors within the normal startup time. This study reported initialization errors caused by electromagnetic interference from energized overhead transmission lines when the GPS receiver was located outside the vehicle, but concluded that “most, if not all of this effect can be eliminated by shielding the receiver and cables.” Placing the receiver inside the vehicle significantly reduced initialization errors.

PacifiCorp does not specifically track interference with GPS tractor navigation systems; however, these systems are widely used in other locations in PacifiCorp’s service area and several existing transmission lines up to 500-kV cross the area. Over the last 10 years, PacifiCorp has not been contacted about interference with tractor GPS navigation systems. Users of these systems have expressed concerns about the possibility of interference, but no specific examples have been reported.

6.2 Evaluation of Alternate Methods and Costs to Reduce Interference

Design options for reducing the radio noise from the transmission line include use of larger diameter conductors, or use of more conductors within the conductor bundles. Increasing the distance between phases of the lines (conductor bundles) may also result in a decrease in the radio noise. These line design options have been employed to minimize the generation of radio noise to acceptable levels.

7.0 Conclusion

Exhibit AA demonstrates the Project will ensure public health and safety with respect to EMFs. Also, this Exhibit, together with the data provided in Exhibit DD, demonstrates that the Project’s AC electric fields and induced currents will comply with the Specific Standards for Transmission Lines under OAR 345-024-0090 provide.

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Exhibit BB

Project Order Requests

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Oregon Administrative Rule (OAR) 345-021-0010(bb) addresses additional information requested by the Project Order. As no such information is as yet available, Exhibit BB does not apply.

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Exhibit CC

Applicable Statutes, Rules, and Local Government Ordinances

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

EFSC	Energy Facility Siting Council
OAR	Oregon Administrative Rule
ORS	Oregon Revised Statutes
Project	Sams Valley Reinforcements Projects

1.0 Introduction

The Energy Facility Siting Council (EFSC; Council) previously approved the Eugene-Medford 500 kV Transmission Line Project¹ and found that PacifiCorp dba Pacific Power (PacifiCorp) appropriately identified permits required for construction and operation. In this Request for Amendment No. 4 (Request), PacifiCorp seeks to expand the EFSC-certificated facility boundary to include the Grants Pass-Sams Valley Transmission Line and the Sams Valley Substation for the Sams Valley Reinforcement Projects (Project). The analysis in this exhibit focuses on the Project described in *Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line*.

Per Oregon Administrative Rule (OAR) 345-021-0010(cc), Exhibit CC identifies state statutes and administrative rules and local government ordinances containing approval criteria that the Project must meet for EFSC to issue a site certificate for the Project, other than those statutes, rules, or ordinances identified in Exhibit E.

2.0 Additional Statutes and Administrative Rules – OAR 345-021-0010(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.

Table CC-1 identifies by legal citation and relevant administering agency the state statutes and administrative rules and local government ordinances referenced in other Exhibits, with the exception of those presented in Exhibit E. The identified statutes, rules, and ordinances contain standards or criteria that the proposed Project must meet for the Council to amend the Facility's site certificate.

¹ EFSC (Energy Facility Siting Council). 1990. Third Amended Site Certification Agreement for the Eugene-Medford 500 kV Transmission Line. October 26.

