Exhibit X
Noise

Boardman to Hemingway Transmission Line Project

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Amended Preliminary Application for Site Certificate

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ACRONYMS AND ABBREVIATIONS

Amended Project Order	First Amended Project Order, Regarding Statutes, Administrative Rules and Other Requirements Applicable to the Proposed Boardman to Hemingway Transmission Line (December 22, 2014)
ANSI	American National Standards Institute
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CAFE	Corona and Field Effects
dBA	A-weighted decibel
EFSC or Council	Energy Facility Siting Council
EMF	electric and magnetic fields
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
IPC	Idaho Power Company
kV	kilovolt
L_{50}	median sound level (50 percent of the measurement interval is above this level, 50 percent is below)
L_{eq}	equivalent sound pressure level
L_{max}	maximum noise emission level
L_w	sound power level
mm	millimeter
mm/hr	millimeters per hour
mph	miles per hour
NSR	noise sensitive receptor
NWR	National Wildlife Refuge
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODOE	Oregon Department of Energy
Project	Boardman to Hemingway Transmission Line Project
ROW	right-of-way
WRCC	Western Regional Climate Center

Exhibit X
Noise

1.0 INTRODUCTION

Exhibit X provides analysis of potential noise impacts from the Boardman to Hemingway Transmission Line Project (Project). Exhibit X identifies all noise sensitive receptors (NSRs) within one-half mile of the Site Boundary from noise-generating Project features such as the transmission line, and demonstrates that the relevant Project noise sources will not exceed the Oregon Department of Environmental Quality's (ODEQ) maximum permissible sound level of 50 A-weighted decibels (dBA). Exhibit X also shows, for the majority of NSRs within the analysis area, that the Project will not exceed ODEQ's ambient antidegradation standard, which prohibits new industrial noise sources located on previously unused sites from increasing ambient noise levels by more than 10 dBA. However, Idaho Power Company (IPC) estimates that, at 30 NSRs, the Project may exceed the ambient antidegradation standard during foul weather conditions that occur on average around 2 percent of the calendar year. To address these limited circumstances where an exceedance may occur, IPC requests that the Oregon Energy Facility Siting Council (EFSC or Council) authorize an exception to the Project's compliance with the ambient antidegradation standard on the basis that such exceedances will be infrequent events and that, in all instances where the Project may exceed the ambient antidegradation standard, the noise generated by the Project is below the maximum permissible nighttime sound level (50 dBA). Alternatively, IPC requests that the Council grant a variance on the basis that requiring the Project to strictly comply with the ODEQ Noise Rules is unreasonable and likely to make the Project unpermittable.

2.0 APPLICABLE RULES AND AMENDED PROJECT ORDER PROVISIONS

2.1 Site Certificate Application Requirements

Oregon Administrative Rule (OAR) 345-021-0010(1)(x) states Exhibit X must include the following information about noise generated by construction and operation of the Project, providing evidence to support a finding by the Council that the Project complies with the ODEQ's Noise Control Regulations at OAR 340-035-0035:

> *(A) Predicted noise levels resulting from construction and operation of the proposed facility.*
>
> *(B) An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035, including a discussion and justification of the methods and assumptions used in the analysis.*
>
> *(C) Any measures the applicant proposes to reduce noise levels or noise impacts or to address public complaints about noise from the facility.*
>
> *(D) Any measures the applicant proposes to monitor noise generated by operation of the facility.*
>
> *(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.*

2.2 ODEQ Noise Control Regulations

2.2.1 Noise Control Regulations for Industry and Commerce

The ODEQ Noise Control Regulations at OAR 340-035-0035 provide, in relevant part:

> *(1) Standards and Regulations:*
>
> *. . .*[1]
>
> *(b) New Noise Sources:*
>
> *(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.*
>
> *(B) New Sources Located on Previously Unused Site:*
>
> *(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, L10 or L50, 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).*
>
> *(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.*
>
> *(c) Quiet Areas. No person owning or controlling an industrial or commercial noise source located either within the boundaries of a quiet area or outside its boundaries shall cause or permit the operation of that noise source if the statistical noise levels generated by that source exceed the levels specified in Table 9 as measured within the quiet area and not less than 400 feet (122 meters) from the noise source.*

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[1] OAR 340-035-0035(1)(a) applies to existing noise sources and not new noise sources. Existing noise sources are those for which installation and construction commenced prior to January 1, 1975; new noise sources are those commencing after January 1, 1975 (see OAR 340-035-0015(17) and (33)). Because installation and construction of the Project will commence after January 1, 1975, the Project is considered a new noise source and therefore OAR 340-035-0035(1)(a) does not apply to the Project.

(d) Impulse Sound. Notwithstanding the noise rules in Tables 7 through 9, no person owning or controlling an industrial or commercial noise source shall cause or permit the operation of that noise source if an impulsive sound is emitted in air by that source which exceeds the sound pressure levels specified below, as measured at an appropriate measurement point, as specified in subsection (3)(b) of this rule:

(A) Blasting. 98 dBC, slow response, between the hours of 7 a.m. and 10 p.m. and 93 dBC, slow response, between the hours of 10 p.m. and 7 a.m.

(B) All Other Impulse Sounds. 100 dB, peak response, between the hours of 7 a.m. and 10 p.m. and 80 dB, peak response, between the hours of 10 p.m. and 7 a.m.

. . .[2]

(3) Measurement:

(a) Sound measurements procedures shall conform to those procedures which are adopted by the Commission and set forth in Sound Measurement Procedures Manual (NPCS-1), or to such other procedures as are approved in writing by the Department;

(b) Unless otherwise specified, the appropriate measurement point shall be that point on the noise sensitive property, described below, which is further from the noise source:

(A) 25 feet (7.6 meters) toward the noise source from that point on the noise sensitive building nearest the noise source;

(B) That point on the noise sensitive property line nearest the noise source.

. . .[3]

(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:*

. . .
(b) Warning devices not operating continuously for more than 5 minutes;
(c) Sounds created by the tires or motor used to propel any road vehicle complying with the noise standards for road vehicles;
. . .
(g) Sounds that originate on construction sites.
(h) Sounds created in construction or maintenance of capital equipment;
. . .

[2] OAR 340-035-0035(1)(e) and OAR 340-035-0035(2) apply where the ODEQ Director has required specific noise sources to meet certain noise standards and compliance requirements. Here, the ODEQ Director has not issued any such directives for the Project. Therefore, OAR 340-035-0035(1)(e) and OAR 340-035-0035(2) do not apply to the Project.

[3] OAR 340-035-0035(4) applies where the ODEQ Director has required specific noise sources to meet certain monitoring and reporting requirements. Here, the ODEQ Director has not issued any such directives for the Project. Therefore, OAR 340-035-0035(4) does not apply to the Project.

> *(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.*

(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.*

2.2.2 Variances

OAR 340-035-0100 provides for variances to the ODEQ Noise Control Regulations as follows:

(1) Conditions for Granting. The Commission may grant specific variances from the particular requirements of any rule, regulation, or order to such specific persons or class of persons or such specific noise source upon such conditions as it may deem necessary to protect the public health and welfare, if it finds that strict compliance with such rule, regulation, or order is inappropriate because of conditions beyond the control of the persons granted such variance or because of special circumstances which would render strict compliance unreasonable, or impractical due to special physical conditions or cause, or because strict compliance would result in substantial curtailment or closing down of a business, plant, or operation, or because no other alternative facility or method of handling is yet available. Such variances may be limited in time.

(2) Procedure for Requesting. Any person requesting a variance shall make his request in writing to the Department for consideration by the Commission and shall state in a concise manner the facts to show cause why such variance should be granted.

2.3 Amended Project Order Provisions

The Amended Project Order includes the following provisions regarding Exhibit X:

All paragraphs [of OAR 345-021-0010(1)(x)] apply. However, because of the linear nature of the proposed facility, the requirements of paragraph E are modified. Instead of one mile, to comply with paragraph E the applicant must develop a list of all owners of noise sensitive property, as defined in OAR 340-035-10 0015, within one-half mile of the proposed site boundary.

. . .

The application shall contain a noise analysis and information to support a Council finding that the proposed facility, including any alternative routes proposed, will comply with the requirements of OAR 340-035-0035.

(Amended Project Order, Section III(x)).

3.0 ANALYSIS

3.1 Analysis Area

The analysis area for Exhibit X is the Site Boundary and one-half mile from the Site Boundary (see Amended Project Order, Section IV). The Site Boundary is defined as "the perimeter of the site of a proposed energy facility, its related or supporting facilities, all temporary laydown and staging areas, and all corridors and micrositing corridors proposed by the applicant" (OAR 345-001-0010(55)). The Site Boundary encompasses the following facilities in Oregon:

- The Proposed Route, consisting of 270.8 miles of new 500-kilovolt (kV) electric transmission line, removal of 12 miles of existing 69-kV transmission line, rebuilding of 0.9 mile of a 230-kV transmission line, and rebuilding of 1.1 miles of an existing 138-kV transmission line;
- Four alternatives that each could replace a portion of the Proposed Route, including the West of Bombing Range Road Alternative 1 (3.7 miles), West of Bombing Range Road Alternative 2 (3.7 miles), Morgan Lake Alternative (18.5 miles), and Double Mountain Alternative (7.4 miles);
- One proposed 20-acre station (Longhorn Station);
- Ten communication station sites of less than ¼ acre each and two alternative communication station sites;
- Permanent access roads for the Proposed Route, including 206.3 miles of new roads and 223.2 miles of existing roads requiring substantial modification, and for the Alternative Routes including 30.2 miles of new roads and 22.7 miles of existing roads requiring substantial modification; and
- Thirty-one temporary multi-use areas and 299 pulling and tensioning sites of which four will have light-duty fly yards within the pulling and tensioning sites.

The Project features are fully described in Exhibit B, and the location of the Project features and the Site Boundary is described in Exhibit C and Table C-24.

3.2 Methods

OAR 345-021-0010(1)(x)(B): An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035, including a discussion and justification of the methods and assumptions used in the analysis.

3.2.1 Overview

To demonstrate compliance with the ODEQ Noise Rules, IPC conducted an acoustic analysis of the Project using the following multistep process:

Step 1: NSRs were identified within the analysis area using the following methods:

a. A computer desktop survey of recently captured aerial photography was conducted to identify all structures, regardless of their sensitivity to noise, within the analysis area.

b. Each structure was analyzed by geographic information system professionals interpreting aerial photography to determine if the structure was an NSR.

c. Where it was unclear if a structure was noise sensitive (e.g., residence, school, campground) vs. non-noise sensitive (e.g., barn, garage), attempts were made to visually verify from public right-of-way (ROW) the use of each structure.

d. Land records were also reviewed for structures where the use of the structure was unknown.

e. If a structure could not be visually verified from public ROW and no land records were available to be reviewed, the structure was assumed to be noise sensitive.

Step 2: Sound source characteristics for noise modeling of the transmission line during foul weather conditions were determined.

Step 3: Initial screening-level modeling results of the transmission line were calculated based on the foul weather conditions, and an assessment was completed to determine the likely maximum received sound at NSRs within the monitoring analysis area. This likely maximum received sound level was added to a conservative assumed ambient sound level of 20 dBA, as requested by the Oregon Department of Energy (ODOE). If potential for increasing baseline ambient sound levels by 10 dBA or less could be reasonably assumed, compliance with the ambient antidegradation standard provided in OAR 340-035-0035(1)(b)(B)(i) was inferred.

Step 4: For NSRs that showed a potential exceedance condition of the ODOE-requested 30 dBA threshold, representative baseline sound measurements were conducted at or near these locations. A sound monitoring protocol was developed in consultation with ODOE (see Attachment X-1). Measurements were conducted over a period of 2 to 4 weeks at 22 preselected monitoring positions in targeted areas (see Attachment X-2). Supplemental sound monitoring was also performed at 8 additional monitoring positions to include alternate corridor segments defined after the initial sound monitoring, as described in Attachment X-3.

Step 5: From the baseline measurements, the representative existing L_{50} sound levels were calculated and new compliance thresholds were defined to assess conformance with the ambient antidegradation standard. The representative existing L_{50} sound levels were calculated by taking the average of the measured L_{50} sound levels for the late night time period (12:00 a.m. to 5:00 a.m.). Atypical sources of extraneous sound, such as sound produced by field crews setting up or calibrating the equipment and periods when the wind speed exceeded 10 miles per hour (mph), were removed from the dataset.

Step 6: The L_{50} sound level for each NSR was assigned based on measurements performed in Step 5 for monitoring positions in a similar acoustic environment. An assessment of the ambient antidegradation standard was then conducted for each NSR. The assigned ambient baseline sound level was compared to the modeled future level to assess compliance with the ambient degradation standard.

In accordance with OAR 345-021-0010(1)(x), Project construction noise was also evaluated, even though construction noise is exempted in OAR 340-035-0035(5). The following sections provide a discussion of (1) the methodology used to model operational noise from the Project; (2) the methodology used to derive ambient baseline sound levels at NSRs; and (3) the methodology used to calculate the frequency of foul weather conditions likely to cause elevated corona noise at the NSRs.

3.2.2 Transmission Line Noise Modeling

Audible corona noise from transmission lines can be predicted using Electric and Magnetic Fields (EMF) Workstation ENVIRO or the Corona and Field Effects (CAFE) program (DOE and BPA n.d.). Both programs use algorithms developed by the U.S. Department of Energy and Bonneville Power Administration (BPA) to calculate expected levels of audible noise from transmission lines. The CAFE program is an older DOS-based model program, while the ENVIRO program is a newer Windows-based model developed by the Electric Power Research Institute (EPRI). Levels of Project noise were predicted at 133 NSRs that were identified within the analysis area. Assumptions regarding tower and conductor configurations are provided in Exhibit AA and not repeated here. For audible noise modeling purposes, the voltage of the 500-kilovolt (kV) circuits was modeled at an operational voltage of 550-kV.

3.2.3 Baseline Sound Monitoring Program

3.2.3.1 Overview

Screening level modeling of corona noise was completed to assist with selecting representative baseline ambient sound monitoring locations. Initial screening-level modeling results of the transmission line were calculated based on foul weather scenario, and assessment was completed to determine the likely maximum received sound at NSRs within analysis area. For NSRs that had the potential to exceed the ambient degradation standard, representative baseline sound measurements were conducted.

A draft sound monitoring protocol was submitted to ODOE that included a description of the sound survey methodology and assumptions, areas to be surveyed, and the measurement parameters (see Attachment X-1). Baseline sound measurements were initially completed at 22 NSRs, and supplemental sound measurements were completed at 8 additional NSRs. The locations of monitoring positions are shown in Attachments X-2 and X-3. Midway through monitoring at each monitoring position, data were downloaded and evaluated to identify occurrences of irregularities in sound levels that warranted investigation.

3.2.3.2 Field Measurement Methodology

Wherever possible, a monitoring position was set up on each property at a point 25 feet towards the noise source (see OAR 340-035-0035(3)(b)). Monitoring positions were placed in similar surroundings experiencing the same weather and acoustic conditions of where a resident was expected to spend the majority of time when outdoors. However, some property owners voiced preference on the siting of sound monitoring equipment. To accommodate property owner’s requests, field engineers sited the monitoring positions per the property owner’s requests if that location maintained the intended goals of the monitoring program. All monitoring stations were anchored and secured in a manner to avoid interference from any large vertical reflective surfaces and photographed from two vantage points as described in each detailed monitoring position description included in Attachments X-2 and X-3.

At each of the monitoring positions a sound level meter was set up, field calibrated, and programmed to data log continuously. Each sound analyzer was programmed to measure and log broadband A-weighted statistical sound levels (L_{10} and L_{50}) sound pressure levels. Sound measurements at each monitoring position were collected continuously over a 2- to 4-week duration. The initial measurement period commenced March 6, 2012, and ended on May 10, 2012, and the supplemental measurement period commenced March 11, 2013 and ended on June 12, 2013. The purpose of the extended duration measurements was to obtain a statistically significant dataset and also to obtain data during a range of meteorological conditions. Field equipment was calibrated with American National Standards Institute (ANSI) Type 1 calibrators, which have accuracy traceable to the National Institute of Standards and Technology.

3.2.3.3 Instrumentation

All measurements were made with a Larson Davis 831 real-time sound level analyzer equipped with a PCB model 377B02 0.5-inch precision condenser microphone. This instrument meets the requirements set forth in the ANSI standards for Type 1 sound level meters for quality and accuracy (precision). All instrumentation was laboratory calibrated within the previous 12-month period as well as field calibrated.

The monitoring stations are designed for service as long-term environmental sound level data loggers. Each sound level analyzer used was enclosed in a weatherproof case and equipped with a self-contained microphone tripod. The microphone and windscreen were tripod-mounted at an approximate height of 1.5 to 1.7 meters (4.9 to 5.6 feet) above grade. When sound measurements are attempted in the presence of elevated wind speeds, extraneous noise can be self-generated across the microphone and is often referred to as pseudo-noise. Air blowing over a microphone diaphragm creates a pressure differential and turbulence. All sound level analyzer microphones were protected with a 180-millimeter (mm) (7-inch) diameter foam windscreen made of specially prepared open-pored polyurethane. By using this microphone protection, the pressure gradient and turbulence are effectively moved farther away from the microphone, minimizing self-generated wind-induced noise. Multiple baseline monitoring stations were also equipped with Vaisala meteorological sensor units. The Vaisala meteorological sensor monitors and collects data on wind speed and direction via its ultrasonic anemometer, barometric pressure, temperature and humidity, as well as a rain gauge via a pressure plate which measures total rainfall, intensity, and duration of rainfall. The Vaisala unit is also able to distinguish between precipitation type such as rain, hail, and snow.

3.2.4 Evaluating Frequency of Foul Weather Conditions

To determine the frequency of foul weather conditions in the analysis area, an analysis of the historical meteorological data (2008-12) was conducted at four discrete data collection stations found in proximity to the Project: Flagstaff Hill, La Grande, Owyhee Ridge, and Umatilla National Wildlife Refuge (NWR). Verified meteorological data were obtained for these stations from the Western Regional Climate Center (WRCC). The WRCC is one of six regional climate centers in the United States and provides meteorological monitoring data for the Pacific Northwest region. The regional climate center program is administered by the National Oceanic and Atmospheric Administration. Specific oversight is provided by the National Climatic Data Center of the National Environmental Satellite, Data and Information Service.

The hourly meteorological data included parameters such as precipitation, wind speed (mph), wind direction (degree), average air temperature (degrees Fahrenheit), relative humidity (percent), and solar radiation (watts per square meter). The data were analyzed to effectively determine the frequency of relevant foul weather conditions in the vicinity of potentially impacted NSRs.

3.3 Predicted Noise Levels

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

3.3.1 Construction Noise

3.3.1.1 Predicted Construction Noise Levels

Project construction will occur sequentially, moving along the length of the Project route, or in other areas such as near access roads, structure sites, conductor pulling sites, and staging and maintenance areas. 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
- Stringing of conductors, shield wire, and fiber-optic ground wire

The following subsections discuss certain construction activities that will periodically generate audible noise, including blasting and rock breaking, implosive devices used during conductor stringing, helicopter operations, and vehicle traffic.

Blasting and Rock Breaking

Blasting is a short-duration event as compared to rock removal methods, such as using track rig drills, rock breakers, jackhammers, rotary percussion drills, core barrels, or rotary rock drills. Modern blasting techniques include the electronically controlled ignition of multiple small-explosive charges in an area of rock that are delayed fractions of second, resulting in a total event duration that is generally less than a second. Impulse (instantaneous) noise from blasts could reach up to 140 dBA at the blast location or over 90 dBA within 500 feet.

Lattice tower foundations for the Project typically will 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 to reach the required depth to install the structure foundations. Final blasting locations will not be identified until an investigative geotechnical survey of the analysis area is conducted during the detailed design.

The contracted blasting specialist will prepare a blasting plan that demonstrate compliance with applicable state and local blasting regulations, including the use of properly licensed personnel and the acquisition of necessary authorizations. The Framework Blasting Plan is set forth in Exhibit G, Attachment G-5.

Implosive Devices

An implosive conductor splice consists of a split-second detonation with sound and flash. Implosive splicing activities are anticipated to be limited to daytime hours. A blasting plan will be developed by an individual certified and licensed to perform the work. The plan will communicate all safety and technical requirements including, but not limited to, delineation of the controlled access zone and distance away from residences.

Helicopter Operations

Access roads to each tower site are generally required 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 the delivery of construction laborers, equipment, and materials to structure sites; structure placement; hardware installation; and wire-stringing operations. For areas where the terrain is rugged and hilly, it is anticipated that line-replacement activities will involve the use of helicopters. Heavy-lift helicopters could be used to erect the single-circuit 500-kV tower sections. Light-duty helicopters will be used during the stringing phase of construction. Helicopters generally fly at lower altitudes than fixed-wing aircraft and increase sound levels where they are operating. The fly yards will be approximately 10 to 15 acres and sited at locations to optimize fly time. Helicopter operations are expected to be limited to daylight hours. The helicopter flight path generally will follow the proposed alignment and avoid flying directly over residences. Figure X-1 compares noise from helicopters to those of other common sources (Helicopter Association International 2017).

General Construction Activities

Noise from general construction activities is expected to be similar to other infrastructure projects. These activities include, among other things, transportation of materials, staging of materials, assembly of transmission line towers and other Project features, construction and repair of access roads, and vehicle traffic from commuting workers and trucks moving material to and from the work sites. The construction equipment that will be used is similar to that used during typical public-works projects and tree service operations (e.g., road resurfacing, storm-sewer installation, natural gas line installation, and tree removal).

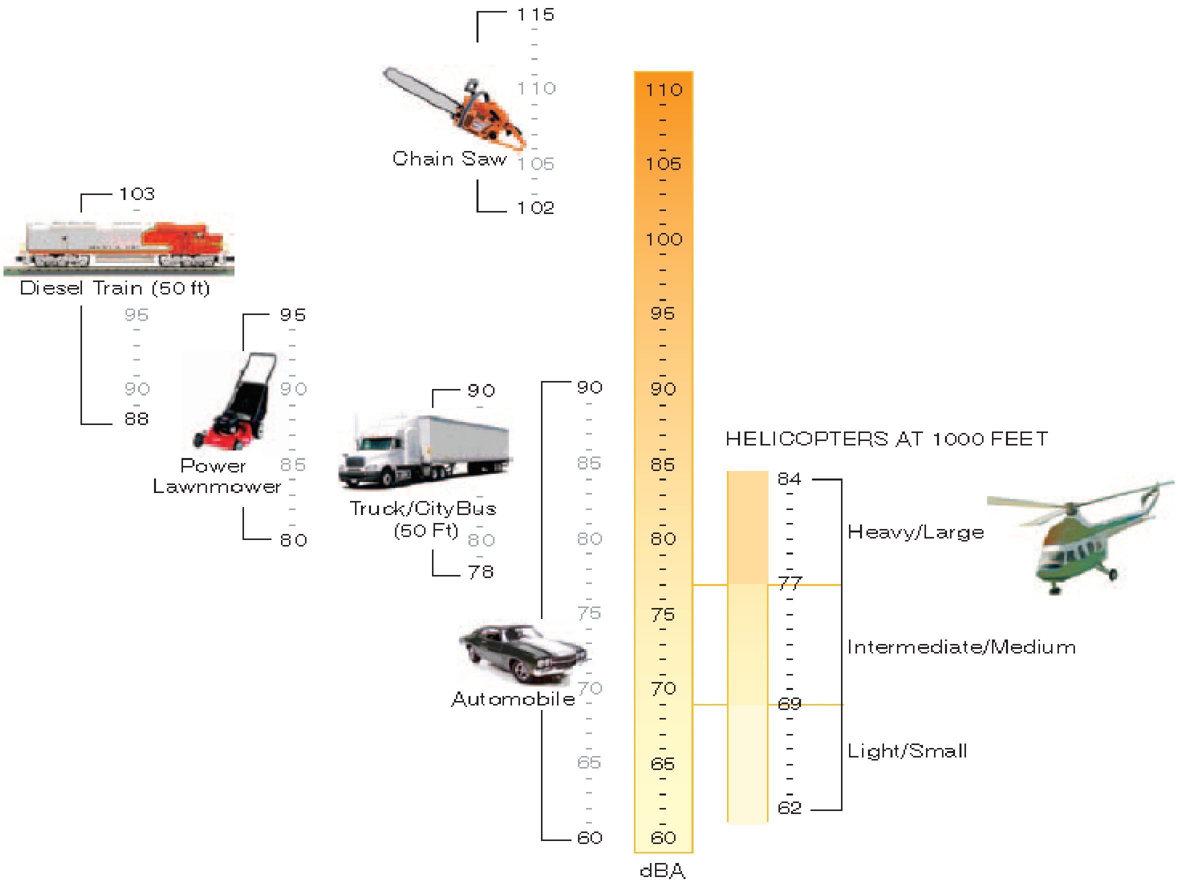


Figure X-1. Helicopter Noise Comparison

Noise Levels by Phase of Construction

Typical noise levels generated by the construction equipment has been published in various reference documents. The expected equipment noise levels listed in the Federal Highway Administration (FHWA) *Roadway Construction Noise Model User's Guide* (FHWA 2006) is one of the more complete and recent references and was used for this evaluation. The User's Guide provides the most recent comprehensive assessment of noise levels from construction equipment. Table X-1 summarizes the average (L_{eq}) noise level at five distinct distances.

Table X-1. Typical Construction Equipment Noise Levels

Equipment Description	Acoustical Usage Factor (%)	Specified L_{max} at 50 feet (dBA)	Calculated L_{eq} at 100 feet (dBA)	Calculated L_{eq} at 1,000 feet (dBA)	Calculated L_{eq} at 2,000 feet (dBA)	Calculated L_{eq} at 4,000 feet (dBA)
All Other Equipment >5 horsepower	50	85	76	56	50	44
Auger Drill Rig	20	85	72	52	46	40
Backhoe	40	80	70	50	44	38
Crane	16	85	71	51	45	39
Dump Truck	40	84	74	54	48	42
Grader	40	85	75	55	49	43

Equipment Description	Acoustical Usage Factor (%)	Specified L_{max} at 50 feet (dBA)	Calculated L_{eq} at 100 feet (dBA)	Calculated L_{eq} at 1,000 feet (dBA)	Calculated L_{eq} at 2,000 feet (dBA)	Calculated L_{eq} at 4,000 feet (dBA)
Pickup Truck	40	55	45	25	19	13
Tractor	40	84	74	54	48	42

Notes:
Source: FHWA 2006
L_{eq} = equivalent sound pressure level
Equation to calculate L_{max} at 1,000, 2,000, and 4,000 feet is as follows:

$$L_{eq}(h) = L_{max} + 10*\log(A.U.F.) – 20*\log(D/Do)$$

where:
L_{max} = Maximum noise emission level of equipment based on work cycle at D/Do (decibel).
A.U.F. = Acoustical usage factor, which accounts for the percent time that equipment is in use over the time period of interest (1 hour).
D = Distance from the equipment to the receptor (feet).
Do = Reference distance (generally, 50 feet) at which the L_{max} was measured for the equipment of interest (feet).

As shown in Table X-1, the loudest typical construction equipment generally emits noise in the range of 80 to 85 dBA at 50 feet, with usage factors of 40 percent to 50 percent. Noise at any specific receptor is dominated by the closest and loudest equipment. The types and numbers of construction equipment near any specific receptor location will vary over time. The following conservative assumptions were used for modeling construction noise:

- One piece of equipment generating a reference noise level of 85 dBA (at 50 feet distance with a 40 percent usage factor) is located on the transmission line route;
- Two pieces of equipment generating reference 85 dBA noise levels are located 50 feet farther away on the transmission line route (100 feet distance with a 40 percent usage factor);
- Two additional pieces of equipment generating reference 85 dBA noise levels are located 100 feet farther away on the transmission line route (200 feet distance with a 40 percent usage factor).

Table X-2 presents construction equipment noise levels at various distances based on this scenario.

Table X-2. Construction Equipment Noise Levels Versus Distance

Distance from Construction Activity (feet)	L_{eq} Noise Level (dBA)
50	83
100	79
200	74
400	69
800	63
1,600	58
3,200	52
6,400	46

Note: See text narrative preceding this table for the parameters of this noise-modeling scenario.

3.3.2 Operational Noise

3.3.2.1 Predicted Operational Noise Levels

Following construction, the Project's noise sources will be limited to vegetation management, regular maintenance activities, Longhorn Station operations, and corona noise.

Vegetation Management

ROW vegetation management may require the use of chainsaws. 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. Chainsaw 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. As a result of safety requirements, chainsaw activities will be limited to daylight hours only.

Regular Maintenance Activities

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 will include on-site component safety inspections, including possible repair or replacement of equipment. Helicopters may also be used to transport crews and identify areas were maintenance activities are necessary.

Longhorn Station Operations

The Project terminus is the proposed Longhorn Station near Boardman, Oregon. BPA has planned the Longhorn Station on land it purchased from the Port of Morrow. In this application, IPC is requesting authorization to develop (construct and operate) the Longhorn Station if BPA does not develop the Longhorn Station on a timely basis.

The Longhorn Station will include 500-kV circuit breakers, high-voltage switches, bus supports, and transmission line termination structures, a 500-kV series capacitor bank, and 500-kV shunt reactor banks. A control house to accommodate the necessary system communications and control equipment will be constructed as necessary. Fiber optic signal communication equipment and a backup propane-powered generator will be installed. No NSRs have been identified within one-half mile of the Longhorn Station.

Corona Noise

Audible noise on transmission lines and structures is due to the effects of corona. Corona is a function of transmission line voltage, altitude, conductor diameter, and condition of the conductor and the suspension hardware. The electric field gradient is the rate at which the electric field changes and is directly related to the line voltage. The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface and, hence, lower corona than smaller conductors, everything else being equal. Irregularities (such as nicks and scrapes on the conductor surface) or sharp edges on suspension hardware concentrate the electric field at these locations and, thus, increase corona at these spots. Similarly, contamination on the conductor surface, such as dust or insects, can cause irregularities that are a source for corona. Raindrops, snow, fog, and condensation are also sources of irregularities. Any newly constructed transmission line will initially generate a higher level of noise for a short period (typically 1 year) and will then level off to a lower audible noise level. This is due to what is called a “burn in period,” which is the time required for any dirt or oil that might have been inadvertently placed on the line as a result of the construction process to wash or wear off (EPRI 2006). Corona typically becomes a design concern for transmission lines at 345 kV and above.

The highest levels of corona and, hence, audible noise will occur during rain when the line conductors are wet. During these wet or foul weather conditions, the conductor will produce the greatest amount of corona noise. However, during heavy rain, the ambient noise generated by the rain typically will be greater than the ambient noise generated by corona. Audible noise from the transmission line during typical fair weather conditions is not predicted to exceed noise limits set by the State of Oregon.

Under most conditions, corona noise from the Project transmission line will be unperceivable or insignificant for many NSRs in the analysis area. However, IPC expects that during infrequent foul weather events, noise associated with corona may be perceptible at certain NSRs. Accordingly, corona noise associated with foul weather is the main focus of this discussion.

Expected audible noise levels resulting from corona generated during foul weather conditions were calculated for the Project using the ENVIRO program, which utilizes the BPA CAFE calculation method. Predictions at an operating voltage of 550-kV show that, during fair weather conditions, typical operational noise levels for the Project single-circuit 500-kV lattice structure transmission lines are 27 dBA at the edge of the ROW with a maximum of 33 dBA within the ROW. The 25 dBA sound level at the edge of the ROW is considered a low-level sound and received sound levels at NSRs would continue to decrease due to distance attenuation between sound source and receiver. However, during foul weather conditions, sound levels are expected to be approximately 52 dBA at the edge of the ROW, increasing to approximately 58 dBA under the transmission line. Operational noise levels at each identified NSR in the analysis area are included in Attachment X-4.

3.4 Compliance with ODEQ Noise Control Regulations

> OAR 345-021-0010(1)(x)(B): An analysis of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035, including a discussion and justification of the methods and assumptions used in the analysis.

3.4.1 Construction Noise

> 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: . . . (g) Sounds that originate on construction sites. (h) Sounds created in construction or maintenance of capital equipment; . . . .

OAR 340-035-0035(5)(g) and (h) provide sounds originating on construction sites and sounds created in construction of capital equipment are exempt from the ODEQ noise standards and regulations. Here, all Project-related construction sounds—including but not limited to blasting and rock breaking, implosive devices used during conductor stringing, helicopter operations, and vehicle traffic—will originate from a construction site or will be the result of construction of capital equipment, and are therefore exempt from the ODEQ noise standards and regulations.

3.4.2 Helicopter Operations

> 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: . . . (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; . . . .

Helicopter operations supporting construction of the Project are related to construction and are therefore exempt from the ODEQ noise standards and regulations under OAR 340-035-0035(5)(g) and (h). Moreover, OAR 340-035-0035(5)(j) provides that sounds generated by the operation of aircraft and subject to pre-emptive federal regulation are also exempt from the ODEQ noise standards and regulations. Here, sound generated by the Project's helicopter construction, operation, and maintenance activities during flight is under the jurisdiction of the Federal Aviation Administration (FAA), pre-empting state noise regulations (see City of Burbank v. Lockheed Air Terminal Inc., 411 U.S. 624, 633 (1973) ("FAA, now in conjunction with EPA, has full control over aircraft noise, pre-empting state and local control"). Accordingly, all Project-related helicopter activities are exempt from the relevant ODEQ noise standards and regulations under OAR 340-035-0035(5)(j), in addition to being exempt under OAR 340-035-0035(5)(g) and (h).

3.4.3 Regular Maintenance Activities, Including Vegetation Management

> 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: . . . (h) Sounds created in . . . maintenance of capital equipment; . . . .

OAR 340-035-0035(5)(h) provides that sounds created in maintenance of capital equipment are exempt from the relevant ODEQ noise standards and regulations. Here, all sounds related to Project maintenance activities—including but not limited to transmission line inspections, transmission line repair and maintenance activities, access road repair and maintenance, and vegetation management—will result from the maintenance of capital equipment and are therefore exempt from the relevant ODEQ noise standards and regulations.

3.4.4 Longhorn Station Operation Activities

As discussed above, there are no NSRs in the vicinity of the Longhorn Station. Because the relevant ODEQ noise standards relate to impacts to NSRs, noise related to the operation of the Longhorn Station will be in compliance with those relevant ODEQ noise standards.

3.4.5 Corona Noise

3.4.5.1 Maximum Permissible Sound Level Standard

> 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 . . . 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).

Table X-3 replicates the "Table 8" statistical noise limits referenced in OAR 340-035-0035(1)(b)(B)(i).

Table X-3. 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

The L_{50} is the median sound level (50 percent of the measurement interval is above this level, 50 percent is below). The noise limits apply at "appropriate measurement points" on "noise sensitive property."[4] 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
- That point on the noise sensitive property line nearest the noise source.[5]

"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."[6] Noise sensitive properties are referred to as NSRs in this Exhibit and are identified in Attachment X-5.

Because the transmission line will operate continuously during day and night, the more stringent nighttime sound level of L_{50} 50 dBA is the maximum "Table 8" regulatory limit. Here, IPC's modeling demonstrates that the maximum transmission line sound levels at the relevant NSRs will be no greater than 46 dBA (see Attachment X-4). Because the maximum sound levels will be less than "Table 8" L_{50} 50 dBA, even during foul weather conditions likely to generate higher levels of corona noise, the Project will be in compliance with the "Table 8" sound level standard at OAR 340-035-0035(1)(b)(B)(i).

3.4.5.2 Ambient Antidegradation Standard

> 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 . . . 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).

Sound Survey Analysis and Results

To analyze the Project's compliance with the ambient antidegradation standard, IPC monitored baseline ambient noise levels and future noise level contributions. Measurement of existing sound levels was conducted to assess the existing ambient baseline sound at NSRs in the analysis area. Table X-4 presents a summary of the sound survey results at each monitoring position during low wind conditions (less than 10 mph), as well as late night and low wind conditions (abbreviated as late night in Table X-4). Attachment X-6 provides a summary of the monitoring position correlation, or applicability, to each NSR.

[4] OAR 340-035-0035(3)(b)
[5] *Id.*
[6] OAR 345-035-0015(5)

Table X-4. Description of Monitoring Positions, Measurement Durations, and Results

Monitoring Point (MP)	Nearest Receptor ID	Time Period/ Meteorology	L_{10} 1-hour dBA Mean	L_{50} 1-hour dBA Mean	Measurement Period Date/ Start Time	Measurement Period Date/ End Time
MP2	168	Low Wind	41	36	Mar 6, 2012 12:00	Mar 19, 2012 10:00
		Late Night	36	33		
MP3	642	Low Wind	37	30	Mar 9, 2012 15:00	Apr 9, 2012 12:00
		Late Night	33	28		
MP5	146	Low Wind	41	34	Mar 6, 2012 14:00	Apr 7, 2012 23:00
		Late Night	32	27		
MP6	142	Low Wind	38	31	Mar 6, 2012 16:00	Apr 6, 2012 23:00
		Late Night	30	25		
MP7	285	Low Wind	48	42	Mar 6, 2012 16:00	Apr 24, 2012 10:00
		Late Night	43	37		
MP8	120	Low Wind	43	41	Mar 7, 2012 9:23	Apr 8, 2012 23:00
		Late Night	43	41		
MP9	123	Low Wind	39	35	Apr 24, 2012 16:00	May 10, 2012 12:00
		Late Night	38	35		
MP11	107	Low Wind	46	34	Mar 7, 2012 12:00	Apr 6, 2012 23:00
		Late Night	47	32		
MP13	91	Low Wind	61	54	Mar 7, 2012 13:00	Apr 23, 2012 23:00
		Late Night	59	48		
MP14	85	Low Wind	42	36	Mar 7, 2012 17:00	Apr 10, 2012 14:00
		Late Night	39	33		
MP15	80	Low Wind	37	30	Apr 10, 2012 14:00	May 10, 2012 14:00
		Late Night	31	27		
MP16	72	Low Wind	52	44	Mar 7, 2012 17:00	Apr 8, 2012 5:00
		Late Night	51	41		
MP17	227	Low Wind	54	44	Mar 22, 2012 12:00	Apr 25, 2012 11:00
		Late Night	54	41		
MP19	67	Low Wind	55	48	Mar 21, 2012 18:00	Apr 25, 2012 11:00
		Late Night	54	44		
MP20	748	Low Wind	52	43	Mar 7, 2012 13:00	Apr 8, 2012 23:00
		Late Night	51	40		
MP22	55	Low Wind	64	55	Mar 7, 2012 16:00	Mar 29, 2012 23:00
		Late Night	62	49		
MP23	53	Low Wind	60	59	Mar 21, 2012 17:00	Apr 25, 2012 13:00
		Late Night	61	59		
MP25	36	Low Wind	58	50	Mar 7, 2012 18:00	Apr 9, 2012 23:00
		Late Night	57	46		
MP27	700	Low Wind	36	32	Mar 8, 2012 14:00	Mar 29, 2012 23:00
		Late Night	35	32		

Monitoring Point (MP)	Nearest Receptor ID	Time Period/ Meteorology	L_{10} 1-hour dBA Mean	L_{50} 1-hour dBA Mean	Measurement Period	
					Date/ Start Time	Date/ End Time
MP28	279	Low Wind	38	32	Apr 13, 2012 14:00	May 10, 2012 11:00
		Late Night	34	30		
MP30	66	Low Wind	49	34	Apr 11, 2012 12:00	May 10, 2012 19:00
		Late Night	48	31		
MP31	32	Low Wind	40	30	Apr 12, 2012 11:00	May 5, 2012 23:00
		Late Night	34	27		
MP32	877	Low Wind	56	47	Mar 11, 2013 15:00	Apr 9, 2013 15:00
		Late Night	54	41		
MP33	936	Low Wind	42	35	Mar 11, 2013 16:00	Apr 9, 2013 15:00
		Late Night	42	34		
MP34	899	Low Wind	41	33	Mar 11, 2013 18:00	Apr 9, 2013 11:00
		Late Night	31	24		
MP35	911	Low Wind	35	28	Mar 12, 2013 12:00	Apr 9, 2013 12:00
		Late Night	29	24		
MP36	863	Low Wind	40	34	Mar 29, 2013 11:00	Apr 17, 2013 8:00
		Late Night	36	33		
MP37	861	Low Wind	36	29	Mar 29, 2013 16:00	Apr 19, 2013 23:00
		Late Night	31	26		
MP38	851	Low Wind	41	37	Apr 10, 2013 8:00	May 6, 2013 22:00
		Late Night	42	36		
MP39	1009	Low Wind	55	50	Apr 30, 2013 16:00	Jun 12, 2013 23:00
		Late Night	56	50		

dBA – A-weighted decibels; L_{10} – noise level exceeded for 10% of the time of measurement duration; L_{50} – noise level exceeded for 50% of the time of measurement duration

Potential Exceedances of Ambient Antidegradation Standard

IPC measured ambient baseline sound levels and compared the baseline with predicted future Project sound level contributions. The results of this analysis indicate that during typical fair weather conditions, the Project is anticipated to comply with the ambient antidegradation standard; however, a potential increase of more than 10 dBA above the L_{50} baseline may occur at 30 of the NSRs in the Operational Noise Analysis Area during infrequent periods representative of foul weather conditions. Table X-5 describes the 30 NSRs at which the Project may exceed the measured late night (midnight to 5 a.m.) L_{50} ambient sound level, during low wind conditions. The resultant Project contribution is considered cumulatively with the existing acoustic environment to determine expected incremental increase in sound levels relative to baseline.

Tabulated results in Attachment X-4 include a summary table of the acoustic modeling output by receptor location, unique receptor identification number, identification of transmission line noise sources evaluated, the distance to the noise source(s), the baseline monitoring position associated with each NSR, and the modeled results in dBA.

Table X-5. Summary of Acoustic Modeling Results in the Proposed Corridor—Comparison of Future Project Sound Levels to Late Night Baseline L_{50}

NSR Sequential Number (Map ID)	Receptor ID	Distance from NSR to the Transmission Line (feet)	Nearest Milepost	County	Associated Monitoring Point (MP)	Late Night Baseline Sound Pressure Level (dBA)	Future Sound Level (Foul Weather) (dBA)	Increase (dBA)
8	New-2	2,139	58.9	Umatilla	MP06	25	36	+11
9	New-3	1,834	59.6	Umatilla	MP06	25	36	+12
10	New-4	1,834	59.6	Umatilla	MP06	25	36	+12
11	New-5	1,398	59.7	Umatilla	MP06	25	38	+13
69	83	1,467	142.6	Baker	MP15	27	39	+12
70	82	1,053	142.7	Baker	MP15	27	40	+14
71[1]	-1	1,335	144.3	Baker	MP15	27	39	+13
92	887	2,434	215.2	Malheur	MP35	24	35	+12
93	888	2,283	216	Malheur	MP34	24	35	+11
94	891	1,801	216.2	Malheur	MP34	24	37	+12
95	890	2,070	216.3	Malheur	MP34	24	36	+12
96	892	1,470	216.5	Malheur	MP34	24	38	+13
97	929	1,693	216.5	Malheur	MP34	24	37	+13
98	925	1,102	216.8	Malheur	MP35	24	39	+15
99	895	1,768	216.9	Malheur	MP35	24	37	+13
100	896	2,119	217	Malheur	MP35	24	36	+12
101	899	673	217	Malheur	MP34	24	42	+17
102	924	607	217.3	Malheur	MP35	24	42	+18
103	915	2,575	217.4	Malheur	MP35	24	35	+11
104	916	1,598	217.4	Malheur	MP35	24	37	+14
105	919	745	217.4	Malheur	MP35	24	41	+17
106	904	2,621	217.7	Malheur	MP35	24	35	+11
107	905	2,474	217.9	Malheur	MP35	24	35	+12
108	911	2,119	218.1	Malheur	MP35	24	36	+12
109	913	2,595	218.1	Malheur	MP35	24	35	+11
110	914	2,648	218.1	Malheur	MP35	24	35	+11
111	1415	2,746	253.5	Malheur	MP35	24	35	+11
112	1420	1,732	254.9	Malheur	MP35	24	37	+13
113	1422	3,087	263.7	Malheur	MP35	24	34	+11
115	U1	659	6.1	Union	MP11	32	43	+11
133	U2	890	255.4	Malheur	MP35	24	40	+16

[1] When considered in isolation, Idaho Power Company's modeling shows noise sensitive receptor (NSR) 71 is expected to have an estimated noise increase of +13 A-weight decibels (dBA). However, there is an existing transmission line located between NSR 71 and the Project, and after taking into account the predicted foul weather corona noise from the existing line, the Project does not result in an exceedance at NSR 71.

Request for Exception to Ambient Antidegradation Standard

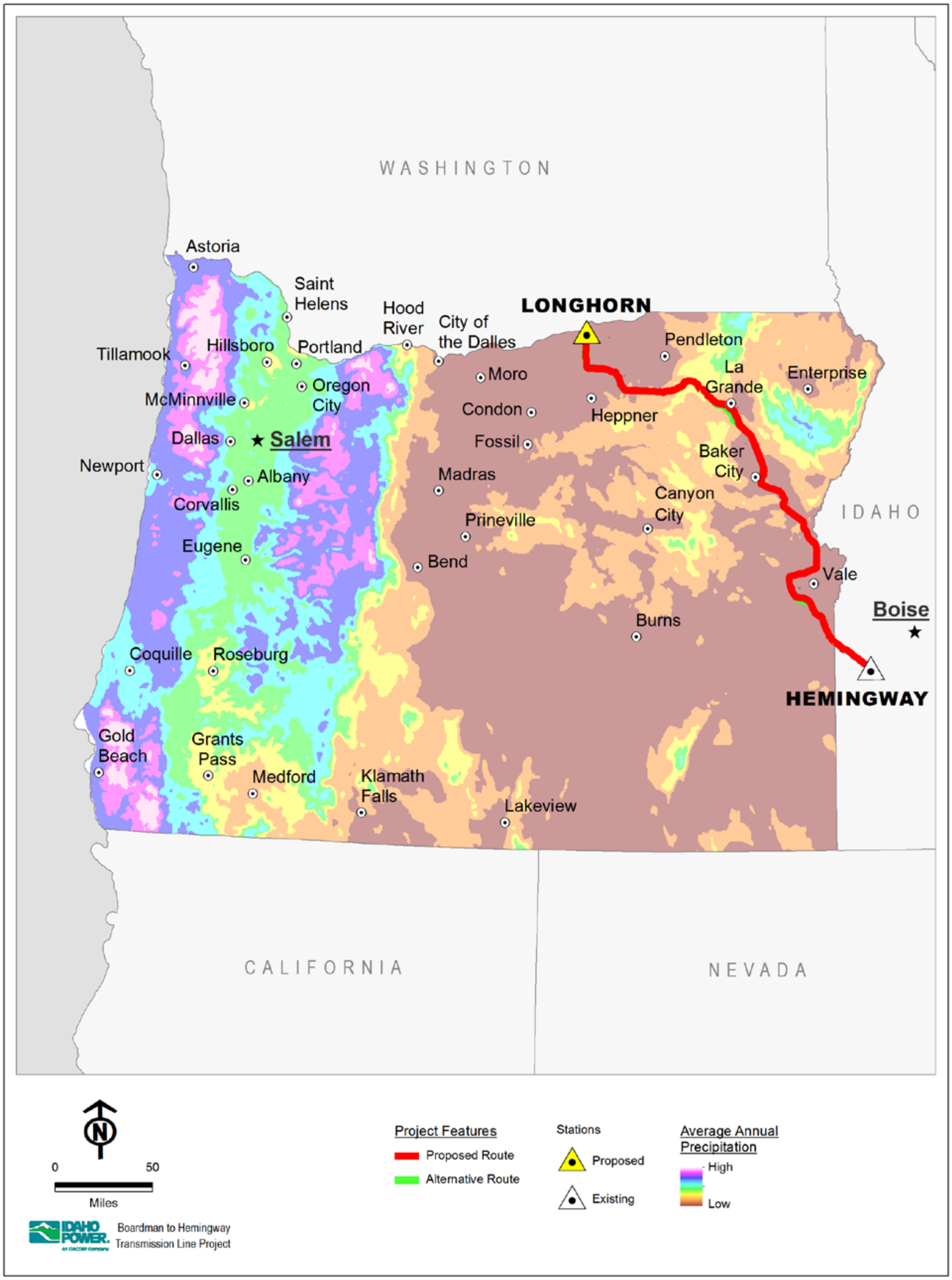
> OAR 340-035-0035(6): Exceptions: Upon written request from the owner or controller of an industrial or commercial noise source, the Department may authorize exceptions to section (1) of this rule, pursuant to rule 340-035-0010, for: (a) Unusual and/or infrequent events; . . . .