Table CC-1. Statutes, Rules, and Local Ordinances Referenced in Other Exhibits

Administering Agency	Agency Address	Program Description Legal Citation	Relevant Exhibit
Oregon Department of Geology and Mineral Industries	Yumei Wang Geologic Survey and Services Program Oregon Department of Geology and Mineral Industries 800 NE Oregon Street #28 Suite 965 Portland, OR 97232	Department of Geology and Mineral Industries Administrative Rules- OAR Chapter 632	Exhibits H, I
Oregon Department of Agriculture	Bob Meinke Program Leader Native Plant Conservation 635 Capitol Street NE Salem, OR 97301	Native Plant Conservation Program (Oregon Revised Statutes)ORS Chapter 564 (Wildflowers, Threatened or Endangered Plants); OAR Chapter 603, Division 73 (Plants: Wildflowers and Endangered, Threatened and Candidate Species)	Exhibit Q
Oregon Department of Environmental Quality	Kate Jackson Regional Solutions Center Liaison - Western Region/Southern 221 Stewart Ave., Suite 201 Medford, OR 97501 (503)975-0895	Hazardous Materials Management ORS Chapters 465 and 466 (Hazardous Waste and Hazardous Materials I and II); and OAR Chapter 340, Divisions 45, 47, 108, 100 through 122, 150, and 160 (Hazardous Waste Management); 40 CFR Parts 110, 122, 262, 265, 280, 302, 355, and 761	Exhibit G
	Kate Jackson Regional Solutions Center Liaison - Western Region/Southern 221 Stewart Ave., Suite 201 Medford, OR 97501 (503)975-0895	Solid Waste Management ORS Chapter 459 (Solid Waste Management) and OAR Chapter 340, Division 93 (Solid Waste General Provisions)	Exhibit V
	Oregon Department of Environmental Quality 811 SW Sixth Avenue Portland, OR 97204-1390 (503) 229-5696	Noise Regulations ORS 467.020 and ORS 467.030(Noise Control) and OAR Chapter 340, Division 35 (Noise Control Regulations)	Exhibit X
Oregon Department of Fish and Wildlife	Central Point Rogue Watershed District Office 1495 E. Gregory Road Central Point, OR 97502 (541) 826-8774	Fish and Wildlife Habitat Mitigation Policy ORS 496; OAR Chapter 635, Divisions 100 and 415 (Fish and Wildlife Habitat Mitigation Policy)	Exhibits J, P, Q

Table CC-1. Statutes, Rules, and Local Ordinances Referenced in Other Exhibits

Administering Agency	Agency Address	Program Description Legal Citation	Relevant Exhibit
	Central Point Rogue Watershed District Office 1495 E. Gregory Road Central Point, OR 97502 (541) 826-8774	State Threatened and Endangered Species OAR Chapter 625, Division 100 (Wildlife Diversity Plan) and OAR 635-044-0130	Exhibit Q
Oregon Department of Land Conservation and Development	Tim Murphy Oregon Department of Land Conservation and Development 635 Capital Street NE, Suite 150 Salem, OR 97301	Statewide Planning Goals ORS Chapter 195 (Local Government Planning Coordination); ORS Chapter 197 (Comprehensive Land Use Planning Coordination); ORS Chapter 215 (County Planning, Zoning, Housing Codes); ORS Chapter 469 (Energy, Conservation Program, Energy Facilities); OAR Chapter 660, Divisions 4 (Interpretation of Goal 2 Exception Process); Division 6 (Forest Lands), Division 12 (Transportation Planning) Division 16 (Requirements and Application Procedures for Complying with Statewide Goal 5);, Divisions 33(Agricultural Land)	Exhibit K
Office of State Fire Marshal; Oregon State Police	Michael Heffner Assistant Chief Deputy Emergency Response Services Branch Office of State Fire Marshal, Oregon State Police 3565 Trelstad Ave. SE Salem, OR 97317	Emergency Planning and Community Right-To-Know Act OAR Chapter 837, Division 85 (Community Right-To-Know Survey and Compliance Programs)	Exhibit U
Public Utility Commission of Oregon	Public Utility Commission of Oregon 550 Capitol Street NE, Suite 215 Salem, OR 97301	Public Utility Commission of Oregon Safety Standards ORS 757.045; OAR Chapter 860, Division 24 (Safety Standards)	Exhibits B, D
State Historic Preservation Office	John Pouley Oregon State Historic Preservation Officer Assistant State Archaeologist 725 Summer St NE Suite C Salem, OR 97301	Historic, Cultural and Archaeological Resources Standard ORS 97.745 (Prohibited Acts); ORS 358.920 (Prohibited Conduct); ORS 390.010 (Outdoor Recreation); ORS 390.235 (Archaeological Sites and Historical Material); and OAR 345-022-0090 (Historic, Cultural and Archaeological Resources Standard)	Exhibit S

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Exhibit DD

Specific Standards for Transmission Lines

**Sams Valley Reinforcement Projects
December 2017**

Prepared for



PacifiCorp

Prepared by



Tetra Tech, Inc.