The ODEQ Noise Control Regulations permit the owner or controller of an industrial noise source to request that the ODEQ (or in this context, the Council) grant an exception from application of the ODEQ Noise Control Regulations. Indeed, EFSC previously considered and granted an exception to the ODEQ Noise Control Regulations in the Biglow Canyon Wind Project Final Order on Amendment #2 (Oregon EFSC 2007). In this instance, IPC requests the Council grant the Project an exception to the Ambient Antidegradation Standard on the basis that the meteorological conditions resulting in maximum corona generation, when they occur, would be “infrequent events” within the meaning of OAR 340-035-0035(6)(a). The exception would apply to the Project as a whole and not just with respect to the 30 NSRs identified in Table X-5.

Meteorological Data

The acoustic modeling results demonstrate the potential for exceedances to occur at 30 NSRs during foul weather conditions when higher levels of corona noise are generated. However, the predicted exceedances at these NSRs would arise only under foul weather meteorological conditions. Somewhat lower levels of audible noise may be present from the conductors when there are water droplets on the conductors, such as just after rain (conductor not yet completely dried) or in a light mist or heavy fog, although these latter conditions are highly variable.

Four meteorological stations were selected to effectively characterize weather trends and patterns within the Project area—Flagstaff Hill, La Grande, Owyhee Ridge, and Umatilla NWR. Four-year meteorological analysis (2008-2012) of these stations demonstrates that foul weather has historically occurred around 2 percent of the time in the Project area. As illustrated by Figure X-2, much of the Project area is arid high desert with relatively little annual precipitation.



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2 **Figure X-2. Oregon Annual Precipitation**

Table X-6 shows the frequency of foul weather meteorological conditions in the Project area. The calculated frequency of 1.3 percent was determined based on the number of hours per year where the rain rate of 0.8 to 5 millimeters per hour (mm/hr) occurred in the Project area. Figure X-3 shows the location of the meteorological data stations.

Table X-6. 4-Year Meteorological Data Analyses in Terms of Frequency

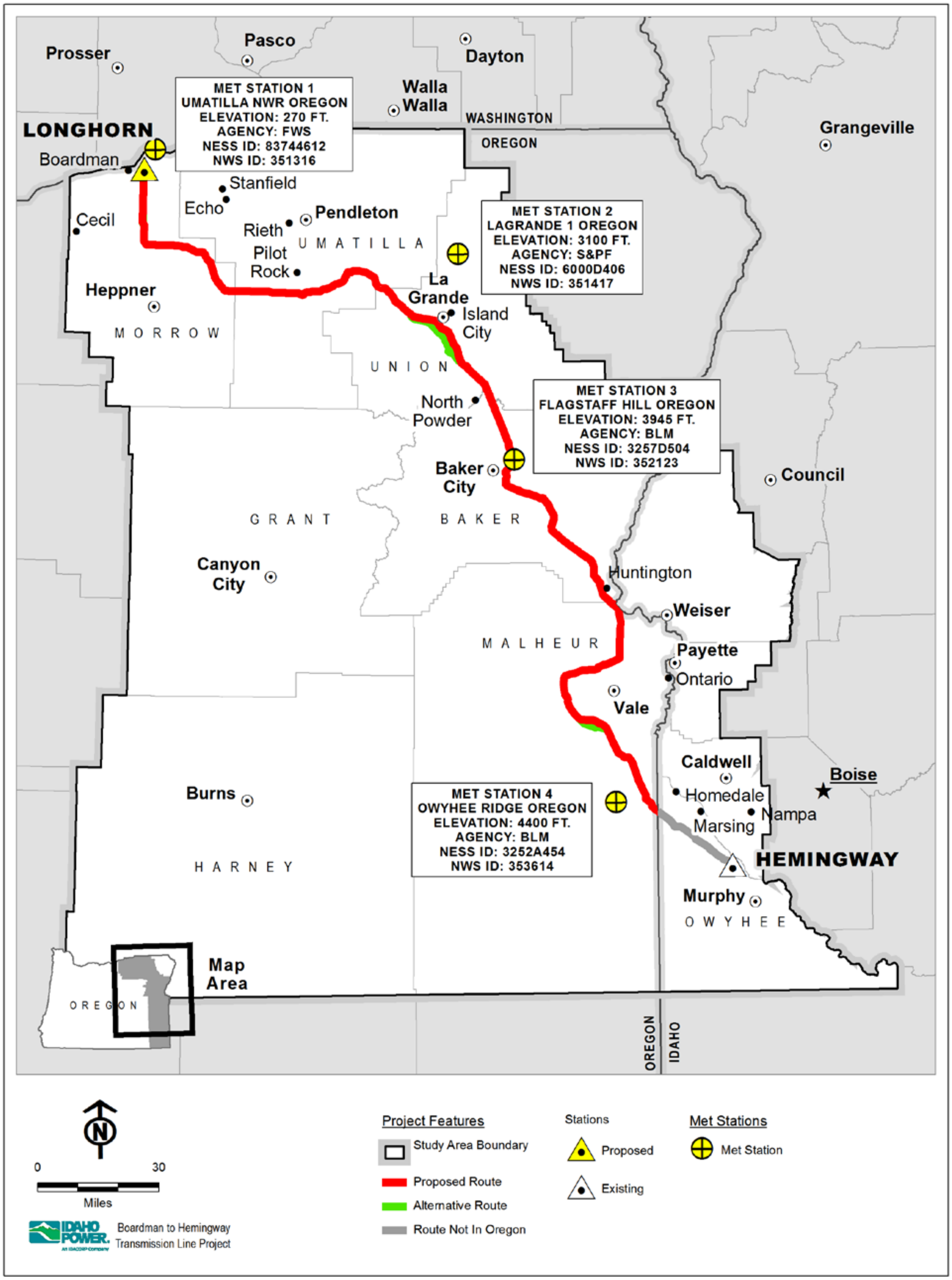
Condition	Frequency				
	Project Area	Flagstaff Hill	La Grande	Owyhee Ridge	Umatilla NWR
Rainfall (0.8 mm/hr – 5 mm/hr)	1.30%	0.87%	2.66%	1.08%	0.60%

The meteorological datasets for each WRCC station were analyzed in more detail to ascertain diurnal and seasonal variations. Additionally, periods of rainfall events over the course of consecutive days or consecutive hours of rain have been identified.

Table X-7 lists the seasonal and diurnal variability in foul weather for the Project area. Foul weather was most frequent during the spring throughout the Project area occurring during 2.0 percent of the hours analyzed. During the spring and in general, there is not much variability diurnally, with the percentage of foul weather in the spring occurring 1.9 percent of the time during the late-night time period as opposed to 2.2 percent during daytime hours.

Table X-7. Season and Diurnal Variation in Meteorological Conditions

Season / Time of Day	All Met Stations		Flagstaff Hill		La Grande		Umatilla NWR		Owyhee Ridge	
	Foul Weather	Not Foul Weather	Foul Weather	Not Foul Weather	Foul Weather	Not Foul Weather	Foul Weather	Not Foul Weather	Foul Weather	Not Foul Weather
Winter	1.4%	98.6%	0.6%	99.4%	3.5%	96.5%	0.4%	99.6%	1.0%	99.0%
Day	1.6%	98.4%	0.7%	99.3%	4.3%	95.7%	0.4%	99.6%	1.1%	98.9%
Night	0.9%	99.1%	0.5%	99.5%	1.8%	98.2%	0.5%	99.5%	0.7%	99.3%
Late Night	1.1%	98.9%	0.0%	100%	3.3%	96.7%	0.3%	99.7%	0.6%	99.4%
Spring	2.0%	98.0%	1.8%	98.2%	3.6%	96.4%	0.9%	99.1%	1.7%	98.3%
Day	2.2%	97.8%	2.0%	98.0%	4.1%	95.9%	0.8%	99.2%	2.0%	98.0%
Night	1.4%	98.6%	1.4%	98.6%	2.3%	97.7%	0.9%	99.1%	0.9%	99.1%
Late Night	1.9%	98.1%	1.8%	98.2%	3.3%	96.7%	0.9%	99.1%	1.5%	98.5%
Summer	0.5%	99.5%	0.5%	99.5%	0.7%	99.3%	0.2%	99.8%	0.5%	99.5%
Day	0.5%	99.5%	0.6%	99.4%	0.6%	99.4%	0.3%	99.7%	0.6%	99.4%
Night	0.4%	99.6%	0.3%	99.7%	0.8%	99.2%	0.2%	99.8%	0.1%	99.9%
Late Night	0.6%	99.4%	0.3%	99.7%	1.2%	98.8%	0.2%	99.8%	0.5%	99.5%
Fall	1.4%	98.6%	0.6%	99.4%	2.8%	97.2%	0.9%	99.1%	1.2%	98.8%
Day	1.4%	98.6%	0.6%	99.4%	3.1%	96.9%	0.9%	99.1%	1.1%	98.9%
Night	1.4%	98.6%	0.6%	99.4%	2.8%	97.2%	0.9%	99.1%	1.3%	98.7%
Late Night	1.1%	98.9%	0.5%	99.5%	1.9%	98.1%	0.9%	99.1%	1.3%	98.7%
4-Year Total	**1.3%**	**98.7%**	**0.9%**	**99.1%**	**2.7%**	**97.3%**	**0.6%**	**99.4%**	**1.1%**	**98.9%**



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2 **Figure X-3. Project Area Meteorological Stations**

Table X-8 shows the total number of days, the maximum number of consecutive days, and the maximum number of consecutive hours that foul weather occurred at each station. Table X-7 also shows the average number of consecutive days and hours that foul weather occurred at each station.

Table X-8. Daily and Hourly Frequency of Foul Weather

MET Station	Years of Meteorological Data Studied	Foul Weather				
		Rainfall 0.8 mm/sec - 5 mm/sec				
		Percent of Days with 1 hour or more of Foul Weather	Maximum Consec. Days with 1 hour or more of Foul Weather	Average Number of Consec. Days with Foul Weather	Maximum Consec. Hours of Foul Weather	Average Number of Consec. Hours of Foul Weather
Flagstaff Hill	4	10%	5	1	5	2
La Grande	4	22%	6	2	11	3
Umatilla NWR	4	6%	3	1	16	2
Owyhee Ridge	4	11%	5	1	8	2
Average of All MET Stations	**4**	**13%**	**5**	**1**	**10**	**2**

mm/sec = millimeters per second

As Table X-8 indicates, maximum consecutive days and hours of foul weather were somewhat variable depending on meteorological station; however, average consecutive days and hours of foul weather were similar for nearly all meteorological stations. Considering all four meteorological stations combined, the average number of consecutive days and hours of foul weather were relatively infrequent in the Project area, with on average foul weather lasting for only 1 day and for 2 consecutive hours. When looking at the average of all of the meteorological stations, foul weather occurred for at least 1 hour during 13 percent of the days over the 4-year period analyzed. The maximum number of consecutive days occurred one time during October 2009 at the La Grande meteorological station where six consecutive days had at least 1 hour of foul weather or more on each of the days. The maximum consecutive hours of foul weather was 16 and occurred in the Umatilla area in December 2010 over the course of 2 days. The maximum consecutive days and hours shown in Table X-8 are uncommon, with the average numbers presented indicative of typical daily and hourly frequency.

The La Grande WRCC meteorological station data reported the highest incidence of foul weather days, having 22 percent of days with 1 hour or more of foul weather. While predominantly (i.e., 78 percent of the days) fair weather persists at the La Grande station, a sensitivity analysis was conducted on the WRCC data to ascertain the frequency with which foul weather occurs during the late-night time period from 12:00 a.m. to 5:00 a.m., which represents the time of the night when the ambient noise is the quietest and accordingly the most likely time period for a potential exceedance. Table X-9 summarizes the results of the sensitivity analysis for the late night time period and demonstrates that consecutive late nights of foul weather occur infrequently in the Project area. On average, late night foul weather only occurs for one night at a time throughout the Project area. Meteorological data from the WRCC confirm that foul weather events occurred during a very small percentage of time. This is true regardless of the season or time of day.

Table X-9. Late Night Frequency of Foul Weather

MET (Metereological) Station	Years of Meteorological Data Studied	Foul Weather Rainfall 0.8 mm/sec – 5 mm/sec		
		Percent of Late Nights with 1 hour or more of Foul Weather	Maximum Consecutive Late Nights with 1 hour or more of Foul Weather	Average Number of Consecutive Days with Late Night Foul Weather
Flagstaff Hill	4	3%	3	1
La Grande	4	7%	3	1
Umatilla NWR	4	2%	3	1
Owyhee Ridge	4	3%	2	1
Average of All MET Stations	4	4%	3	1

mm/sec = millimeters per second

Exceedances Are Expected to be Infrequent

ODEQ Noise Control Regulations do not define the term “infrequent” for purposes of the exception. However, the common meaning of that term is “seldom happening or occurring,” or “placed or occurring at wide intervals in space or time.”[7] Here, the potential exceedances are expected to occur only during certain foul weather events, and such foul weather is expected to occur only 1.3 percent of the time (see Table X-6). Because the potential exceedances are anticipated to occur only approximately 1 percent of the time, the exceedances will seldom occur and therefore are considered infrequent events for purposes of the exception.

Moreover, this conclusion is consistent with BPA’s interpretation of the “infrequency” standard as applied to the weather conditions giving rise to corona noise—which constitutes the only legal precedent regarding the application of ODEQ’s “infrequency” standard. Significantly, in analyzing how BPA transmission projects in Oregon would comply with the ODEQ Noise Control Regulations, BPA has concluded that corona noise caused by foul weather conditions east of the Cascades would be ”infrequent.”[8] In addition, for purposes of analyzing noise effects from specific proposed transmission projects in National Environmental Policy Act documents, BPA has focused on the infrequent occurrence of foul weather in the Project vicinity—which meteorological showed would happen occur between 1 percent and 6 percent of the year, depending on the location of the project.[9]

[7] Merriam-Webster Online Dictionary at https://www.merriam-webster.com/dictionary/infrequent (last visited December 2016).
[8] See Memorandum regarding Sound Level Limits for BPA Facilities (May 26, 1982) (“based on a meteorological analysis of the frequency of these rain rates (0.8–5 mm/hr), alternating current transmission lines east of the Cascades will meet this criteria”).
[9] See North Steens Transmission Line Project, Final EIS (October 2011), Appendix C at C/21 (“Based on hourly precipitation records near the route of the proposed transmission line, such conditions are expected to occur about 7% of the time during the year in the North Steens area.”); Big Eddy-Knight 500-kV Project, Final EIS Vol. 2 (July 2011), Appendix E at 21 (describing frequency of foul weather events as 1% of the year based on meteorological data); and Klondike III/Biglow Canyon Wind Integration Project, Final EIS (September 2006), Appendix C at 20 (describing frequency of foul weather events as 6% of the year based on meteorological data); McNary-John Day

Finally, the conclusion that exceedances will be infrequent is further bolstered by the data regarding the distribution and duration of potential exceedances at the relevant NSRs. As shown in Table X-8, the average percentage of days in a year in which foul weather might occur at any point in the day (for a period of 1 hour or more) ranges from 6 percent to 22 percent, with foul weather occurring in the late night hours (for a period of 1 hour or more), as shown in Table X-9, between 2 percent and 7 percent of the time. Importantly, as shown in Tables X-8 and X-9, on average such foul weather can be expected to occur for only one night at a time and last for only 1 day and for 2 consecutive hours.

Additional Considerations

> OAR 340-035-0010(2): In establishing exceptions, the Department shall consider the protection of health, safety, and welfare of Oregon citizens as well as the feasibility and cost of noise abatement; the past, present, and future patterns of land use; the relative timing of land use changes; and other legal constraints.

Granting an exception is consistent with the obligation to protect the health, safety, and welfare of Oregon citizens.

Several factors specific to corona noise suggest that, while exceedances may occur, the corona noise produced by the Project will not have an adverse impact on the health, safety, or welfare of Oregon citizens.

First, as explained above, the foul weather conditions causing the generation of corona noise will occur infrequently in the Project area, including during the quietest time of the night when noise might be most likely to disturb sleep—from 12:00 a.m. to 5:00 a.m. For this reason, any disturbance or annoyance to persons living along the route is low due to the general character of corona noise being steady state and the levels do not exceed the “Table 8” limits.

Second, the fact that elevated levels of corona noise primarily are produced during foul weather is highly significant on this point. Foul weather in itself produces noise from rain hitting foliage or wind interacting with surrounding terrain and vegetation. For that reason, it is fair to assume that during the times that the corona noise occurs, sometimes the ambient noise levels will be greater than those assumed for the purposes of IPC’s study, and therefore the increase in sound levels resulting from elevated corona noise will be less than suggested by the study.

Similarly, the study modeled the level of corona noise that would be perceptible *outside*. However, it can be fairly assumed that in most cases, during times of foul weather, persons present at NSRs will be inside homes or dwellings, with the windows closed, thus further attenuating the effect of any noise. Structures such as residential buildings typically provide significant sound attenuation (according to the FHWA, approximately 10 dBA with windows open to 20 dBA and greater with windows closed, dependent on structure quality and window type). Therefore, received sound levels from the Project indoors at the affected NSRs are likely to be less than suggested by this study.

Moreover, in most instances in which the Project sound level contribution might exceed the ambient antidegradation standard, the Project noise level would nevertheless be in compliance with the “Table 8” limits. Because the exceedances of the ambient antidegradation standard would occur infrequently and the “Table 8” limits are complied with, and further, because IPC commits to working to resolve concerns caused by any exceedances, the granting of an exception protects the health, safety, and welfare of Oregon citizens.

Transmission Project, Draft EIS (February 2002), Appendix G at 18 (describing frequency of foul weather events as 1% of the year based on meteorological data).

The exceedances that occur cannot reasonably be mitigated at the source in a cost-effective manner.

IPC can work with owners of individual NSRs to help resolve concerns about noise exceedances when appropriate. However, IPC *cannot* reasonably prevent the potential exceedances at the source. While many types of industrial noise sources may be mitigated at the source through the installation of insulation or silencers, transmission lines produce corona noise all along their length, and as such cannot reasonably be enclosed, insulated, or shielded. Accordingly, the only possible mitigation option for a transmission line is rerouting. Unfortunately, when IPC analyzed the possibility of rerouting around NSRs where the ambient antidegradation standard may be exceeded during foul weather, it found no reasonable solutions. On the contrary, IPC found that in some circumstances, rerouting around the NSRs where exceedances are predicted would move the Project closer to other NSRs, therefore creating new possible exceedances. In other circumstances, rerouting was impossible or impracticable due to siting constraints such as existing transmission lines, wind turbines, restricted airspace, and protected habitat. For these reasons, IPC has exhausted all reasonable measures to prevent these potential exceedance conditions. Figure X-4 is a map of certain siting constraints IPC was required to consider across the length of the Project.

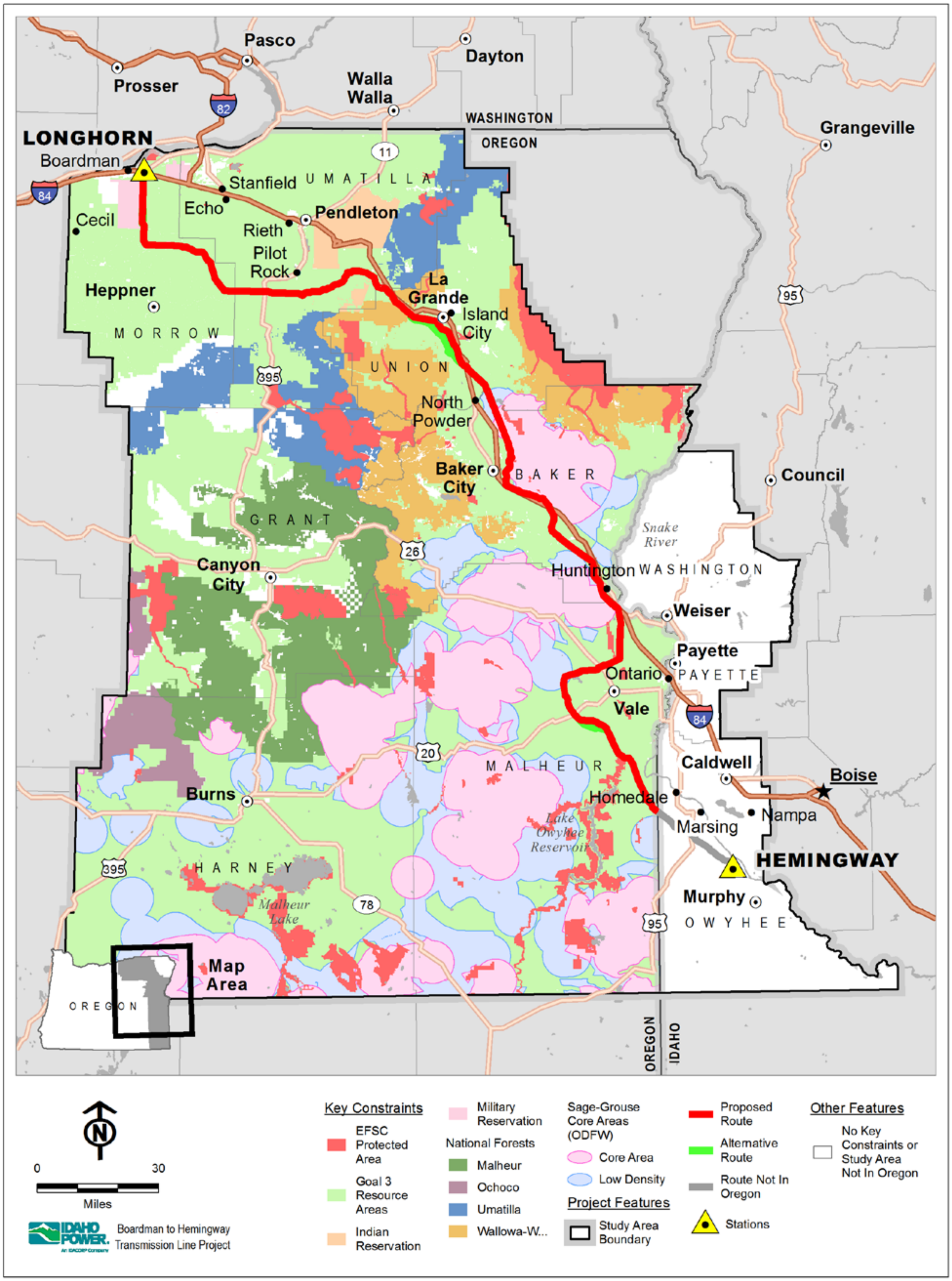


Figure X-4. Key Constraints

With respect to the individual NSRs in Table X-5 where potential exceedances have been identified, the following discussion explains the circumstances that make rerouting impossible or impracticable due to siting constraints beyond noise:

- <u>NSR-8, -9, -10, and -11 (see Figure X-5)</u>: Morrow and Umatilla counties recommended the location of this portion of the Project in their comments on the Draft Environmental Impact Statement. IPC took the counties' recommendation and designed the route to comply as best as possible with the counties' proposal, while also avoiding NSRs and other sensitive areas where possible. As shown on Figure X-5, the Project threads between NSR-11 and NSR-9/-10 at a point that is approximately equidistant between those NSRs. Moving the line to the north will increase the noise levels at NSR-11, and moving the line to the south will increase the noise levels at NSR-9/-10. With respect to NSR-8, IPC estimates that the noise levels at this NSR potentially will increase by 11 dBA, which is 1 dBA above the regulatory threshold (requiring no more than a 10 dBA increase). IPC may be able to microsite the line near the southern edge of the Site Boundary to lessen the noise levels at NSR-8 and potentially avoid an exceedance. However, there is no route through the relevant area that would entirely avoid these NSRs.
- <u>NSR-69 and -70 (see Figure X-6)</u>: The Proposed Route parallels existing transmission lines to the north and south of this portion of the Project. In the vicinity of NSR-69 and NSR-70, the Project bumps out from the existing transmission lines to avoid affecting a certain Oregon Department of Transportation rock quarry. As shown on Figure X-6, the Project cannot continue along its path paralleling the existing lines without affecting the quarry. Additionally, the relevant area is considered sage-grouse Core Area Habitat; any rerouting to the east would result in greater impacts to said habitat.
- <u>NSR-92 through -110 (see Figure X-7)</u>: In earlier versions of the Project, IPC proposed to avoid this area and locate the Project primarily on Bureau of Land Management (BLM) lands. However, BLM indicated that IPC's proposal was located in sage-grouse habitat and that said habitat should be avoided. Instead, IPC was required to relocate the Project through the Willow Creek area, which contains a lot of developed farmland and is populated by numerous residences and other noise sensitive properties. IPC sited the Project as best it could in a manner to avoid NSRs and to avoid affecting center-pivot agricultural plots. The result is the proposed route, which threads its way from NSR-92 through -110 and connects with the relevant BLM lands. Avoiding NSRs completely in this area was impossible or impractical.
- <u>NSR-111, -112, and -133 (see Figure X-8)</u>: Regarding NSR-111, IPC's modeling estimates that the noise levels at this NSR potentially will increase by 11 dBA, which is 1 dBA above the regulatory threshold. IPC may be able to microsite the line near the western edge of the Site Boundary to lessen the noise levels at NSR-111 and potentially avoid an exceedance. For NSR-112 and -133, the BLM developed the route in this area as mitigation to avoid or minimize visual impacts to the Owyhee River Below the Dam Area of Critical Environmental Concern, pushing the Project east while also trying to maximize the use of the designated utility corridor and avoiding new private land impacts. Where the line threads between NSR-112 and -133, it is approximately equidistant between those NSRs. Moving the line to the north would increase the noise levels at NSR-112, and moving the line to the south would increase the noise levels at NSR-133. Where the line passes to the east of NSR-133, IPC may be able to microsite the line near the eastern edge of the Site Boundary to lessen the noise levels at NSR-133.
- <u>NSR-113 (see Figure X-9)</u>: The BLM directed IPC to maximize its use of designated utility corridors throughout the Project where possible. Here, the Project will be located near the edge of the utility corridor that is farthest from NSR-113. IPC's modeling

estimates that the noise levels at this NSR potentially will increase by 11 dBA, which is 1 dBA above the regulatory threshold of a 10 dBA increase. IPC may be able to microsite the line near the western edge of the Site Boundary to lessen the noise levels at NSR-113 and potentially avoid an exceedance. However, IPC cannot move the Site Boundary farther to the west because doing so would move it outside the utility corridor.