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Acronyms and Abbreviations

AC	alternating current
BPA	Bonneville Power Administration
EFSC	Energy Facility Siting Council
kV	kilovolt
kV/m	kilovolts per meter
mA	milliampere
NESC	National Electrical Safety Code
OAR	Oregon Administrative Rule
PacifiCorp	PacifiCorp dba Pacific Power
Project	Sams Valley Reinforcement Projects

1.0 Introduction

The Energy Facility Siting Council (EFSC; Council) previously approved the Eugene-Medford 500 kV Transmission Line Project (EFSC 1990) and found that PacifiCorp dba Pacific Power (PacifiCorp) appropriately identified permits required for construction and operation. In this Request for Amendment No. 4, PacifiCorp seeks to expand the EFSC-certificated facility boundary to include the Grants Pass–Sams Valley Transmission Line and the Sams Valley Substation for the Sams Valley Reinforcement Projects (Project). The analysis in this exhibit focuses on the Project described in the *Written Request for Amendment #4 Eugene–Medford 500 kV Transmission Line*.

Exhibit DD was prepared to meet the submittal requirements for the Project, per Oregon Administrative Rule (OAR) 345-021-0010(1)(dd), related to specific standards for transmission lines.

2.0 Site Certificate Condition Compliance

No existing site certificate conditions apply to this resource. PacifiCorp proposes the new following condition per OAR 345-021-0010(1)(dd):

- **Siting Standards for Transmission Lines Condition 1:** During construction, in order to reduce or manage human exposure to electromagnetic fields, the site certificate holder shall construct all aboveground transmission lines in accordance with the requirements of the current edition of the National Electrical Safety Code.
- **Siting Standards for Transmission Lines Condition 2:** During operation, the certificate holder shall take the following steps to reduce or manage human exposure to induced currents:
 - a. Providing to landowners a map of overhead transmission lines on their property;
 - b. Implementing a safety protocol to ensure adherence to NESC grounding requirements.

3.0 Specific Standards not Applicable to the Project

3.1 Wind Energy Facilities – OAR 345-021-0010(1)(dd)(A)

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:

(A) For wind energy facilities, OAR 345-024-0010 and -0015.

The Project is not a wind energy facility, so this section does not apply.

3.2 Surface Facilities Related to Underground Gas Storage – OAR 345-021-0010(1)(dd)(B)

(B) For surface facilities related to underground gas storage reservoirs, OAR 345-024-0030, including information required by 345-021-0020.

The Project is not an underground gas storage facility, so this section does not apply.

4.0 Specific Standards for Transmission Lines – OAR 345-021-0010(1)(dd)(C)

(C) For any transmission line under Council jurisdiction, OAR 345-024-0090.

The Specific Standards for Transmission Lines under OAR 345-024-0090 provide that PacifiCorp must demonstrate it:

(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;

(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.

4.1 Methods

The methods PacifiCorp used to model expected electric fields and induced current for the Project are the same as described in Exhibit AA, and are summarized here.

The electric field, magnetic field, and audible noise that may be produced by the proposed transmission line was predicted using EMFWorkstation: ENVIRO (Version 3.52), a Windows-based model developed by the Electric Power Research Institute (EPRI 1997). The ENVIRO program uses the algorithms developed by the Bonneville Power Administration (BPA), which were originally described in the Corona and Field Effects program from BPA (BPA n.d.). The inputs to the ENVIRO model are line voltage, load flow (current), and the physical dimensions of the line (number of phases, conductor diameter, spacing, height, and subconductor configuration).

4.2 Alternating Current Electric Fields

The modeling results (see Attachment AA-1) show that the Project's transmission lines will produce alternating current (AC) electric fields that will be less than 9 kV per meter (kV/m) at 1 meter above the ground at the edge of the right-of-way, and therefore, the Project will comply with the AC

electric field standard. Table DD-1 and DD-2 summarizes the electric field strengths at the peak and edge of the right-of-way for the different transmission line configurations proposed for the Project. The electric field profiles in Exhibit AA show how the strength of the electric field will vary across the right-of-way for each transmission line configuration (see Exhibit AA).

Table DD-1. EMF Strength for Double-Circuit 230/115-kV Single Pole Structures Adjacent to Existing 230 kV H Frame Structures

Structure Type	ROW Width (feet)	South/West ROW Edge (kV/m)	Maximum within ROW (kV/m) ¹	North/East ROW Edge (kV/m)
Electric Field Strength				
230/115-kV single pole and 230 kV H frame	260	0.05	3.9	0.11
Magnetic Field Strength				
230/115-kV single pole and 230 kV H frame	260	42	665	150
Electric and magnetic field strengths calculated at standard height of 1 meter above ground surface. kV = kilovolt; kV/m = kilovolt per meter; ROW = right-of-way.				

Table DD-2. EMF Strength for Reconductored 230-kV H Frame Structures Adjacent to Existing 115 kV H Frame Structures and 500 kV Lattice Structures

Structure Type	ROW Width (feet)	South/West ROW Edge (kV/m)	Maximum within ROW (kV/m) ¹	North/East ROW Edge (kV/m)
Electric Field Strength				
Reconductored 230 kV H Frame adjacent to 115 kV H Frame and 500 kV Lattice	450	1.6	10.4	1.4
Magnetic Field Strength				
Reconductored 230 kV H Frame adjacent to 115 kV H Frame and 500 kV Lattice	450	85	703	200
Electric and magnetic field strengths calculated at standard height of 1 meter above ground surface. kV = kilovolt; kV/m = kilovolt per meter; ROW = right-of-way.				

¹ Under OAR 345-024-0090, the 9-kV per meter threshold is focused on areas accessible to the public. Here, PACIFICORP generally will obtain easements for the lands crossed by the Project, and public access to those lands generally will depend on the policies of the landowners and will not be determined until the time that right-of-way negotiations take place (see Exhibit C, Table C-1 (describing the varying landownerships crossed by the Project)). Even so, as set forth in Table AA-4, the maximum electric field value will be below the 9-kV/m threshold throughout the right-of-way, regardless of whether there will be public access or not.

Table DD-2. EMF Strength for Reconductored 230-kV H Frame Structures Adjacent to Existing 115 kV H Frame Structures and 500 kV Lattice Structures

Structure Type	ROW Width (feet)	South/West ROW Edge (kV/m)	Maximum within ROW (kV/m) ¹	North/East ROW Edge (kV/m)
1. Under OAR 345-024-0090, the 9-kV per meter threshold is focused on areas accessible to the public. Here, PACIFICORP generally will obtain easements for the lands crossed by the Project, and public access to those lands generally will depend on the policies of the landowners and will not be determined until the time that right-of-way negotiations take place (see Exhibit C, Table C-1 (describing the varying landownerships crossed by the Project)). Even so, as set forth in Table AA-4, the maximum electric field value will be below the 9-kV/m threshold throughout the right-of-way, regardless of whether there will be public access or not.				

4.3 Induced Currents

4.3.1 Overview of Induced Current, Induced Voltage, and Nuisance Shock

The flow of electricity in a transmission line can induce a small electric charge, or voltage, in nearby conductive objects. An induced electric charge can flow, or become electric current, when a path to ground is presented. Induced current can be observed as a continuous flow of electricity or, under some circumstances, as a sudden discharge, commonly known as a “nuisance shock.” The most common example of a nuisance shock is when a vehicle, which is insulated from grounding by its tires, is parked under a transmission line for sufficient time to build up a charge. A person touching such a charged vehicle could become a conducting path for the current and can feel a momentary shock if the available electrical charge is sufficient, generally above 1 milliamper (mA) (Dalziel and Mansfield 1950).