- NSR-115 (see Figure X-10): IPC's modeling estimates that the noise levels at NSR-115 potentially will increase by 11 dBA, which is 1 dBA above the regulatory threshold. IPC may be able to microsite the line near the northeastern edge of the Site Boundary to lessen the noise levels at NSR-115 and potentially avoid an exceedance. However, the Project threads between NSR-115 and Twin Lake at a point that is approximately equidistant between the two. IPC will need to avoid micrositing the line too close to the lake so as to avoid any direct impacts to the same. Additionally, the line in this area is also close to Morgan Lake and moving the line to the northeast may also impact the scenic resources at that lake, which IPC has been asked to avoid.

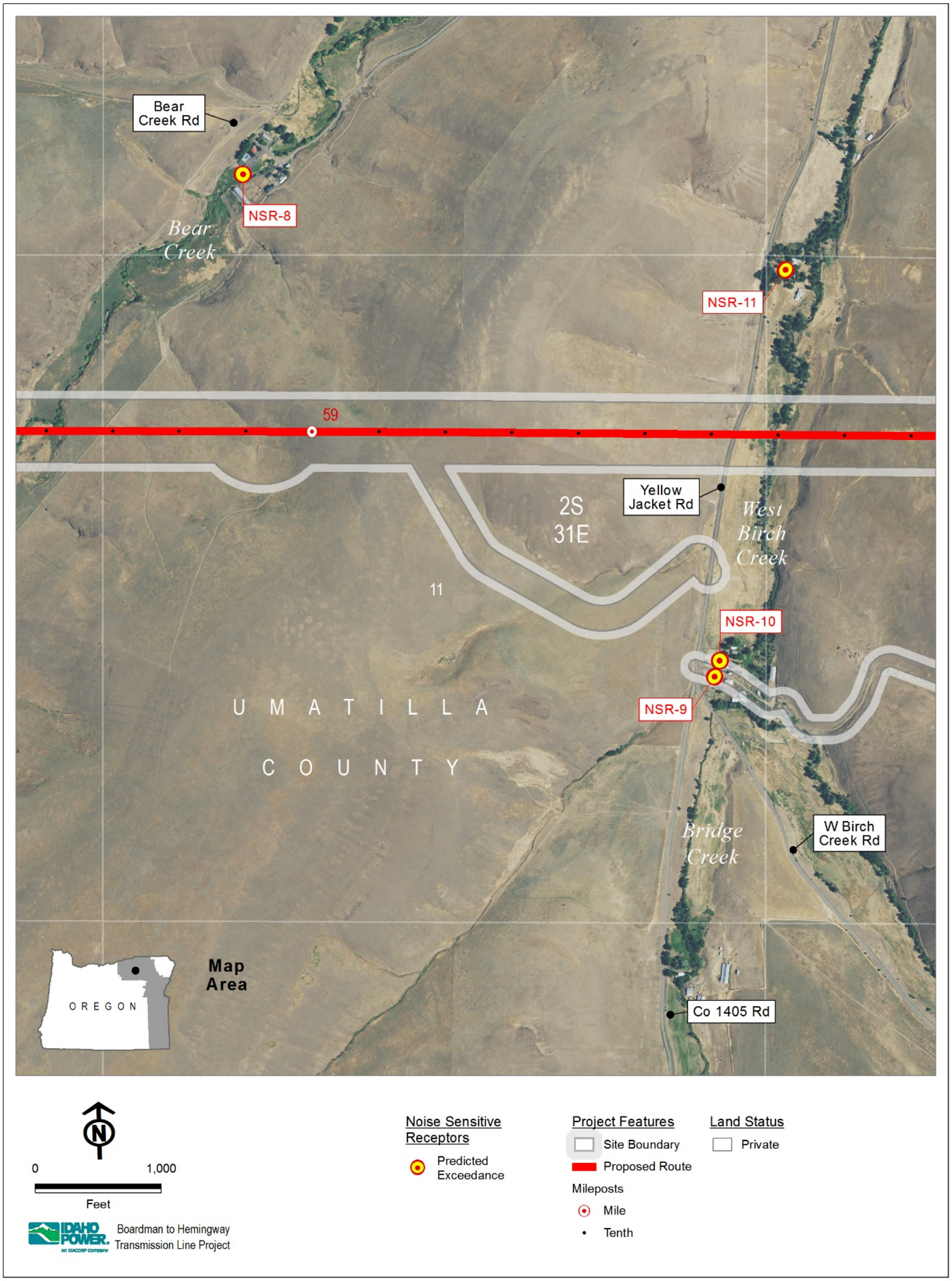


Figure X-5. Constraints Around NSR-8, -9, -10, and -11

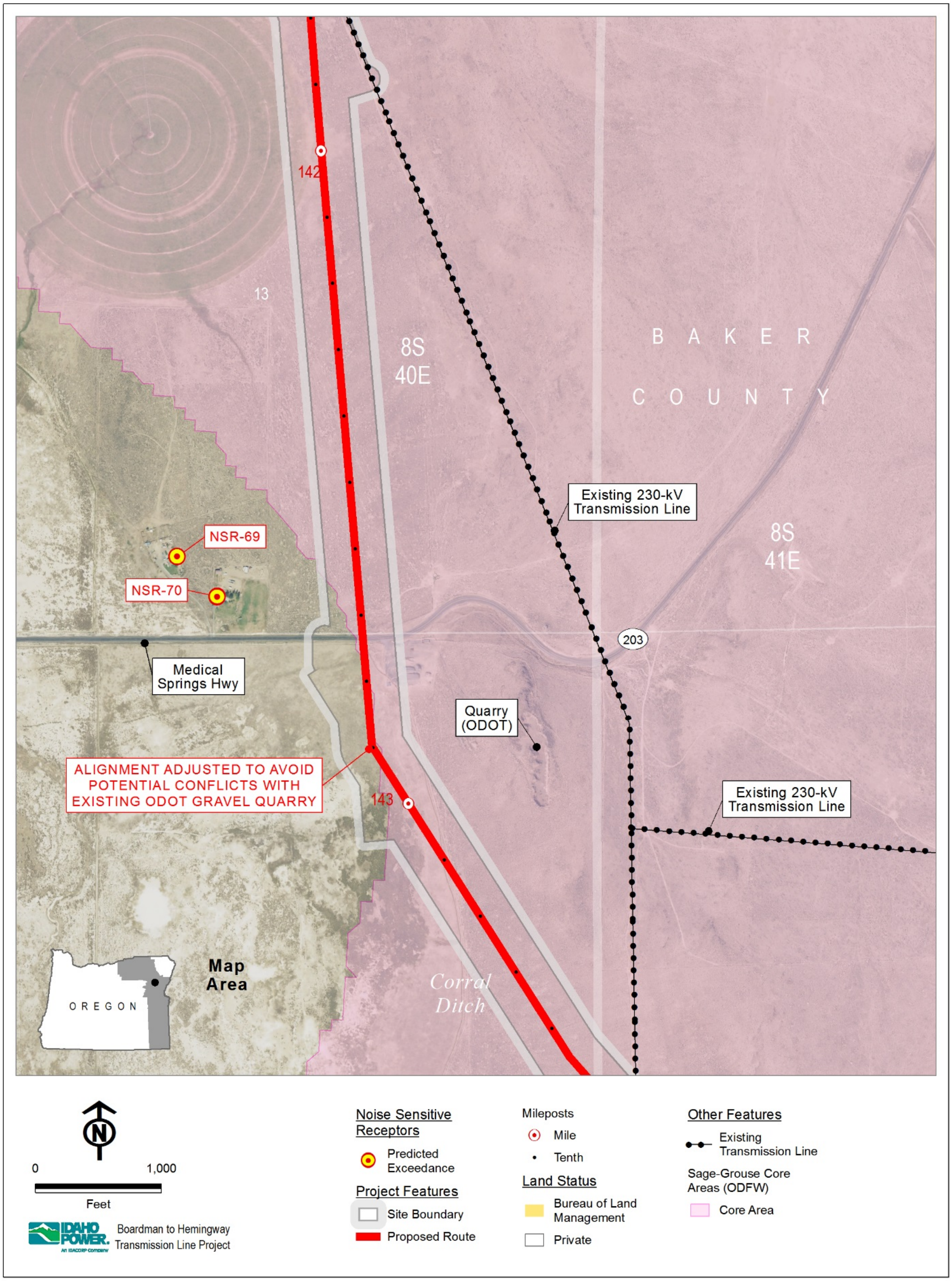


Figure X-6. Constraints Around NSR-69 and -70

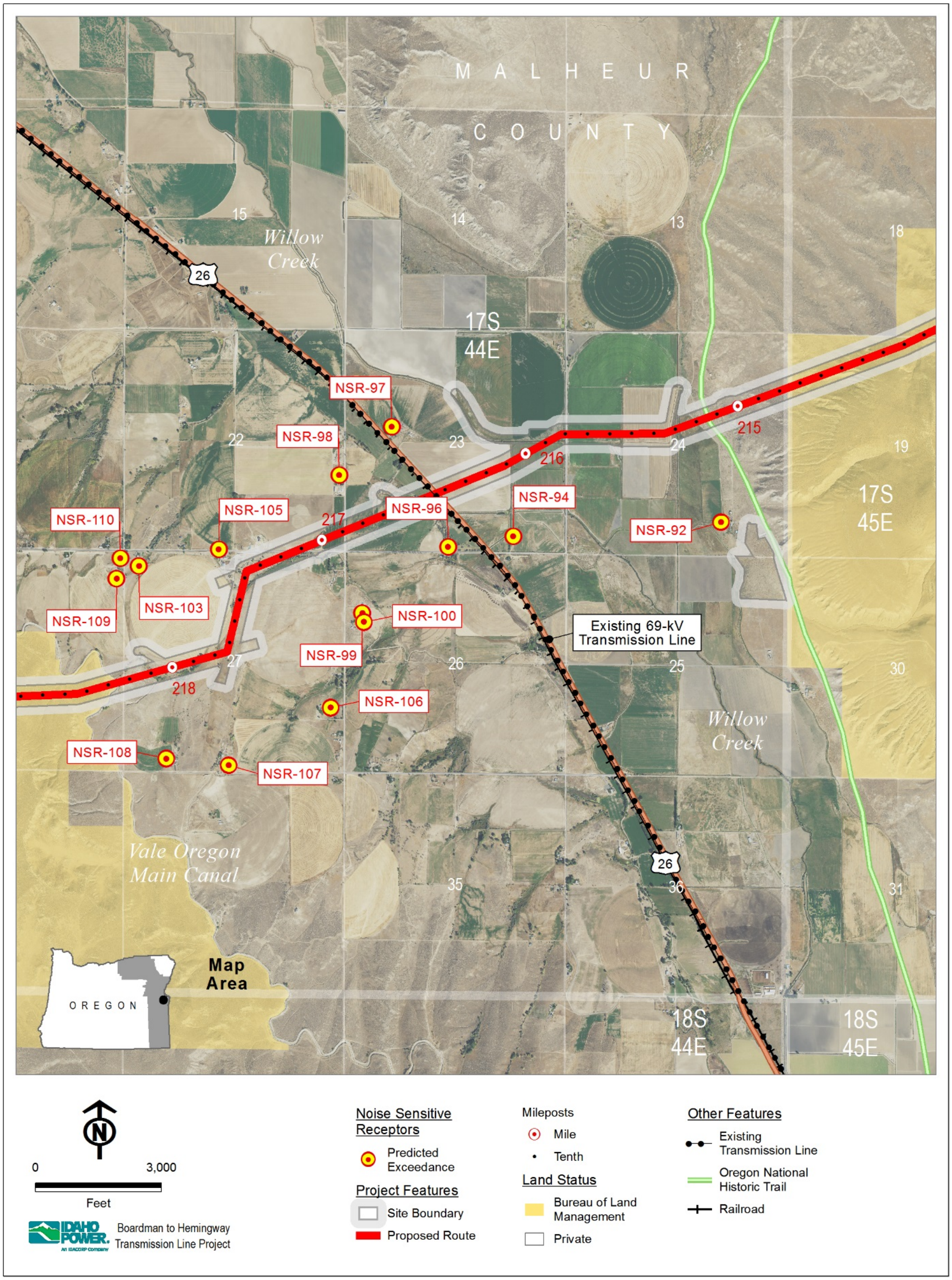


Figure X-7. Constraints Around NSR-92 through -110

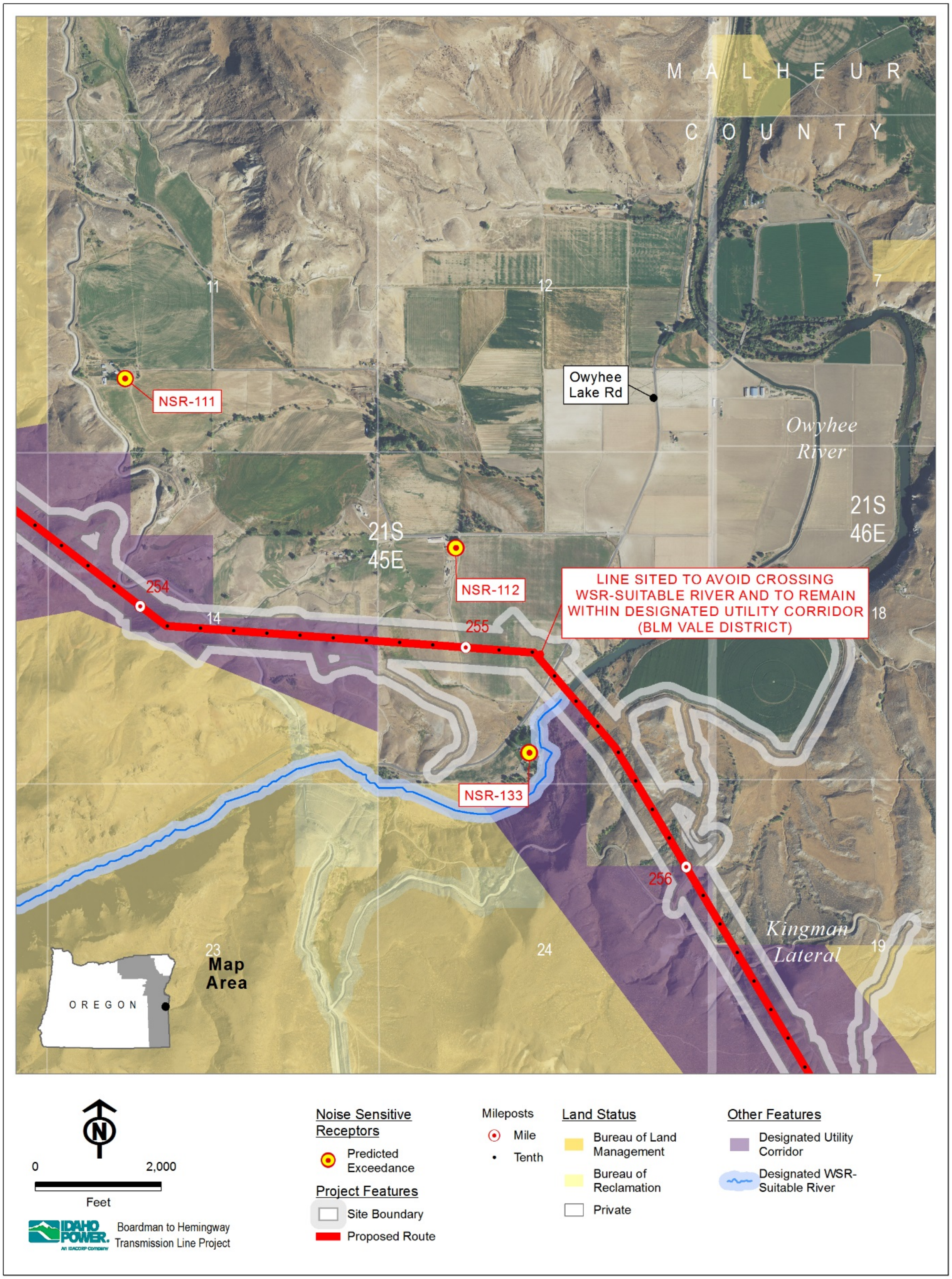


Figure X-8. Constraints Around NSR-111, -112, and -133

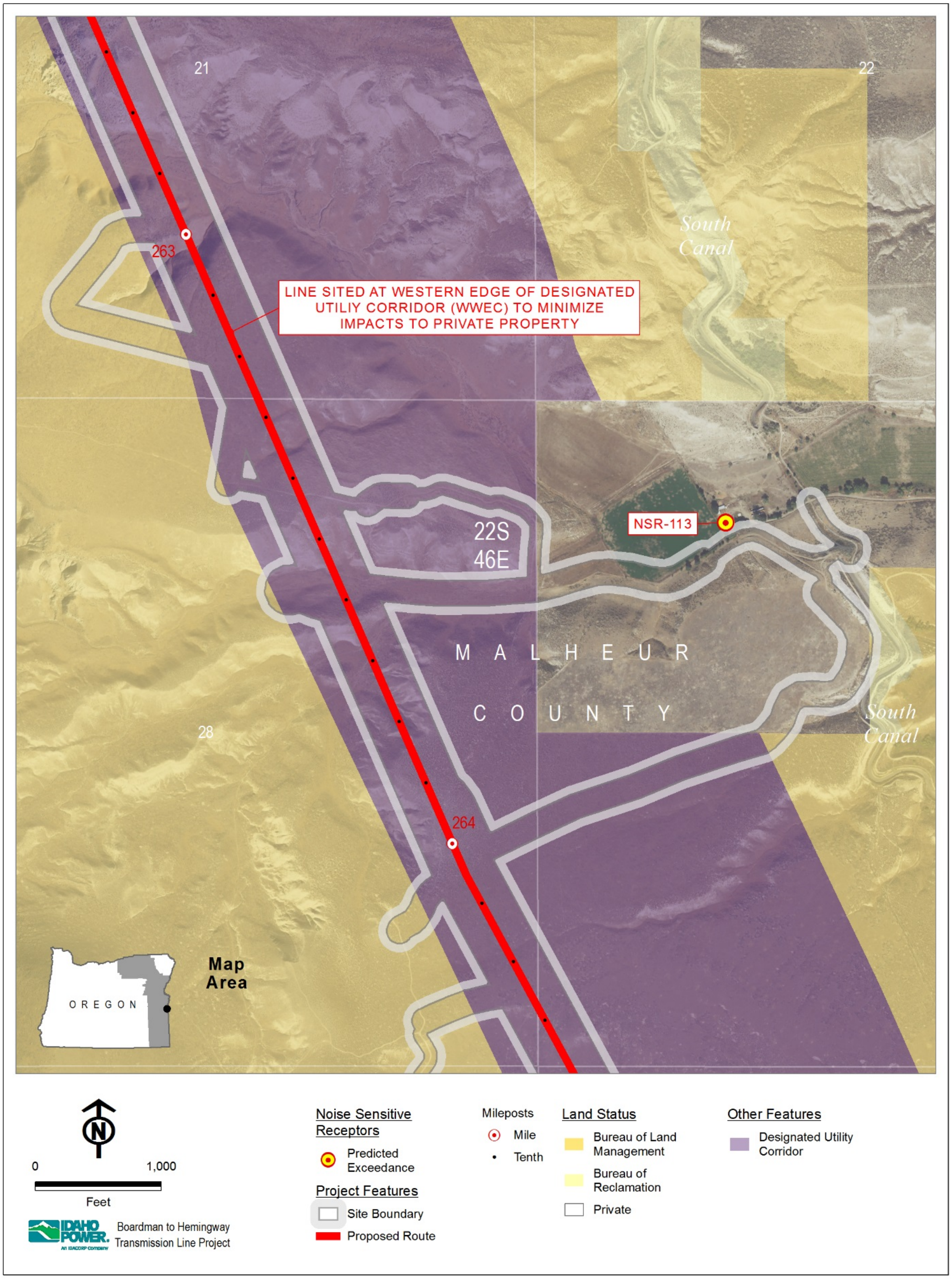
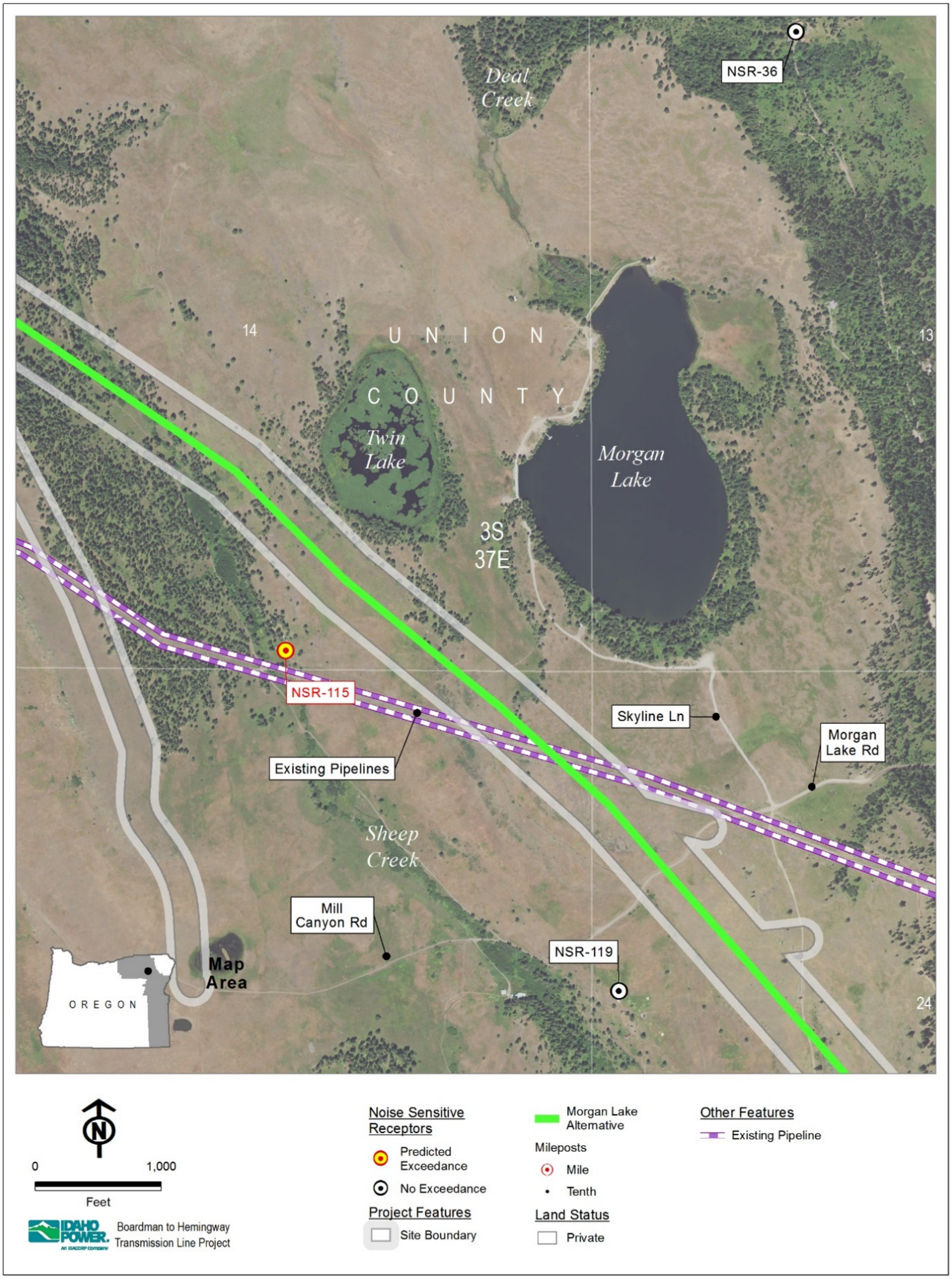


Figure X-9. Constraints Around NSR-113

1



2

3 **Figure X-10. Constraints Around NSR-115**

Granting an exception is consistent with the past, present, and future patterns of land use.

The potential exceedances described above occur in resource zones. None of the possible exceedances occur on land zoned for residential use.

Granting an exception is consistent with the relative timing of land use changes.

IPC has no information to indicate that significant future land use changes are likely to occur at or near the relevant NSRs.

Legal constraints render it extremely difficult to reroute the line to eliminate exceedances.

Many legal siting constraints are imposed on the Project, dictating the route choices and resulting potential exceedances. These constraints include the following:

- Federal land management agency requirements, including the federal land management plans governing many of the federal lands in the analysis area;
- Western Electricity Coordinating Council Common Corridor Criteria and prudent utility practice, including minimum separation distances from existing transmission lines to ensure reliability of facilities;
- EFSC's Fish and Wildlife Habitat Standard, which does not permit siting of an energy facility on lands designated Category 1 habitat under the Oregon Department of Fish and Wildlife's habitat mitigation policy; and
- EFSC's Protected Area Standard, which does not permit siting of an energy facility in certain protected areas, such as parks, scenic waterways, and wildlife refuges, and certain federally designated areas, such as areas of critical environmental concern, wilderness areas, wild and scenic rivers, BLM Class I and U.S. Department of Agriculture, Forest Service Retention visual management areas, national monuments, and NWRs.

These and other siting constraints are discussed in detail in the Siting Studies (see Exhibit B, Attachment B-2, 2012 Supplemental Siting Study; Attachment B-4, 2015 Supplemental Siting Study; and Attachment B-6, 2017 Supplemental Siting Study).

Exception Conditions

The ODEQ Noise Control Regulations allowing for an exception provide ODEQ (or in this context, the Council) shall specify the times during which the noise rules may be exceeded, and the quantity and quality of the noise generated. Because the infrequent generation of corona noise will depend on meteorological conditions, which may occur at any time of day, IPC requests that authorization for the exception not be limited to a specific time of day or in any other temporal or weather-dependent manner. The quantity of noise generated is still expected in all instances to be below the 50 dBA maximum permissible limit, and the quality of noise generated is corona noise, which consists of a low hum and hissing, frying, or crackling sound.

Conclusion

For the foregoing reasons, IPC requests that the Council issue an exception to the Ambient Antidegradation Standard based on the infrequency of the expected exceedances.

3.4.5.3 Request for Variance to Ambient Antidegradation Standard

In addition or in the alternative to an exception, IPC requests that EFSC grant the Project a variance from the Ambient Antidegradation Standard. Like the exception, the variance would apply to the Project as a whole and not just with respect to the 30 NSRs identified in Table X-5.

> OAR 340-035-0100(1). Conditions for Granting. The Commission may grant specific variances from the particular requirements of any rule, regulation, or order to such specific persons or class of persons or such specific noise source upon such conditions as it may deem necessary to protect the public health and welfare, if it finds that strict compliance with such rule, regulation, or order is inappropriate because of conditions beyond the control of the persons granted such variance or because of special circumstances which would render strict compliance unreasonable, or impractical due to special physical conditions or cause, or because strict compliance would result in substantial curtailment or closing down of a business, plant, or operation, or because no other alternative facility or method of handling is yet available. Such variances may be limited in time.

The Environmental Quality Commission (in this context, EFSC) may grant variances from the requirements of the Noise Control Regulations if strict compliance with the rule or standard is "inappropriate" for certain reasons. Here, a variance from the Ambient Antidegradation Standard is warranted because strict compliance is inappropriate due to siting constraints that should be considered "conditions beyond [IPC's] control," "special circumstances which would render strict compliance unreasonable, or impractical due to special physical conditions or cause," or both (OAR 340-035-0100(1)).

As discussed previously, IPC will use a triple-bundled conductor with subconductor spacing to minimize the occurrence of corona noise. However, no materials are available that would completely prevent corona noise from occurring on a 500-kV transmission line during foul weather conditions. Thus, the only cure for an exceedance at a particular NSR is to reroute the line away from the NSR. Unfortunately, IPC's analysis reveals that such rerouting is not possible. Given the complex siting constraints, the Project cannot simply be relocated into compliance and may not pass permitting requirements unless a variance is granted.

The fact that strict compliance could prevent permitting of the Project is especially salient because the Project is required to provide a public service. In adopting its industrial and commercial noise rules regarding ambient antidegradation, the Environmental Quality Commission's Director specifically stated that "sources unable to comply with this standard and which are necessary as a public service at that particular location, a variance request may be submitted to the Commission for their consideration."[10] As discussed in Exhibit N, the Project is a critical component of IPC's preferred portfolio for serving its customers in Oregon and Idaho, is a critical component of regional transmission planning for the future, and is an important part of the solution to relieve congestion on transmission paths between the Northwest and Rocky Mountain regions. A determination that the Project could not be permitted would deprive the region and its citizens of a critical energy infrastructure for many years into the future.

[10] Memorandum to Environmental Quality Commission from Director, Re: Adoption of Statewide Rules Related to Noise Pollution from Industrial and Commission Sources and Changes to the Sound Measurement Procedures Manuals, NPCS-1,2 (Sept. 4, 1974).

Because the antidegradation exceedances will be due to siting constraints beyond IPC's control, which render strict compliance unreasonable and impractical, the Council should grant the Project a variance from the Ambient Antidegradation Standard.

3.4.6 Quiet Areas

> OAR 340-035-0035(1)(c): Quiet Areas. No person owning or controlling an industrial or commercial noise source located either within the boundaries of a quiet area or outside its boundaries shall cause or permit the operation of that noise source if the statistical noise levels generated by that source exceed the levels specified in Table 9 as measured within the quiet area and not less than 400 feet (122 meters) from the noise source.

There are no ODEQ-designated "quiet areas" within the Site Boundary or within the vicinity of the Project. Therefore, the Project will be in compliance with OAR 340-035-0035(c).

3.4.7 Impulse Sound

> OAR 340-035-0035(1)(d): Impulse Sound. Notwithstanding the noise rules in Tables 7 through 9, no person owning or controlling an industrial or commercial noise source shall cause or permit the operation of that noise source if an impulsive sound is emitted in air by that source which exceeds the sound pressure levels specified below, as measured at an appropriate measurement point, as specified in subsection (3)(b) of this rule: (A) Blasting. 98 dBC, slow response, between the hours of 7 a.m. and 10 p.m. and 93 dBC, slow response, between the hours of 10 p.m. and 7 a.m. (B) All Other Impulse Sounds. 100 dB, peak response, between the hours of 7 a.m. and 10 p.m. and 80 dB, peak response, between the hours of 10 p.m. and 7 a.m.

OAR 340-035-0035(1)(d) applies to blasting and other impulse sounds resulting from the "operation" of noise sources. Here, while the Project may include certain blasting or other impulse sounds, those sounds will occur during construction and not operation of the Project. Accordingly, the Project will be in compliance with OAR 340-035-0035(1)(d).

3.5 Measures to Reduce Noise Levels or Impacts or Address Complaints

> 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.

As discussed previously, IPC will use a triple-bundled conductor with subconductor spacing to minimize the occurrence of corona noise. To ensure IPC uses such materials to reduce corona noise, IPC proposes that the Council include the following condition in the site certificate:

> ***Noise Control Condition 1:*** *During construction, the site certificate holder shall use transmission line materials that have been designed and tested to minimize corona noise. The site certificate holder shall use a bundle configuration and larger conductors to limit audible noise, radio interference, and television interference due to corona. The site certificate holder shall maintain tension on all insulator assemblies to ensure positive contact between insulators, thereby avoiding sparking. The site certificate holder shall exercise caution during construction to avoid scratching or nicking the conductor surface, which may provide points for corona to occur.*

In the event a complaint regarding corona noise is raised by a landowner, IPC will have in place a system to receive and respond to such a complaint. IPC will work with complainants to address the noise issues. Specifically, certain window treatments have been shown to be effective in reducing indoor sound pressure levels.[11] IPC will pay landowners—where a greater than 10 dBA exceedance is established—the cash equivalent of what it would cost to install noise-dampening window treatments. Landowners would be able to spend the money as they wished by installing the windows, installing different treatments, or otherwise. The payment would fully resolve the complaint. With respect to the methodology for determining whether an exceedance exists, deference would be provided to the modeling results set forth in Exhibit X. If the NSR is covered in Exhibit X and the landowner disagrees with the Exhibit X modeling, the landowner would need to provide its own evidence showing an exceedance. If the NSR was missed in Exhibit X, IPC would model the noise impacts for the landowner. This approach provides a fair balance between ensuring that exceedance NSRs are properly identified and addressed, and avoiding unnecessary noise sampling. IPC proposes that the Council include the following conditions in the site certificate setting forth this noise complaint response approach:

> ***Noise Control Condition 2:*** *During operation, the site certificate holder shall maintain a complaint response system to address noise complaints. If the site certificate holder receives a noise complaint and it is shown that corona noise exceeds the antidegradation standard, the site certificate holder shall provide to the landowner a payment equal to the reasonable cost of installing reasonable acoustic window treatments, as approved by the department. The payment provided for in this condition shall fully resolve any noise complaint related to the Project; no additional mitigation shall be required.*
> *a. If the complainant's noise sensitive receptor or receptors are included in Appendix X-4 in ASC Exhibit X, the sound level increases set forth in Appendix X-4 will be assumed to be valid for purposes of determining whether the corona noise exceeds the antidegradation standard. If the complainant disagrees with the sound level increases set forth in Appendix X-4, the complainant must provide its own scientific evidence demonstrating that corona noise exceeds the antidegradation standard.*
> *b. If the complainant's noise sensitive receptor or receptors are not included in Appendix X-4 in ASC Exhibit X, the site certificate holder shall model the sound level increases using the methods set forth in ASC Exhibit X. If the complainant disagrees with the sound level increases modeled by the site certificate holder, the complainant must provide its own scientific evidence demonstrating that corona noise exceeds the antidegradation standard.*
> *c. Under any and all circumstances, the site certificate holder may conduct site-specific sound monitoring to confirm the noise levels at the complainant's property, and the complainant must allow such monitoring if requested by the site certificate holder.*

> ***Noise Control Condition 3:*** *During operation, the site certificate holder shall notify the department within ten working days of receiving a noise complaint related to the facility. The notification shall include the date the site certificate*

[11] See, e.g., http://www.indowwindows.com/wp-content/uploads/2016/09/Indow_Field-Sound-Transmission-Loss_081116.pdf (report on sound transmission loss related to a certain manufacturer's window treatments); http://www.magnetite.com/products/product-information/soundproofing/index.html (facts about window soundproofing); and https://www.macnoise.com/sites/macnoise.com/files/pdf/tips.pdf (Metropolitan Airports Commission report on insulating homes against aircraft noise).

holder received the complaint, the nature of the complaint, the complainant's contact information, the location of the affected property, and any actions taken, or planned to be taken, by the site certificate holder at the site certificate holder's discretion to address the complaint.

3.6 Monitoring

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

As discussed above, IPC shows the Project will comply with the Maximum Permissible Sound Level Standard and IPC requests that the Council issue an exception to, or variance from, the Ambient Antidegradation Standard. Because the Project will either directly comply with Noise Control Regulations or comply through an exception or variance, IPC does not propose any monitoring.

3.7 List of Noise Sensitive Properties

> 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.

Per the Amended Project Order, the list of NSR owners must include all owners of NSRs within one-half mile, and not one mile, of the Site Boundary (see Amended Project Order, Section III(x)). Refer to Exhibit F, Attachment F-1 for a list of the names and addresses of all owners of noise sensitive property, as defined in OAR 340-035-0015, within one-half mile from the Site Boundary.

4.0 IDAHO POWER'S PROPOSED SITE CERTIFICATE CONDITIONS

IPC proposes the following site certificate conditions to ensure compliance with the Noise Standard:

<u>During Construction</u>

Noise Control Condition 1: *During construction, the site certificate holder shall use transmission line materials that have been designed and tested to minimize corona noise. The site certificate holder shall use a bundle configuration and larger conductors to limit audible noise, radio interference, and television interference due to corona. The site certificate holder shall maintain tension on all insulator assemblies to ensure positive contact between insulators, thereby avoiding sparking. The site certificate holder shall exercise caution during construction to avoid scratching or nicking the conductor surface, which may provide points for corona to occur.*

<u>During Operation</u>

Noise Control Condition 2: *During operation, the site certificate holder shall maintain a complaint response system to address noise complaints. If the site certificate holder receives a noise complaint and it is shown that corona noise exceeds the antidegradation standard, the site certificate holder shall provide to the landowner a payment equal to the reasonable cost of installing reasonable acoustic window treatments, as approved by the department. The payment*

provided for in this condition shall fully resolve any noise complaint related to the Project; no additional mitigation shall be required.
a. If the complainant's noise sensitive receptor or receptors are included in Appendix X-4 in ASC Exhibit X, the sound level increases set forth in Appendix X-4 will be assumed to be valid for purposes of determining whether the corona noise exceeds the antidegradation standard. If the complainant disagrees with the sound level increases set forth in Appendix X-4, the complainant must provide its own scientific evidence demonstrating that corona noise exceeds the antidegradation standard.
b. If the complainant's noise sensitive receptor or receptors are not included in Appendix X-4 in ASC Exhibit X, the site certificate holder shall model the sound level increases using the methods set forth in ASC Exhibit X. If the complainant disagrees with the sound level increases modeled by the site certificate holder, the complainant must provide its own scientific evidence demonstrating that corona noise exceeds the antidegradation standard.
c. Under any and all circumstances, the site certificate holder may conduct site-specific sound monitoring to confirm the noise levels at the complainant's property, and the complainant must allow such monitoring if requested by the site certificate holder.

***Noise Control Condition 3:** During operation, the site certificate holder shall notify the department within ten working days of receiving a noise complaint related to the facility. The notification shall include the date the site certificate holder received the complaint, the nature of the complaint, the complainant's contact information, the location of the affected property, and any actions taken, or planned to be taken, by the site certificate holder at the site certificate holder's discretion to address the complaint.*

5.0 CONCLUSION

Exhibit X shows the Project will comply with the ODEQ Noise Control Regulations through compliance with the relevant standards, an exception, a variance, or a combination of the same.

6.0 COMPLIANCE CROSS-REFERENCES

Table X-10 identifies the location within the application for site certificate of the information responsive to the application submittal requirements in OAR 345-021-0010(1)(x), the Noise Control Regulations at OAR 340-035-0035, and the relevant Amended Project Order provisions.

Table X-10. Compliance Requirements and Relevant Cross-References

Requirement	Location
OAR 345-021-0010(1)(x)	
(x) Exhibit 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:	
(A) Predicted noise levels resulting from construction and operation of the proposed facility.	Exhibit X, Section 3.3, Section 3.4, and Attachment X-4

Requirement	Location
(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.	Exhibit X, Section 3.2, Section 3.3, and Section 3.4.1
(C) Any measures the applicant proposes to reduce noise levels or noise impacts or to address public complaints about noise from the facility.	Exhibit X, Section 3.5
(D) Any measures the applicant proposes to monitor noise generated by operation of the facility.	Exhibit X, Section 3.6
(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.	Exhibit X, Section 3.7; Exhibit F, Attachment F-1
OAR 345-035-035	
(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.	Exhibit X, Section 3.4.6.1
(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).	Exhibit X, Section 3.4.6.1 and Section 3.4.6.2
(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.	Exhibit X, Section 3.4.6.1 and Section 3.4.6.2
(1)(c) Quiet Areas. No person owning or controlling an industrial or commercial noise source located either within the boundaries of a quiet area or outside its boundaries shall cause or permit the operation of that noise source if the statistical noise levels generated by that source exceed the levels specified in Table 9 as measured within the quiet area and not less than 400 feet (122 meters) from the noise source.	Exhibit X, Section 3.4.7

Requirement	Location
(1)(d) Impulse Sound. Notwithstanding the noise rules in Tables 7 through 9, no person owning or controlling an industrial or commercial noise source shall cause or permit the operation of that noise source if an impulsive sound is emitted in air by that source which exceeds the sound pressure levels specified below, as measured at an appropriate measurement point, as specified in subsection (3)(b) of this rule: (A) Blasting. 98 dBC, slow response, between the hours of 7 a.m. and 10 p.m. and 93 dBC, slow response, between the hours of 10 p.m. and 7 a.m. (B) All Other Impulse Sounds. 100 dB, peak response, between the hours of 7 a.m. and 10 p.m. and 80 dB, peak response, between the hours of 10 p.m. and 7 a.m.	Exhibit X, Section 3.4.8
(3) Measurement: (a) Sound measurements procedures shall conform to those procedures which are adopted by the Commission and set forth in Sound Measurement Procedures Manual (NPCS-1), or to such other procedures as are approved in writing by the Department; (b) Unless otherwise specified, the appropriate measurement point shall be that point on the noise sensitive property, described below, which is further from the noise source: (A) 25 feet (7.6 meters) toward the noise source from that point on the noise sensitive building nearest the noise source; (B) That point on the noise sensitive property line nearest the noise source.	Exhibit X, Section 3.2
(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: . . . (b) Warning devices not operating continuously for more than 5 minutes; (c) Sounds created by the tires or motor used to propel any road vehicle complying with the noise standards for road vehicles; . . . (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.	Exhibit X, Section 3.4.1 through Section 3.4.4
(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.	Exhibit X, Section 3.4.6.2

Requirement	Location
OAR 340-035-0100	
(1) Variances. Conditions for Granting. The Commission may grant specific variances from the particular requirements of any rule, regulation, or order to such specific persons or class of persons or such specific noise source upon such conditions as it may deem necessary to protect the public health and welfare, if it finds that strict compliance with such rule, regulation, or order is inappropriate because of conditions beyond the control of the persons granted such variance or because of special circumstances which would render strict compliance unreasonable, or impractical due to special physical conditions or cause, or because strict compliance would result in substantial curtailment or closing down of a business, plant, or operation, or because no other alternative facility or method of handling is yet available. Such variances may be limited in time. (2) Procedure for Requesting. Any person requesting a variance shall make his request in writing to the Department for consideration by the Commission and shall state in a concise manner the facts to show cause why such variance should be granted.	Exhibit X, Section 3.4.6.2 and Section 3.4.6.3
Amended Project Order, Section III(x)	
[B]ecause of the linear nature of the proposed facility, the requirements of paragraph E are modified. Instead of one mile, to comply with paragraph E the applicant must develop a list of all owners of noise sensitive property, as defined in OAR 340-035-10 0015, within one-half mile of the proposed site boundary.	Exhibit X, Section 3.7; Exhibit F, Attachment F-1
The application shall contain a noise analysis and information to support a Council finding that the proposed facility, including any alternative routes proposed, will comply with the requirements of OAR 340-035-0035.	Exhibit X

7.0 RESPONSE TO PUBLIC COMMENTS

Table X-11 provides IPC's responses to the public comments cited in the Amended Project Order.

Table X-11. Public Comments

Public Comments	
Noise impacts, both from construction and operation of the proposed transmission line. Applicant shall address noise impacts and compliance with state noise standards in Exhibit X. Potential noise impacts to wildlife shall be addressed in Exhibits P and Q.	Exhibit X; Exhibit P; Exhibit Q

8.0 REFERENCES

DOE (U.S. Department of Energy) and BPA (Bonneville Power Administration). Undated. Corona and Field Effects Program Version 3.0 Computer Program. BPA, P.O. Box 491-ELE, Vancouver, Washington 98666.

EPRI (Electric Power Research Institute). 2006. EPR AC Transmission Line Reference Book – 200 kV and Above, Third Edition. January 2006.

FHWA (Federal Highway Administration). 1992. "Procedures for Abatement of Highway Traffic Noise and Construction Noise." *Code of Federal Regulations*, Title 23, Part 772, 1992.

FHWA. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054, January 2006.

Helicopter Association International. 2017. *Fly Neighboring Guide.* Third edition. Available online: https://www.rotor.org/Operations/FlyNeighborly/FlyNeighborlyGuide.aspx. Accessed January 2017.

Oregon EFSC (Energy Facility Siting Council). 2007. *Biglow Canyon Wind Farm: Final Order on Amendment #2*. Pp. 45-49. May.

ATTACHMENT X-1
BASELINE SOUND MONITORING PROTOCOL

Boardman to Hemmingway Transmission Line Project

Baseline Sound Monitoring Protocol

Prepared for:

An IDACORP Company

Idaho Power
P.O. Box 70
Boise, ID 83707

Prepared by:

TETRA TECH EC, INC.

3380 Americana Terrace Suite 201
Boise, ID 83706

March 2012

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ABBREVIATIONS AND ACRONYMS

ASC	Application for Site Certificate
ANSI	American National Standards Institute
B2H	Boardman to Hemingway Transmission Line Project
BPA	Bonneville Power Administration
CAFE	Corona and Field Effects
dBA	A-weighted decibels
DOE	US Department of Energy’s
EFSC	Energy Facility Siting Council
Hz	hertz
INCE	Institute of Noise Control Engineers
IPC	Idaho Power Company
L_{10}	sound pressure level exceeded 10 percent of the time
L_{50}	sound pressure level exceeded 50 percent of the time
L_{90}	sound pressure level exceeded 90 percent of the time
L_{eq}	equivalent sound level
MP	monitoring position
NEMA	National Electrical Manufacturers Association
NIST	National Institute of Standards and Technology
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODOE	Oregon Department of Energy
ROW	right-of-way

1.0 INTRODUCTION

Idaho Power Company (IPC) is currently pursuing a site certificate from the Oregon Energy Facility Siting Council (EFSC) for the proposed Boardman to Hemmingway (B2H) Transmission Line Project (Project). The Oregon Department of Energy (ODOE) requires that the proposed Project meet the Oregon Administrative Rule (OAR) standards. As a part of the EFSC Application for Site Certificate (ASC) process, a set of specific exhibits must be provided to the Oregon Department of Energy (ODOE) demonstrating that the proposed Project will meet standards given under the Oregon Administrative Rule (OAR). Idaho Power filed a Notice of Intent (NOI) in July 2010 and subsequently EFSC issued a Draft Project Order on January 19, 2012 establishing the requirements for the Project's ASC (Appendix A). The Project Order was finalized on March 2, 2012.