The amount of current flow, or the magnitude of the nuisance shock, is determined by the level of charge that can be induced and the nature (conductivity or impedance) of the path to ground. Metallic roofs, vehicles, equipment, or wire fences are examples of metallic objects in the vicinity of the Project in which a small electric charge could be induced. Factors to consider when assessing the potential hazards and mitigation measures for induced voltage include the characteristics of nearby objects, and the degree and nature of grounding of those objects. More conductive materials accumulate greater charge than less conductive materials while large objects, such as a tractor-trailer, will accumulate a greater charge than smaller objects such as a pick-up truck (EPRI 2005). A linear object that is parallel to the transmission line would be more greatly affected than one that is perpendicular to the line. An object passing quickly under the transmission line would be minimally affected compared to a stationary object. A grounded or partially grounded object will accumulate charge that could be discharged as a nuisance shock, while continuous current would occur in a grounded object. The total amount of charge that can be induced in a perfectly nongrounded object is limited by the strength of the magnetic field and the nature of the object; after a time, the field and the induced charge in the object will reach equilibrium (steady-state), and the induced charge would stop building.

Continuous induced current may occur if a metallic object is partially grounded or grounded some distance from the transmission line. Continuous induced current may occur in linear objects that are parallel to the transmission line, such as some fences, railroads, pipelines, irrigation piping, or other transmission or power distribution lines.

4.3.2 National Electrical Safety Code Provisions Relevant to Induced Current

The National Electrical Safety Code (NESC) sets the standards for practical safeguarding of people during the installation, operation, or maintenance of electric supply and communication lines and associated equipment. NESC Rule 234G.3 (NESC 2012) addresses induced current and sets forth a certain standard to ensure the safety and health implications of the same are properly addressed:

[f]or voltages exceeding 98 kV ac to ground, either the clearances shall be increased or the electric field, or the effects thereof, shall be reduced by other means, as required, to limit the steady-state current due to electrostatic effects to 5 mA, rms, if an ungrounded metal fence, building, sign, billboard, chimney, radio or television antenna, tank or other installation, or any ungrounded metal attachments thereto, were short-circuited to ground.

The 5-mA figure embedded in the NESC rule is a scientifically derived health and safety limitation, intended to eliminate the potential for harmful electric shock. The threshold of perception for current flowing through the human body is approximately 1 mA (Dalziel and Mansfield 1950). If the current is increased sufficiently beyond a person's perception threshold, it can become bothersome and possibly startling. Larger currents can cause the muscles of the arm and hand to involuntarily contract so that a person cannot let go of an electrified object. The value at which 99.5 percent of men, women, and children can still let go of an object is approximately 9, 6, and 5 mA, respectively. To address this safety concern, NESC Rule 234G.3 limits the steady-state current due to electrostatic effects to 5 mA; it is a performance standard aimed at limiting the potential charge that could be developed so that a potential nuisance shock would not be harmful to children.

The NESC is updated every 5 years. PacifiCorp will design, construct, and operate the Project in accordance with the version of the NESC that is most current at the time final engineering of the Project is completed.

4.3.3 Predicted Induced Current

Empirical evidence has yielded a known relationship between short-circuit current and electric field strength for various types and sizes of objects (EPRI 2005). Based on these known relationships, Table DD-3 indicates the maximum current that could be induced in several types of vehicles and agricultural-related pieces of equipment potentially present in the transmission line right-of-way.

Table DD-3. Induced Current Factors

Object	I_{sc}/E (mA/kV/m)	Maximum Induced Current (mA)¹
Car—L 4.6 m x W 1.78 m x H 1.37 m	0.088	0.92
Pickup Truck—L 5.2 m x W 2.0 m x H 1.7m	0.10	1.05
Large Tractor-Trailer—Total Length 15.75 m Trailer: 12.2 m x W 2.4 m x H 3.7 m	0.64	6.72
Combine—L 9.15 m x W 2.3 m x H 3.5 m	0.38	4.0
Source: Table 7.8-2, from EPRI 2005. I_{sc} = short-circuit current E = AC electric field m = meter ¹ Maximum induced current calculated for strongest predicted electric field of 10.5 kV/m, associated with the proposed Project.		

Multiplying the factors listed in Table DD-3 by the transmission line electric field strength yields the short-circuit current expected under conditions expected to produce the greatest magnitude short-circuit currents. The strongest electric field calculated for the project configurations is 3.9 kV/m for the 230/115-kV monopole structure and 10.4 for the reconductored 230-kV H Frame structures adjacent to existing 115 kV H Frame structures and 500 kV lattice. The vehicles and equipment listed in Table DD-3 will have short-circuit currents less than the 5-mA current required by the NESC, except for the tractor-semitrailer for which the induced current would be 6.72 mA if the entire length of the tractor-semitrailer were in a 8.9 kV/m electric field (e.g., parallel to and directly under the line). Tractor-semitrailers generally will not be parked under the line where the 8.9 kV/m electric field occurs, except at road crossings where the tractor-semitrailers will not be parallel to the line and will be present only for a short duration while crossing under the line—that being so, the inducible charge under those circumstances likely would be less than 5 mA. At locations where large vehicles are anticipated to occur directly under the transmission line in parallel with the line and for a meaningful period, the line design would be altered if necessary, for example by an increase in the height of the line at that location, so that the line complies with the NESC 5-mA safety requirement.

In addition to the transmission line, the Project includes the following components and related or supporting facilities: Sams Valley Substation, access roads, temporary laydown areas, and pulling and tensioning sites. The Sams Valley Substation will be constructed in a manner to minimize induced currents in surrounding facilities, while the access roads, laydown areas, and pulling and tensioning sites will not include components that will contribute to induced currents or voltages.

4.3.4 Stray Voltage

Stray voltage is not an issue for this Project. Stray voltage is an issue that may occur with lower voltage distribution systems that have unequally loaded phases and an improperly grounded neutral wire. Stray voltage can also be an issue that occurs with the customer's electrical system

beyond the local utility company's meter. The issue of stray voltage related to the Project is eliminated by the balanced three-phase configuration of the proposed transmission lines.

4.3.5 Program to Prevent Induced Current and Nuisance Shock

Nuisance shocks and induced currents can be reduced or eliminated by proper grounding of metallic objects near the transmission line, shielding them from the electric field, or positioning the transmission line farther from the objects. Grounding an object will reduce the induced potential to essentially zero and eliminate the object as a source of shocks or currents.

During final engineering and construction of the Project, PacifiCorp will identify all wire fences, pipelines, irrigation lines, metal roofs, and other objects nearby the right-of-way in which a current could be induced. All such objects will be properly grounded within or as close as practicable to the right-of-way in order to prevent induced current and nuisance shocks.

5.0 Conclusion

Exhibit DD demonstrates that the transmission lines associated with the Sams Valley Transmission Line Project (Project) will be designed, constructed, and operated to ensure AC electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public. Exhibit DD also shows that the induced currents resulting from the Project transmission lines and related or supporting facilities will be as low as reasonably achievable.

6.0 References

- BPA (Bonneville Power Administration). Undated. "Corona and Field Effects" Computer Program – Public Domain Software. Bonneville Power Administration, Vancouver, WA.
- Dalziel, C.F., and T H. Mansfield. 1950. Effects of Frequency on Perception Currents. AIEE Transactions 69:1162–1168.
- EFSC (Energy Facility Siting Council). 1990. Third Amended Site Certification Agreement for the Eugene-Medford 500 kV Transmission Line. October 26.
- EPRI (Electric Power Research Institute). 1997. EMFWorkstation: ENVIRO (Version 3.52). Windows-based model developed by Electric Power Research Institute.
- EPRI. 2005. AC Transmission Line Reference Book: 200 kV and Above. Third edition. EPRI, Palo Alto, CA. 1011974.
- NESC (National Electric Safety Code). 2012. National Electrical Safety Code. 2012 ed. Institute of Electrical and Electronics Engineers, Inc., New York, NY. 287 pages.

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