OAR Chapter 340, Division 35 prescribes noise regulations applicable throughout the state of Oregon in Section 340-035-0035, "Noise Control Regulations for Industry and Commerce." (Appendix B) The standard provides guidance for new noise sources based on whether the source will be located on a previously used industrial or commercial site or whether it will be located on a previously unused industrial or commercial site (OAR 340-035-0035(1)(b)(A)-(B)). IPC presumes that the transmission line will constitute an industrial or commercial use located on predominantly previously unused sites. Therefore, to demonstrate compliance with OAR 340-035-0035(1)(b)(B)(i), the Project must 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, or exceed the levels provided in Table 8 of OAR 340-035-0035. Compliance is determined at the appropriate measurement points, as specified in OAR 340-035-0035(3)(b). This ambient degradation test allows for an increase in sound of 10 dBA relative to the existing ambient background sound level.

This B2H Baseline Sound Monitoring Protocol (Protocol) has been designed to support an engineering acoustic analysis to meet the anticipated reporting requirements and to provide additional information necessary to assess potential noise generated by operation of the proposed Project. This analysis is required to meet the submittal requirements of Oregon Administrative Rule (OAR) 345-021-0010(1)(x) for the purposes of demonstrating compliance with the Oregon Department of Environmental Quality's (ODEQ) noise control standards in OAR 340-35-0035. OAR 345 Division 22 does not provide an approval standard specific to demonstrating compliance with (OAR) 345-021-0010(1)(x). IPC presents its methodology as described in this Protocol based upon conservative assumptions. In doing so, IPC does not stipulate to the applicability of OAR 340-035-0035 to the Facility, and reserves the right to dispute its applicability to the Facility.

This Protocol includes a description of the sound survey methodology and assumptions, potential areas to be surveyed, and a description the measurement equipment and parameters. Acoustic measurements will be completed to establish baseline conditions and the results of the data analysis of the measurement data used as supporting documentation the analysis required

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pursuant to OAR) 345-021-0010(1)(x) (referred to Exhibit X). The Protocol has the following three objectives:

1. Document existing ambient baseline sound conditions at discrete noise sensitive areas (comprised of one or more noise sensitive properties) located along the proposed right-of-way (ROW).
2. Determine the expected increase in ambient baseline sound levels attributable to the future installation of the transmission line lateral in conjunction with the results of the acoustic modeling analysis results.
3. Monitoring stations will be equipped with weather data collection systems to assist in determining meteorological conditions coincident with the onset of corona noise.

2.0 SCREENING PROCEDURE

The analysis area for noise impacts is defined in the Draft Project Order as "[t]he area within the site boundary and one-half mile from the site boundary." The Project area traverses Morrow, Umatilla, Union, Baker and Malheur Counties, Oregon. The altitudes at the MP locations range from approximately 571 to 4,516 feet.

To assist in the initial site selection, screening level modeling of corona noise was completed at all potentially noise sensitive properties identified within the analysis area (i.e., area within one-half mile distance from the site boundary). The modeling methodologies involved two separate analytical methods. The first was the US Department of Energy's (DOE) Corona and Field Effects (CAFE) program, which was used to determine anticipated corona noise source levels (DOE, undated). The second modeling methodology employed the Datakustik Computer-Aided Noise Abatement Program (CadnaA) program, which conforms to the Organization for International Standardization (ISO) standard 9613-2 (1996), *Attenuation of Sound During Propagation Outdoors*. Cadna A was used to model how sound travels outward from the transmission line to receivers in three dimensions. Together, these two methods were used to estimate potential increase in sound levels as a result of the Project, assuming a rural background. On March 6, 2012, the ODOE third party reviewer for acoustics assigned to the Project, Daly Standlee and Associates, provided comment on the Draft Baseline Sound Monitoring Protocol in a technical memo (DSA File #: 1450818-A). As a result of comments received, the acoustic study area was effectively extended to include all areas where there is a potential for the Project to result in a received sound level of 30 dBA. A total of six candidate MPs (four new MPs and 2 redundant MPs) have been added for inclusion in the study and will be considered for supplemental testing.

Final monitoring positions (MPs) will be selected based on whether preliminary acoustic modeling indicates a potential to exceed a given threshold. Receptors situated closer to the Project would generally be considered to have a higher likelihood of impact. A preliminary field investigation was completed in February, 2012 to identify receptor status for the purposes of verification and subjective determinations of areas where existing sound sources may influence the rural background sound level assumed under the screening level assessment. The measurement of existing sound levels at the sites provides a means of determining how much natural masking noise there might be at the nearest residences to the Project. The relevance of this is that elevated levels of background noise would act to reduce or preclude the audibility of the transmission line corona noise. Conversely, under low levels of background noise, operational noise from the project is more likely to be readily perceptible.

3.0 POTENTIAL MEASUREMENT LOCATIONS

A total of 31 candidate acoustic study areas requiring further review for the potential for adverse noise impacts have been identified. Acoustic monitoring stations (MP) are planned to be positioned at up to a total 21 of these locations. Due to the large number (> 1000) of potential noise sensitive receptors identified within the analysis area, it was not feasible to conduct baseline monitoring at every receptor. Generally, ambient measurements at a single MP can be used to represent a grouping of nearby receptors. Several such MPs are planned to be situated in proximity to existing transmission lines.

Appendix C shows the B2H Transmission Project Area and the location of the 31 potential acoustic study areas and the associated MPs. The preliminary noise modeling results in combination with observations from the preliminary field investigation will be used to determine final MP locations, as a subset of the 31, for baseline field testing to document the actual ambient baseline sound environment.

The proposed acoustic study areas and associated MPs are also summarized in Table 1. Table 1 lists each identified noise sensitive receptor, a unique receptor identification number, and the Universal Transverse Mercator (UTM) coordinates in North American Datum 1983 (NAD 83) Zone 11. The UTM coordinates are listed in Table 1 are for general informational purposes and are not intended to be exact locations for deployment of monitoring equipment. Table 1 also presents information on the population density per square mile and average household size in number of persons for each MP. Population statistics were obtained from the U.S. Census Bureau's 2010 Decennial Census at the tract level.

A fixed outdoor noise MP location will be chosen within a given acoustic study area, to be representative of the background sound conditions that would be experienced by residents in their yards. However, some property owners, in discussions with the field engineer, may voice opinions and preferences on proposed locations to site the equipment on their properties. The field engineers will work conscientiously with the property owners to site the MPs per property owner's requests, while maintaining the intended goals of the monitoring program. All monitoring stations will be anchored in a manner to avoid interference from any large vertical

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reflective surfaces and will be photographed from two vantage points.

Final measurement locations will depend on IPC's ability to obtain landowner permissions to access private properties. Measurement locations may be substituted to alternate locations as shown in Appendix C, or eliminated entirely based on revised acoustic modeling results or changes in line design or alignment, right-of entry denials, or due to other unanticipated factors.

Table 1: Summary of Candidate Areas to be Surveyed

Monitoring Location	UTM Coordinates		Representative Receptor Identifier	Population Density per Sq. Mile	Number of Persons per Household
	X (meters)	Y (meters)			
MP-1	268789.9	5061553.37	176	26	3.07
MP-2	269421.95	5059079.64	167	2	2.41
MP-3	301692.78	5069246.08	642	2	2.41
MP-4	308166.92	5053802.33	151	2	2.41
MP-5	309910.96	5054654.67	299	2	2.41
MP-6	354499.35	5043195.66	142	11	2.39
MP-7	359584.22	5042759.02	285	2	2.45
MP-8	374299.85	5038249.63	120	2	2.45
MP-9	377967.33	5038279.98	123	2	2.45
MP-10	384895.65	5038241.17	118	2	2.45
MP-11	391084.49	5032153.34	107	6	2.38
MP-12	410654.11	5015744.57	100	6	2.38
MP-13	424118.5	4998514.07	91	5	2.45
MP-14	428329.81	4994572.38	85	5	2.45
MP-15	440664.2	4965578.68	81	14	2.30
MP-16	440871.66	4951165.75	72	4	2.29
MP-17	448177.63	4948129.88	227	4	2.29
MP-18	452311.38	4947967.31	68	4	2.29
MP-19	457334.09	4943596.82	67	4	2.29
MP-20	461459.09	4940796.92	220	2	2.04
MP-21	463970.68	4938571.25	63	2	2.04
MP-22	470446.82	4927698.72	55	4	2.29
MP-23	470983.14	4927472.64	53	2	2.04
MP-24	473349.65	4924035.02	40	4	2.29
MP-25	473609.57	4921456.62	36	4	2.29
MP-26	462830.08	4893727.12	717	1	2.46

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Table 1: Summary of Candidate Areas to be Surveyed					
Monitoring Location	**UTM Coordinates**		**Representative Receptor Identifier**	**Population Density per Sq. Mile**	**Number of Persons per Household**
	X (meters)	**Y (meters)**			
MP-27	481079.43	4835783.42	700	1	2.46
MP-28	344952.11	5045212.33	590	11	2.39
MP-29	414263.38	5009326.30	745	6	2.38
MP-30	460877.08	4942573.35	66	2	2.04
MP-31	453921.39	4901060.23	33	1	2.46

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4.0 FIELD MEASUREMENT METHODOLOGY

Baseline field measurements will be completed over a 2- to 3-week period. The fieldwork program is tentatively scheduled to commence during the week of March 5, 2012. Supplemental measurements will be scheduled for additional MPs during the spring of 2012. Approximately midway through the sound measurement program, the test equipment will be field -recalibrated, and the data will be downloaded and reviewed by an acoustic engineer. It may be determined from this preliminary dataset that additional field observations are warranted, during specific time periods, to help further identify and describe anomalous or regularly occurring sound events.

Prior to any field measurements, all test equipment will be field calibrated with an American National Standards Institute (ANSI) Type 1 (precision) calibrator that has accuracy traceable to the National Institute of Standards and Technology (NIST). Baseline sound monitoring data will be measured continuously and logged in 10-minute and 1-hour intervals. The analyzers will simultaneously measure broadband dBA sound levels, third octave band frequency components, and multiple statistical parameters. The equivalent sound level (L_{eq}), L_{10} (intrusive noise level), L_{50} (median), and L_{90} (residual sound level) sound metrics will be data-logged for the duration of the monitoring period to fully characterize the ambient acoustic environment. All acoustic measurements will be completed by a full member of the Institute of Noise Control Engineers (INCE), or by field engineers under his direct supervision. The location of MPs will be determined using a global positioning system unit and photographs taken in the direction of receptor and Project Corridor.

4.1 INSTRUMENTATION

Measurements will be completed with Larson Davis 831 real-time sound level analyzers equipped with a PCB model 377B02 ½-inch precision condenser microphone. This instrument has an operating range of 5 dB to 140 dB, and an overall frequency range of 8 to 20,000 hertz (Hz) and meets or exceeds all requirements set forth in the ANSI standards for Type 1 sound level meters for quality and accuracy (precision). All instrumentation components, including microphones, preamplifiers and field calibrators, have current laboratory certified calibrations traceable to the NIST.

Figure 1. Monitoring Station

The microphone and windscreen will be tripod-mounted at an approximate height of 1.2 to 1.7 meters (4 to 5.6 feet) above grade (see Figure 1). The sound monitoring stations are self-supporting and weather-proof and are

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typically deployed within 15 to 30 meters of an existing residential structure in the direction of the proposed Project. All sound level analyzer microphones will be protected from wind-induced self-noise effects by an oversized 180 millimeter (7-inch) diameter foam windscreen made of specially prepared open-pored polyurethane. By using this specialized environmental windscreen, the pressure gradient and turbulence associated with windy conditions are moved farther away from the microphone, minimizing self-generated noise. Each sound analyzer will be programmed to measure and log broadband A-weighted sound pressure levels, including a number of statistical parameters such as the average L_{eq}, maximum L_{max}, and statistical L_n sound levels. Data will also be collected for 1/1 and 1/3 octave band data spanning 6.3 Hz to 20 kilohertz. All instrumentation will be laboratory calibrated within the previous 12-month period with calibration documentation provided in the final technical report. Table 2 provides a summary of the measurement equipment that will be used.

Table 2: Measurement Equipment

Description	Manufacturer	Type
Signal Analyzer	Larson Davis	831H/L
Weather Transmitter	Vaisala	WXT520
Microphone	PCB	377B02
Windscreen	ACO Pacific	7-inch
Calibrator	Larson Davis	CAL200

4.2 DATA ANALYSIS

Upon completion of the baseline sound survey, the results will be tabulated into relevant time periods of interest based on the received sound levels, diurnal variations, and meteorological conditions that may influence the resulting data set. The goal is to identify ambient sound levels corresponding to meteorological conditions when transmission line corona noise is likely to occur. The deliverable associated with this work will consist of a technical report. The report will present the monitoring methodology and findings of the survey and will be used as a supporting study to Exhibit X.

The analysis will include the following data:

- A description of the noise monitoring locations and a map(s) depicting the measurement location and measurement equipment placement.
- Sound pressure level data over the range of meteorological conditions present during testing. Monitoring stations equipped with weather data collection systems which will provide further information including wind speed, temperature, relative humidity, and rainfall events.

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- A plot showing the time histories in 1-hour measurement intervals. Results will be tabulated into relevant time periods of interest based on the received sound levels, diurnal variations, and meteorological conditions that may influence the resulting data set, i.e. sound conditions when transmission line corona noise is likely to occur.
- For each time period, the following measurement descriptors will be presented:
  - Unweighted octave-band analysis (16, 2 31.5, 63, 125, 250, 500, 1K, 2K, 4K, and 8K Hz);
  - One hour statistical values including L_{eq}, L_{10}, L_{50}, and L_{90}, in dBA;
  - A narrative description of sounds audible during equipment deployment and retrieval as well as a discussion of any anomalous or regularly occurring sound events identified over the course of the monitoring program;
  - Distance to all major infrastructure (major roads, transmission lines, etc) within 1 mile of the MP; and
  - Existing land uses in the vicinity of the measurement location.

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APPENDIX A: PROJECT ORDER MARCH 2, 2012

(x) Exhibit X – Noise

All paragraphs apply. The application must contain a noise analysis and information to support a Council finding that the proposed facility, including any alternative routes proposed, will comply with the requirements of OAR 340-035-0035. Exhibit X should address each of the following:

- Identify all noise sensitive receptors on aerial and topographic maps in Exhibit X within one-half mile of the site boundary from the transmission line and any related and supporting facilities. Provide the distance between facility components and the nearest noise sensitive receptors (as that term is defined by ODEQ). Each noise sensitive receptor should be uniquely identified on all maps, and tables should be provided within Exhibit X that show the receptor identification number, identification of noise sources evaluated, the distance to the noise source(s), and the modeled results.
- If the applicant elects to conduct ambient baseline sound measurements at one or more locations, provide a draft noise monitoring protocol for Department review and approval prior to conducting any monitoring. The protocol should include a description of the sound survey methodology and assumptions, areas to be surveyed, and the measurement parameters needed to best respond to concerns of the applicable agencies and the public.
- Predicted noise levels resulting from construction and operation of the proposed facility. Where appropriate, perform noise modeling using the procedures identified in ISO 9613-2 (1996)1 accounting for the specialized sound propagation conditions associated with elevated sound sources, i.e. high voltage power lines. For each noise source, specify whether the "general method of calculation" or the "alternate method of calculation" in ISO 9613-2 was used to predict the sound level radiating from the source to a receptor and explain why the method was used.
- Include information on the noise levels predicted to radiate from the transmission line during late–night and early-morning hours under a range of weather conditions including those that typically result in greater noise production (e.g. high wind and high humidity conditions). Sound propagation calculations should apply meteorological conditions consistent with assumptions as used in source level calculations of corona noise or alternatively site specific meteorological conditions conducive to long range sound propagation.
- The input data for noise modeling of the transmission line should be developed from standardized engineering technical guidelines and literature sources that reflect actual measurements of existing transmission lines of similar design under similar weather

[1] ISO 9613-2 (1996): Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

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conditions. All reference data and its source shall be provided in the application materials.

- Base the analysis on conservative assumptions allowing for possible deviations in preferred alignment that may occur within the designated right of way during project construction. The transmission line will be placed nearest the most limiting noise sensitive receptors as would be allowed under applicable safety requirements or other design constraints. Provide a table listing all input parameters used to perform the noise modeling.
- Describe any measures the applicant proposes to reduce noise levels or noise impacts or to address public complaints about noise from the facility.
- Describe any measures the applicant proposes to monitor noise generated by operation of the facility.
- The applicant retains the option to request further consultation with the ODOE to maintain flexibility within the prescribed Project Order as the technical and regulatory compliance approaches are developed during the ASC process.

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APPENDIX B: OAR CHAPTER 340, DIVISION 35

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 8, as referenced in the above regulation, gives statistical noise limits as summarized below.

Table 8. 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

The standard also provides guidance for new noise sources on a previously *unused* site:

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.

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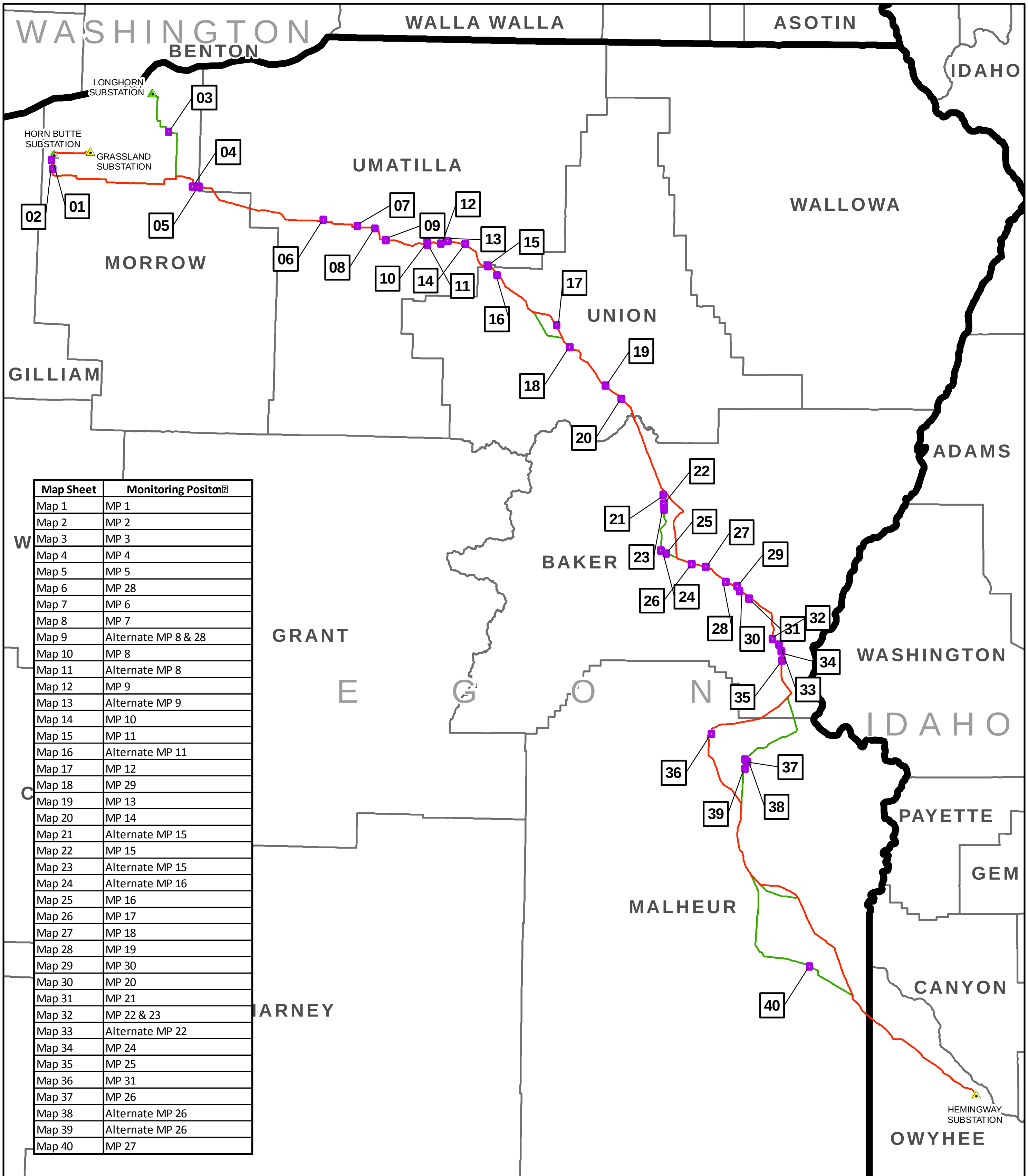
APPENDIX C: MAP BOOK IDENTIFYING POTENTIAL NOISE MONITORING POSITIONS



Map Sheet	Monitoring Positon
Map 1	MP 1
Map 2	MP 2
Map 3	MP 3
Map 4	MP 4
Map 5	MP 5
Map 6	MP 28
Map 7	MP 6
Map 8	MP 7
Map 9	Alternate MP 8 & 28
Map 10	MP 8
Map 11	Alternate MP 8
Map 12	MP 9
Map 13	Alternate MP 9
Map 14	MP 10
Map 15	MP 11
Map 16	Alternate MP 11
Map 17	MP 12
Map 18	MP 29
Map 19	MP 13
Map 20	MP 14
Map 21	Alternate MP 15
Map 22	MP 15
Map 23	Alternate MP 15
Map 24	Alternate MP 16
Map 25	MP 16
Map 26	MP 17
Map 27	MP 18
Map 28	MP 19
Map 29	MP 30
Map 30	MP 20
Map 31	MP 21
Map 32	MP 22 & 23
Map 33	Alternate MP 22
Map 34	MP 24
Map 35	MP 25
Map 36	MP 31
Map 37	MP 26
Map 38	Alternate MP 26
Map 39	Alternate MP 26
Map 40	MP 27

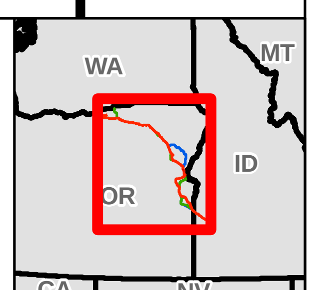
Potential Noise Monitoring Positions

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Noise Map Sheet
Proposed Substation
Alternative Substation
Proposed Route
Proposed Rebuild
Alternative

0 5 10 15 20
Miles



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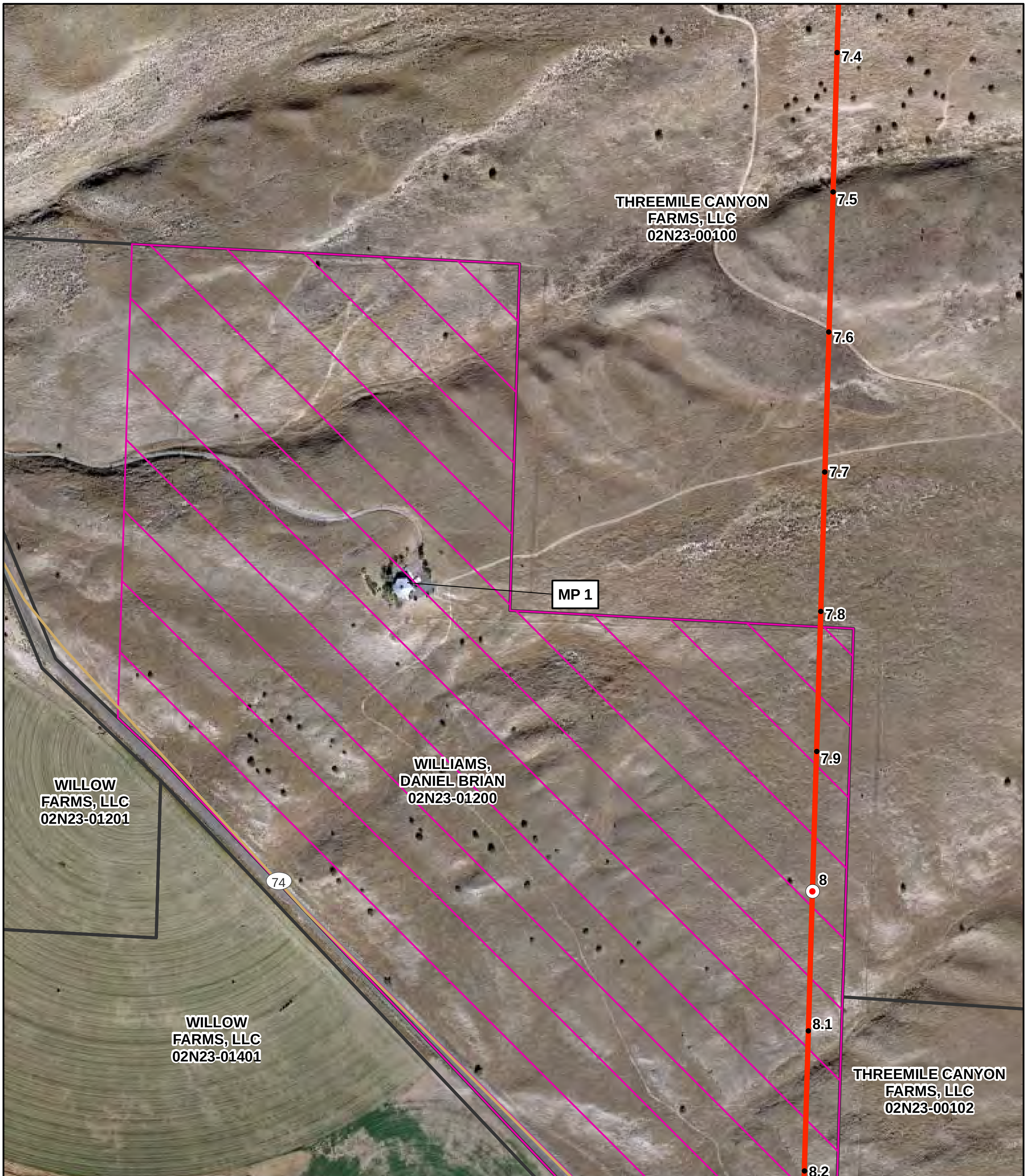


Monitoring Position 1
Morrow County

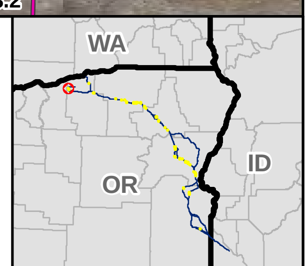
Map 1 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 1 of 40

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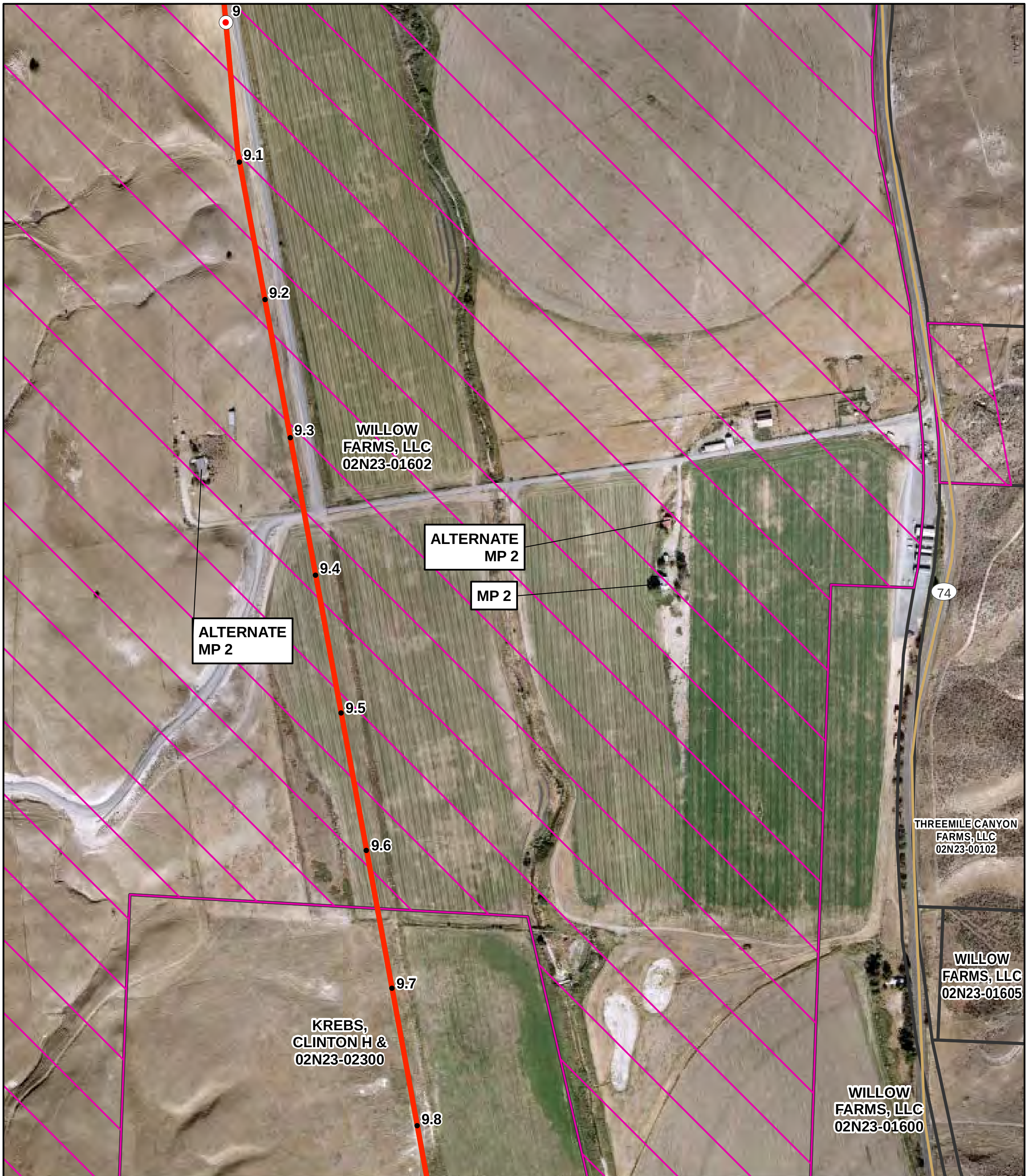


Monitoring Position 2
Morrow County

Map 2 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet

\GIS_B2H\Spatial\MXD\2012_Misc\20120206_NoiseMapbook\20120315_NoiseProtocol_Revision\20120315 Mapbook_NoiseProtocol_PotMP.mxd

Monitoring Position 3
Morrow County

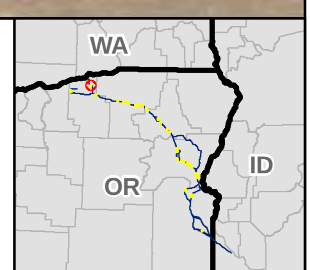
Map 3 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 3 of 40

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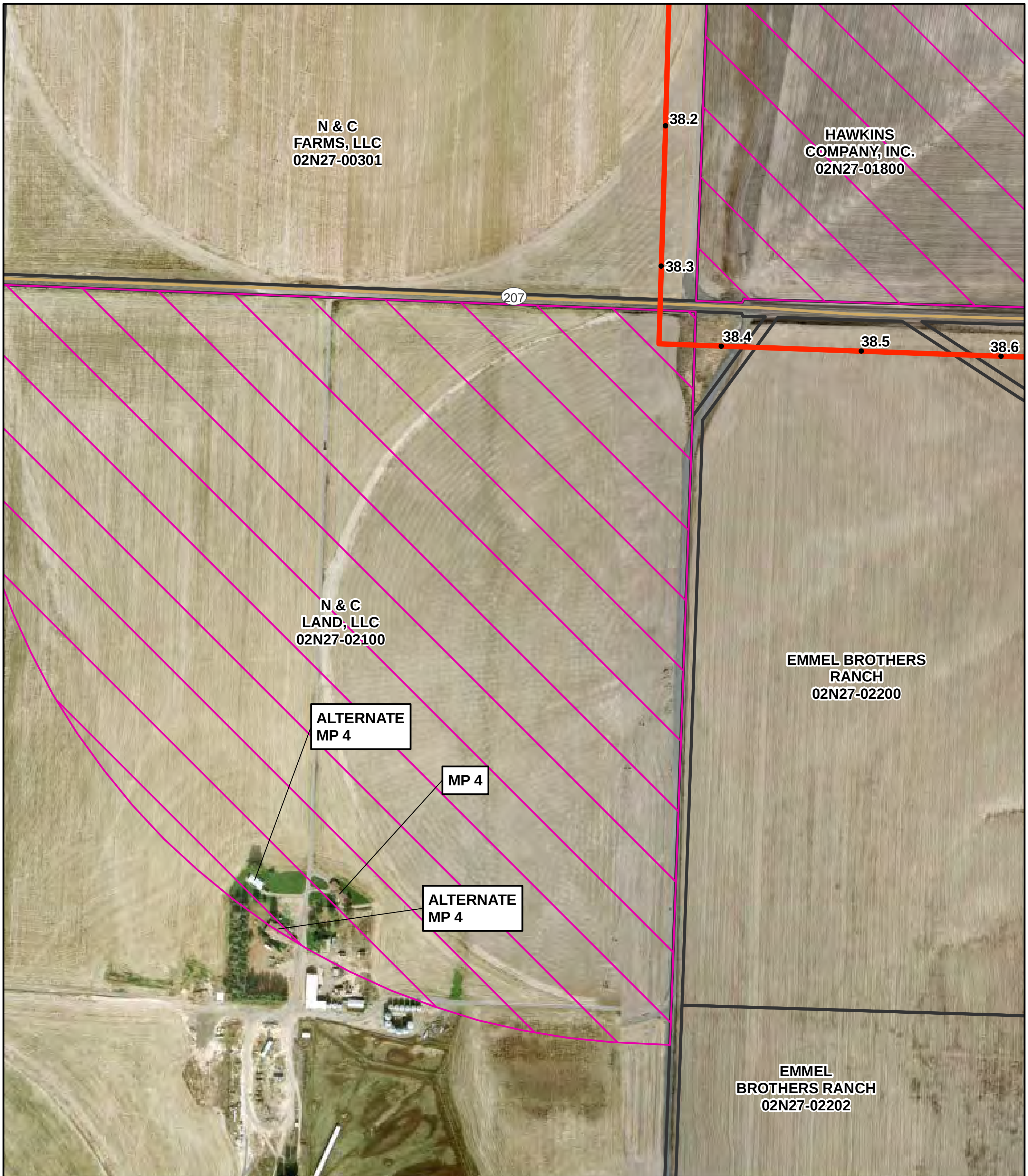
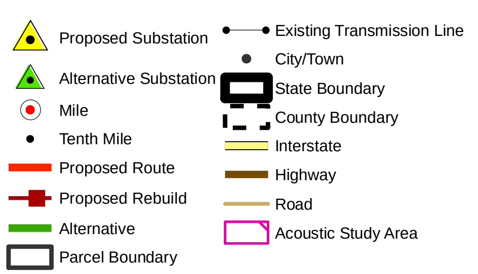


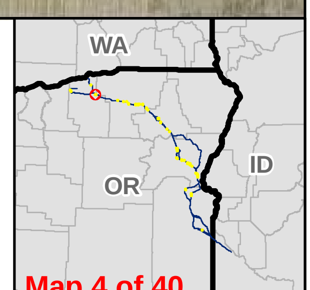
Monitoring Position 4
Morrow County

Map 4 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012





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Monitoring Position 5

Morrow/Umatilla Counties

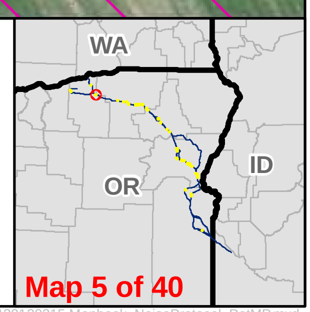
Map 5 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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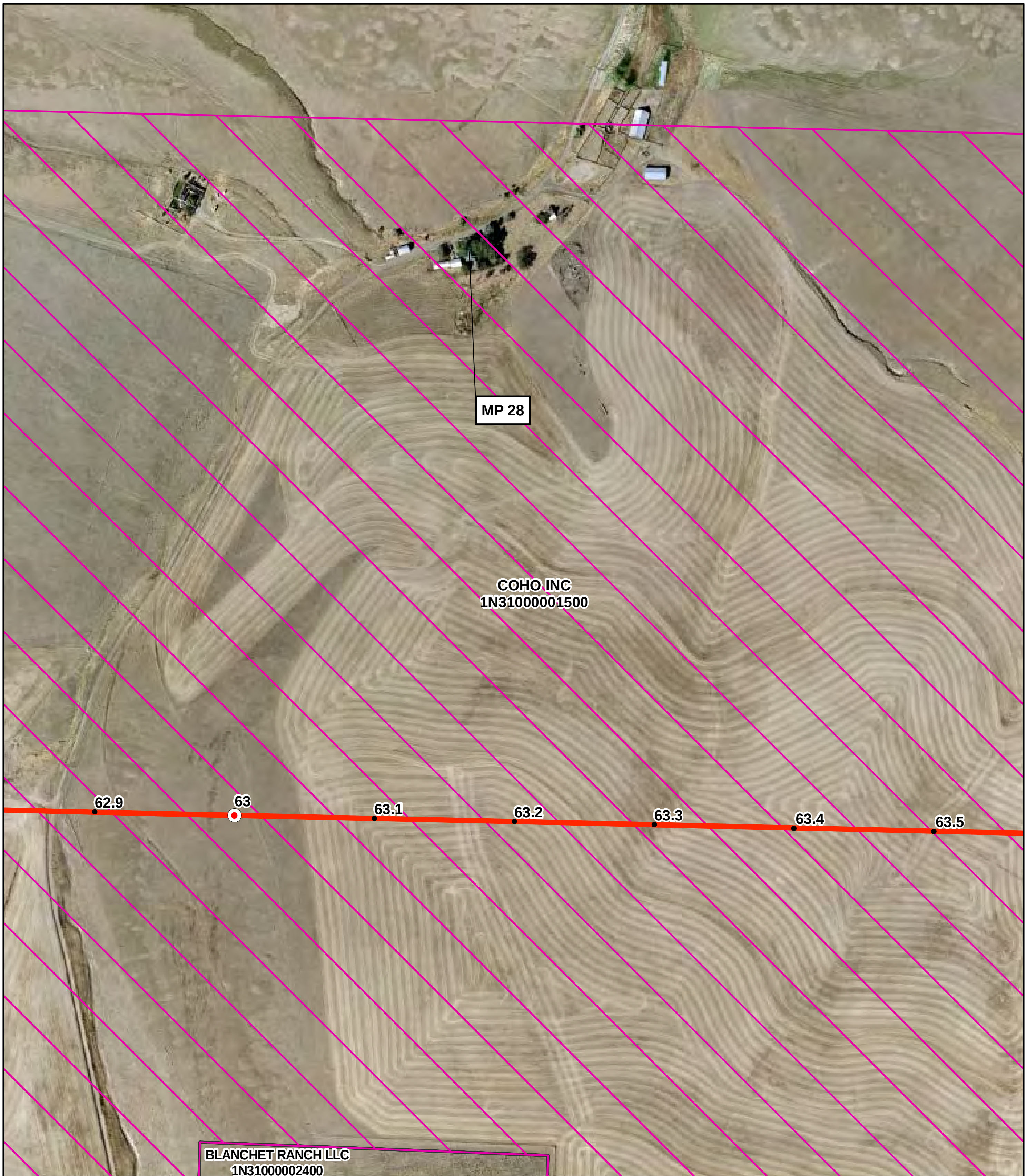


Monitoring Position 28
Umatilla County

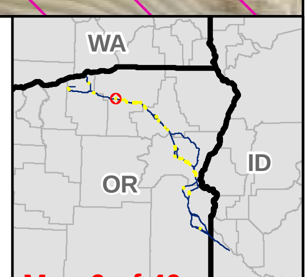
Map 6 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 6 of 40

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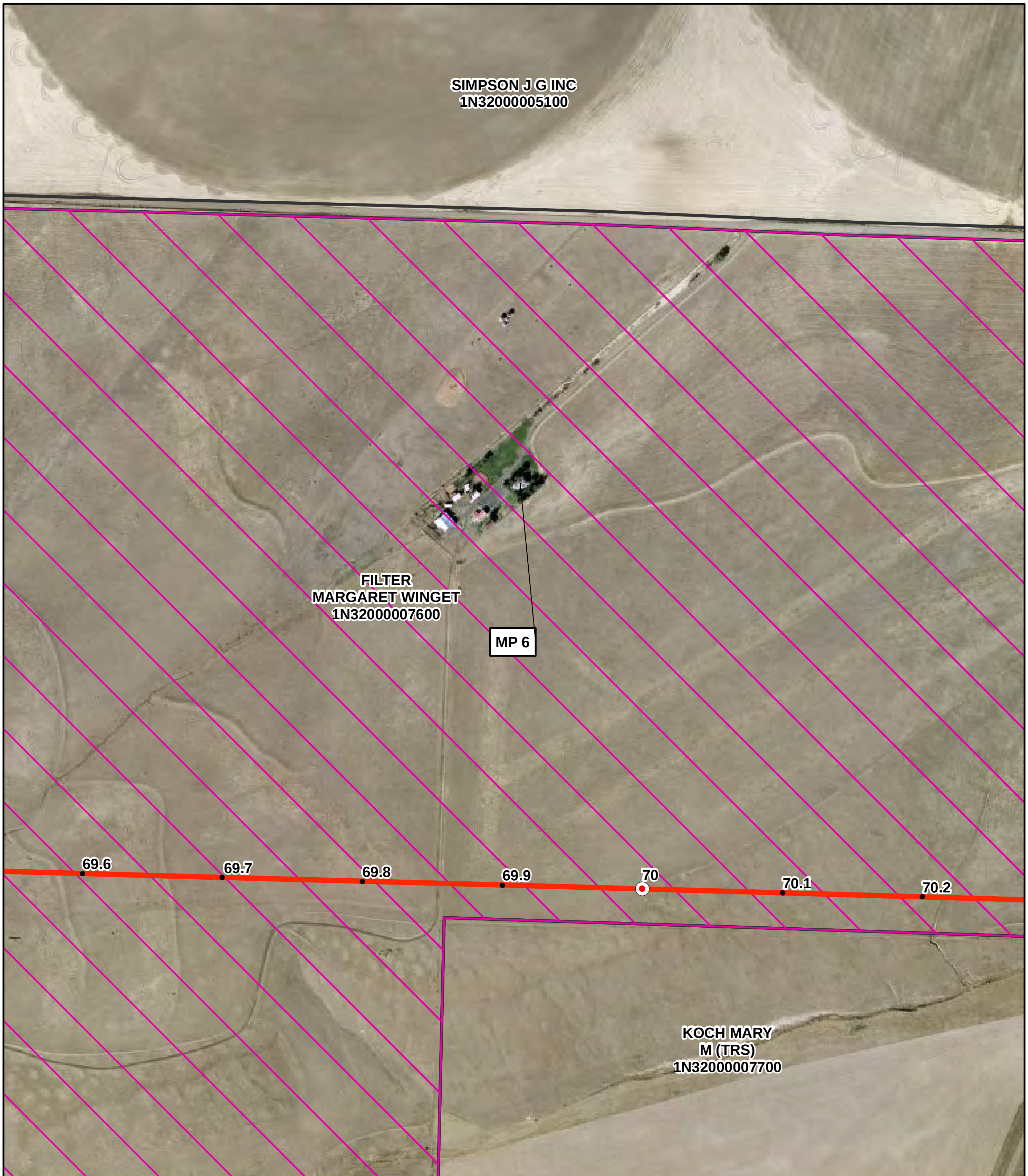


Monitoring Position 6
Umatilla County

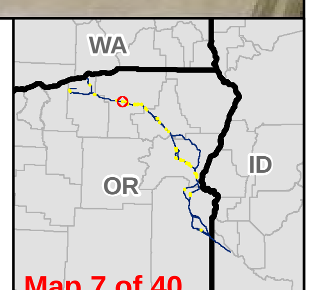
Map 7 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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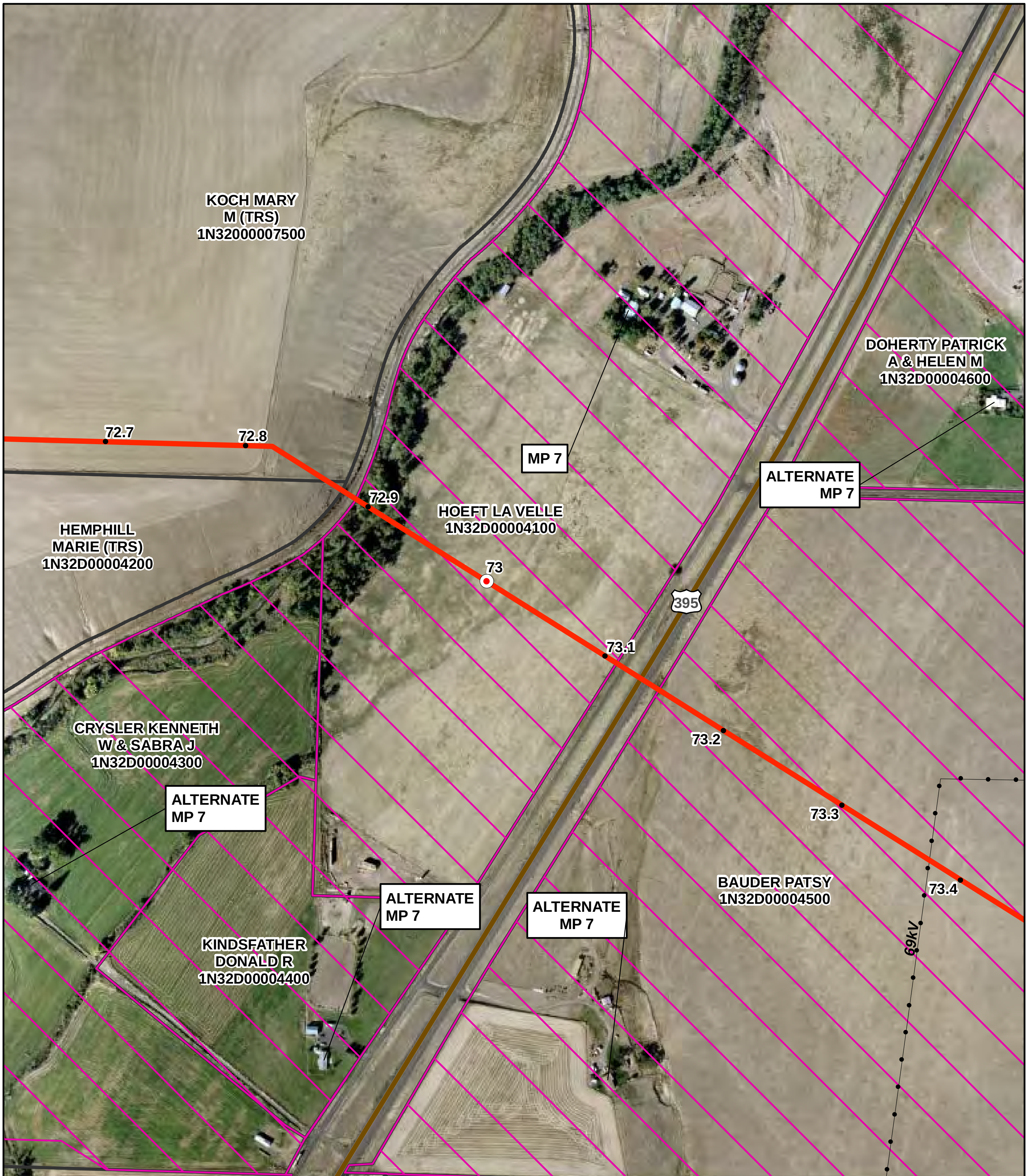


Monitoring Position 7
Umatilla County

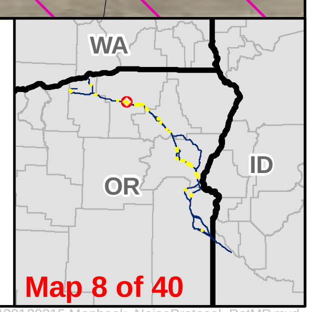
Map 8 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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Alternate MP 8 & 28
Umatilla County

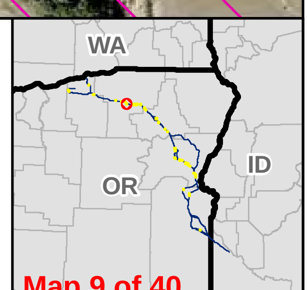
Map 9 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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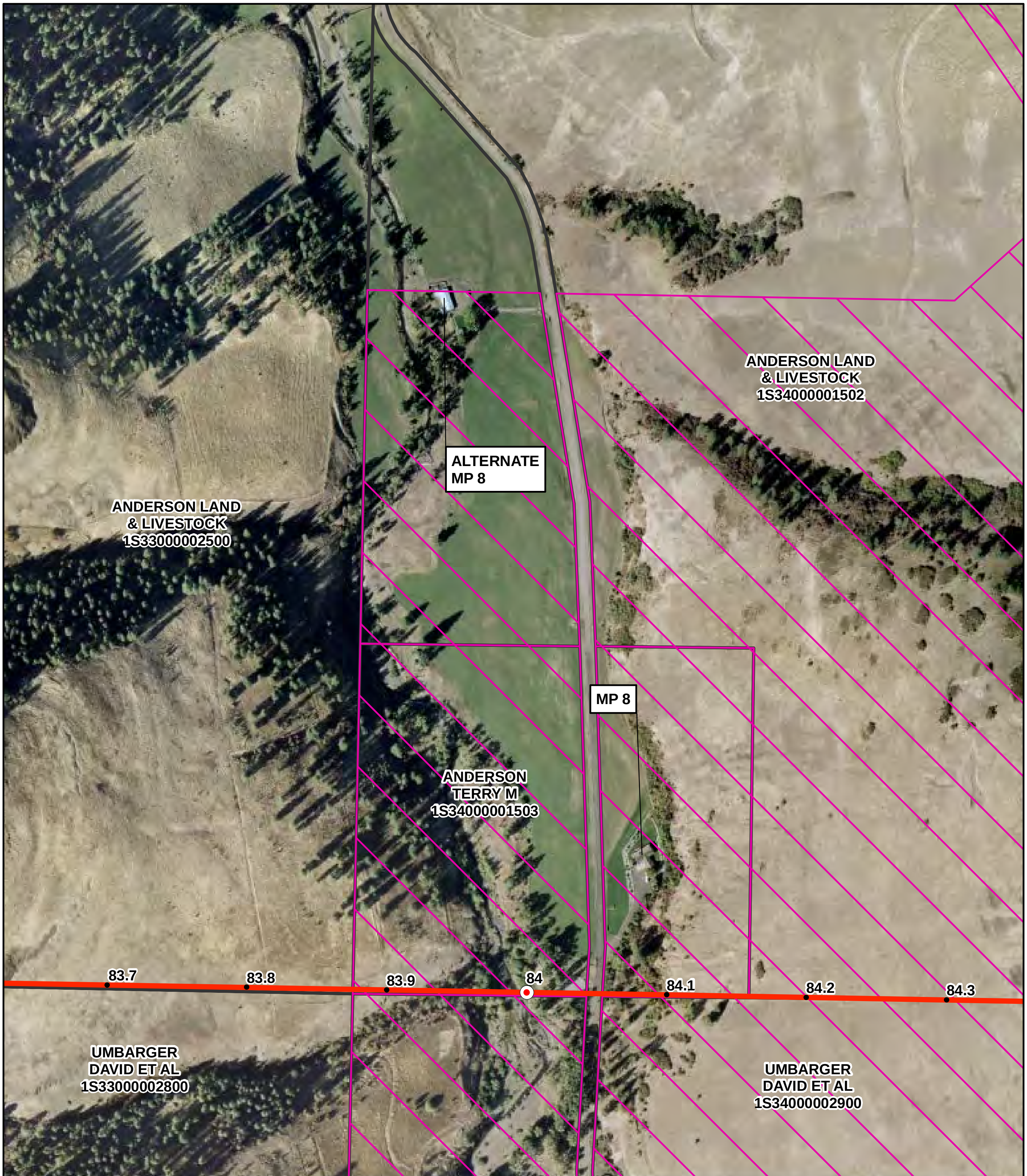


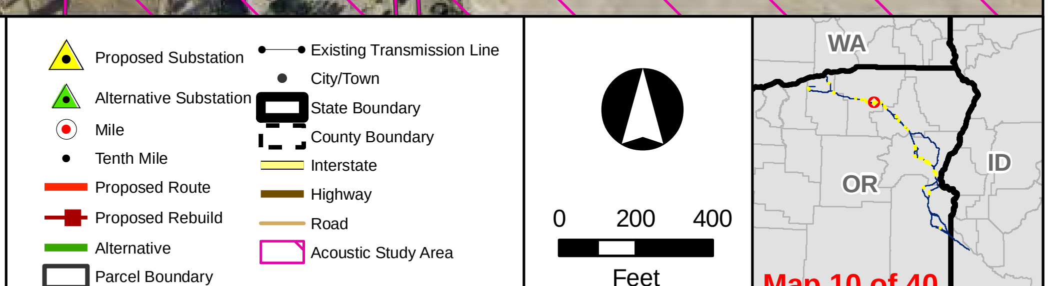
Monitoring Position 8

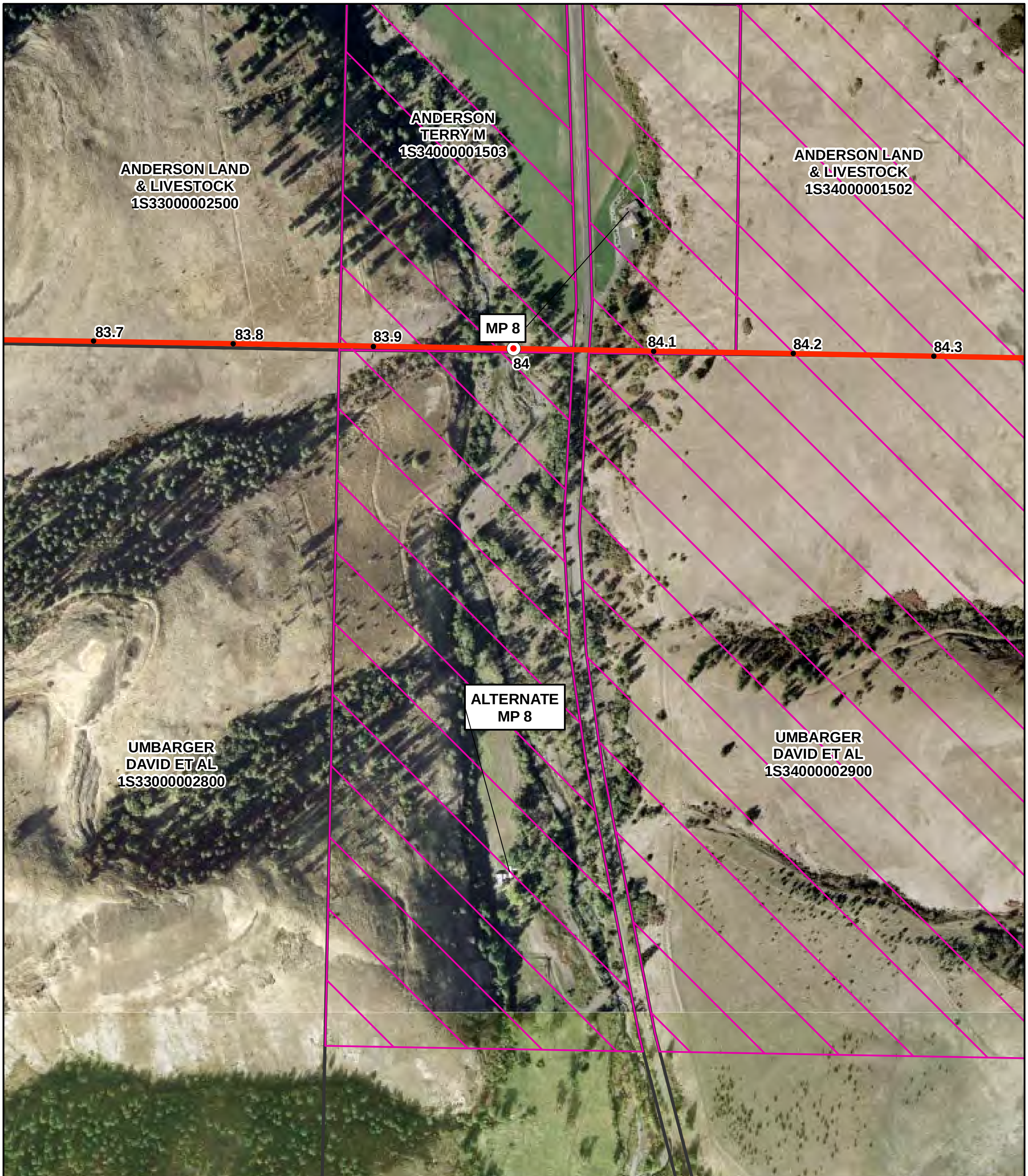
Umatilla County

Map 10 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012





Alternate MP 8
Umatilla County

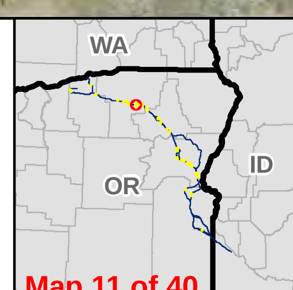
Map 11 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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Monitoring Position 9
Umatilla County

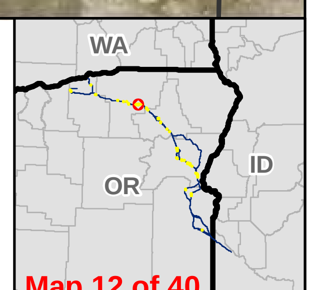
Map 12 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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Alternate MP 9
Umatilla County

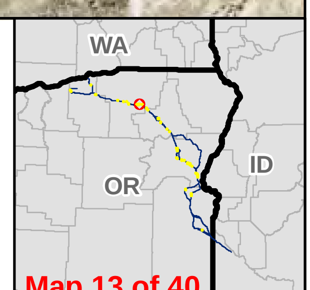
Map 13 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 13 of 40

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Monitoring Position 10

Umatilla County

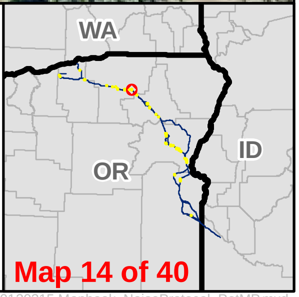
Map 14 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

- Proposed Substation
- Alternative Substation
- Mile
- Tenth Mile
- Proposed Route
- Proposed Rebuild
- Alternative
- Parcel Boundary
- Existing Transmission Line
- City/Town
- State Boundary
- County Boundary
- Interstate
- Highway
- Road
- Acoustic Study Area

0 200 400
Feet



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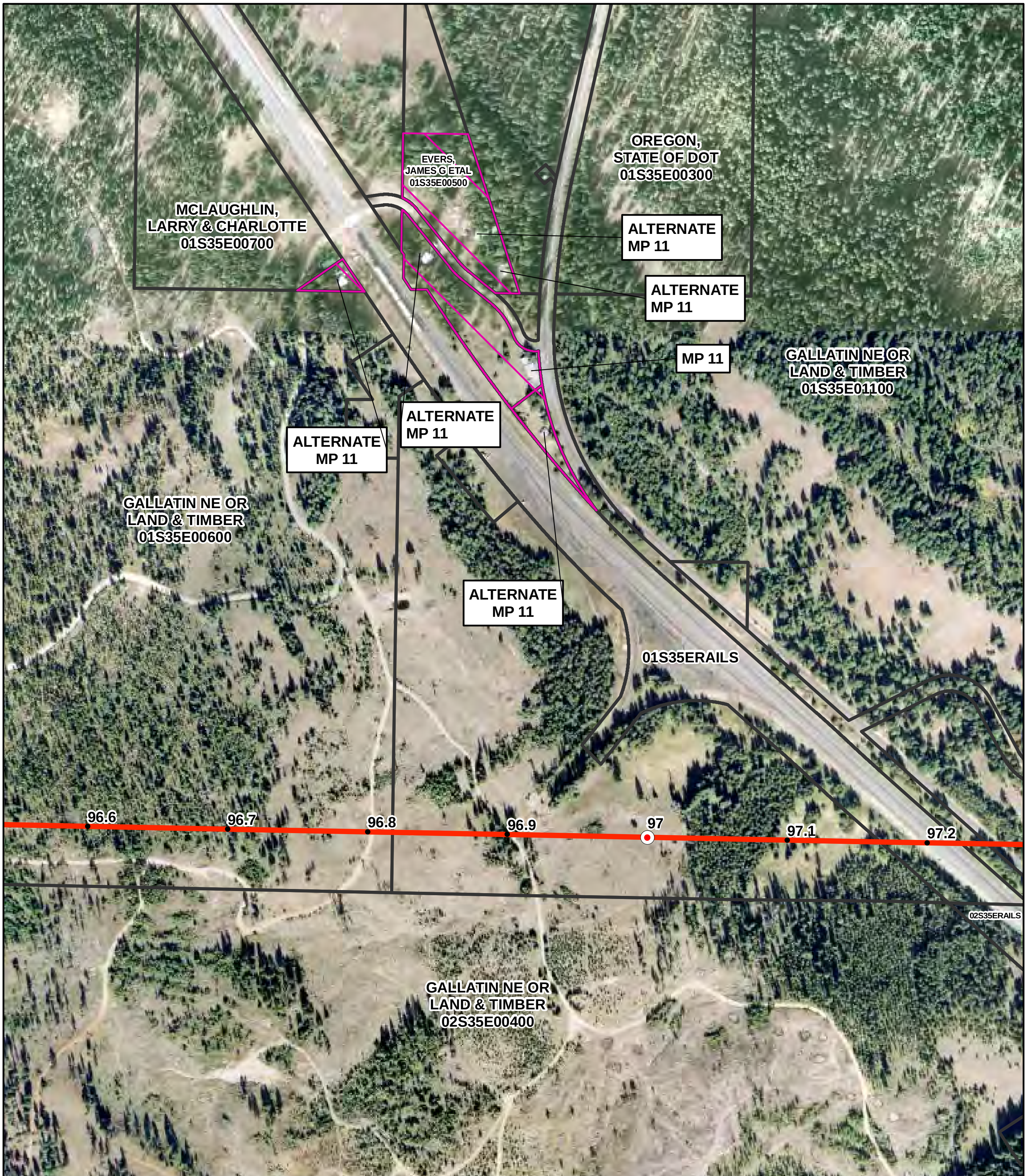


Monitoring Position 11

Union County

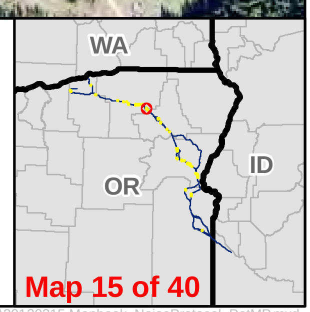
Map 15 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 15 of 40

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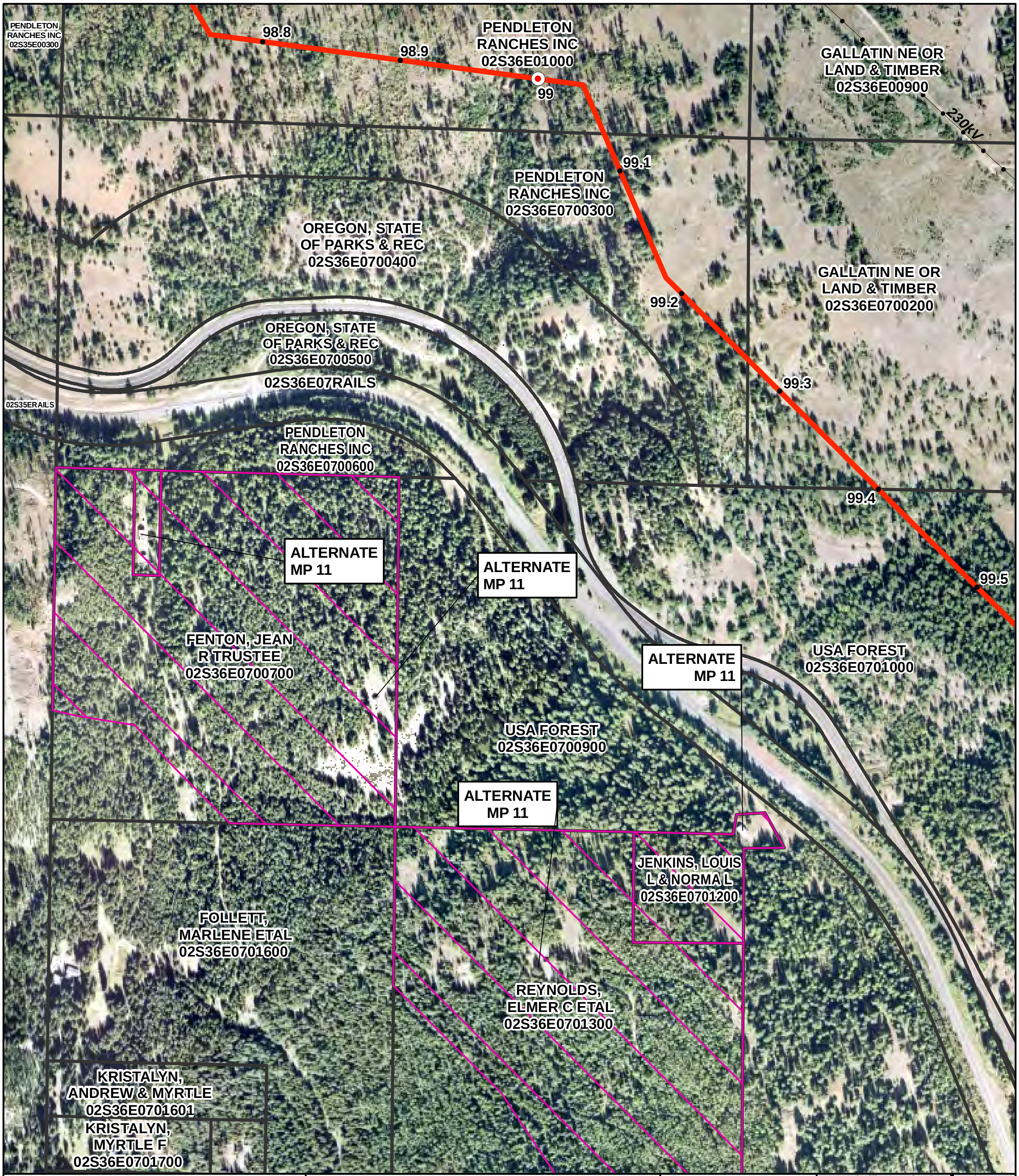


Alternate MP 11
Union County

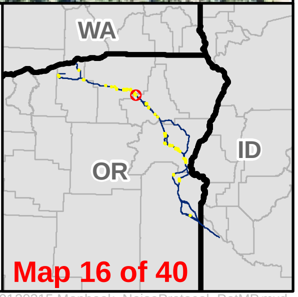
Map 16 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

- Proposed Substation
- Alternative Substation
- Mile
- Tenth Mile
- Proposed Route
- Proposed Rebuild
- Alternative
- Parcel Boundary
- Existing Transmission Line
- City/Town
- State Boundary
- County Boundary
- Interstate
- Highway
- Road
- Acoustic Study Area

0 200 400
Feet



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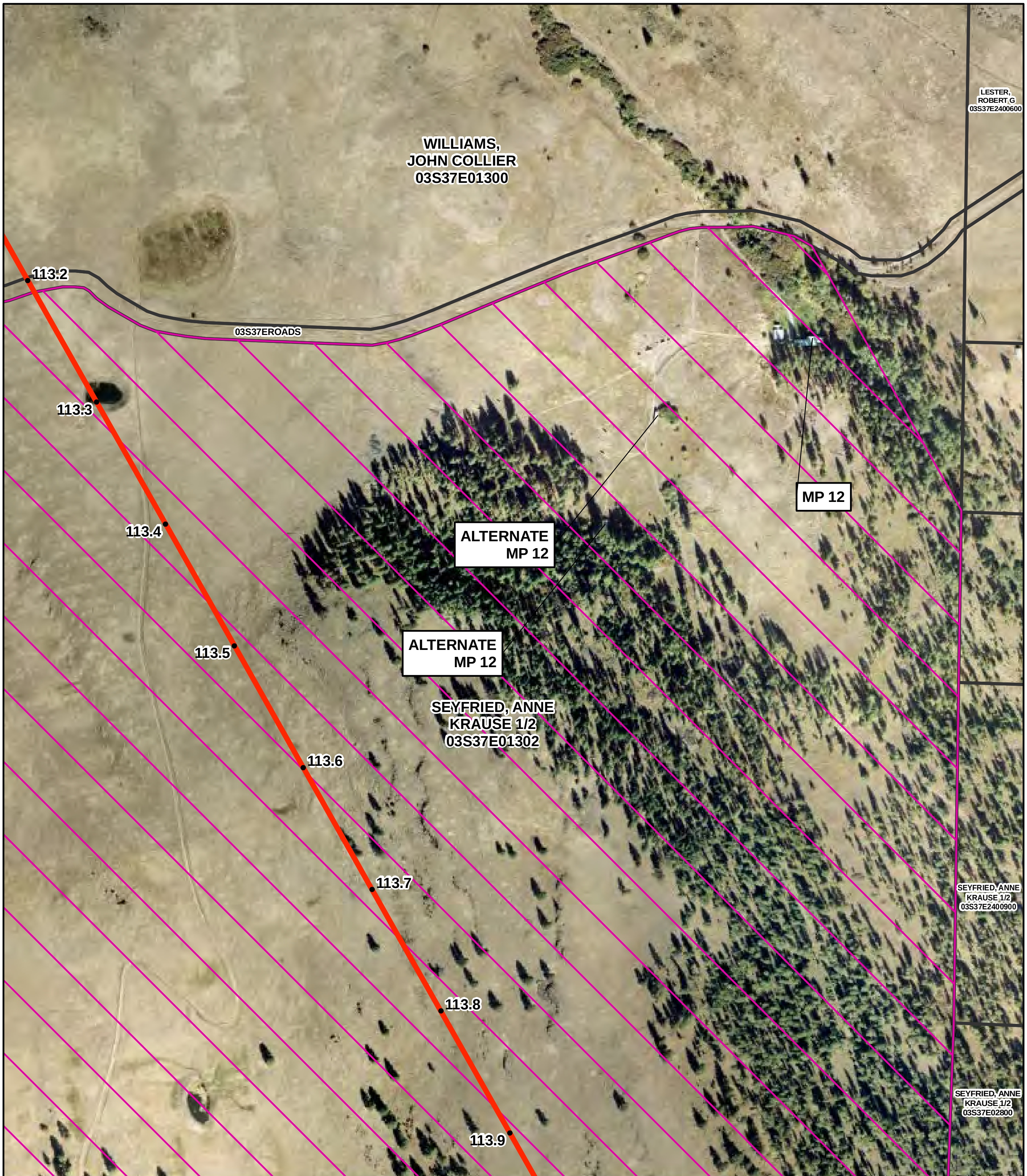


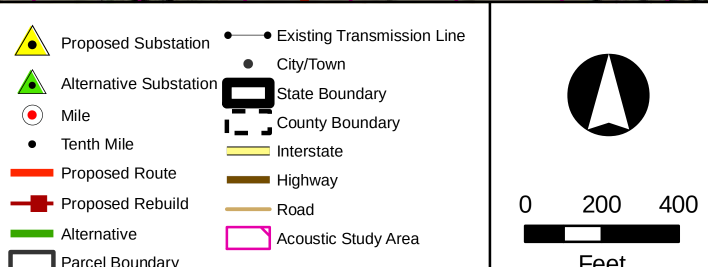
Monitoring Position 12

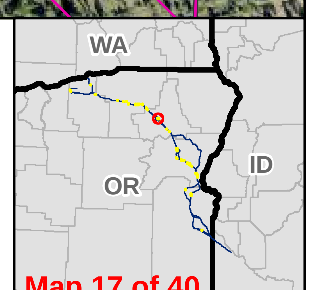
Union County

Map 17 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012





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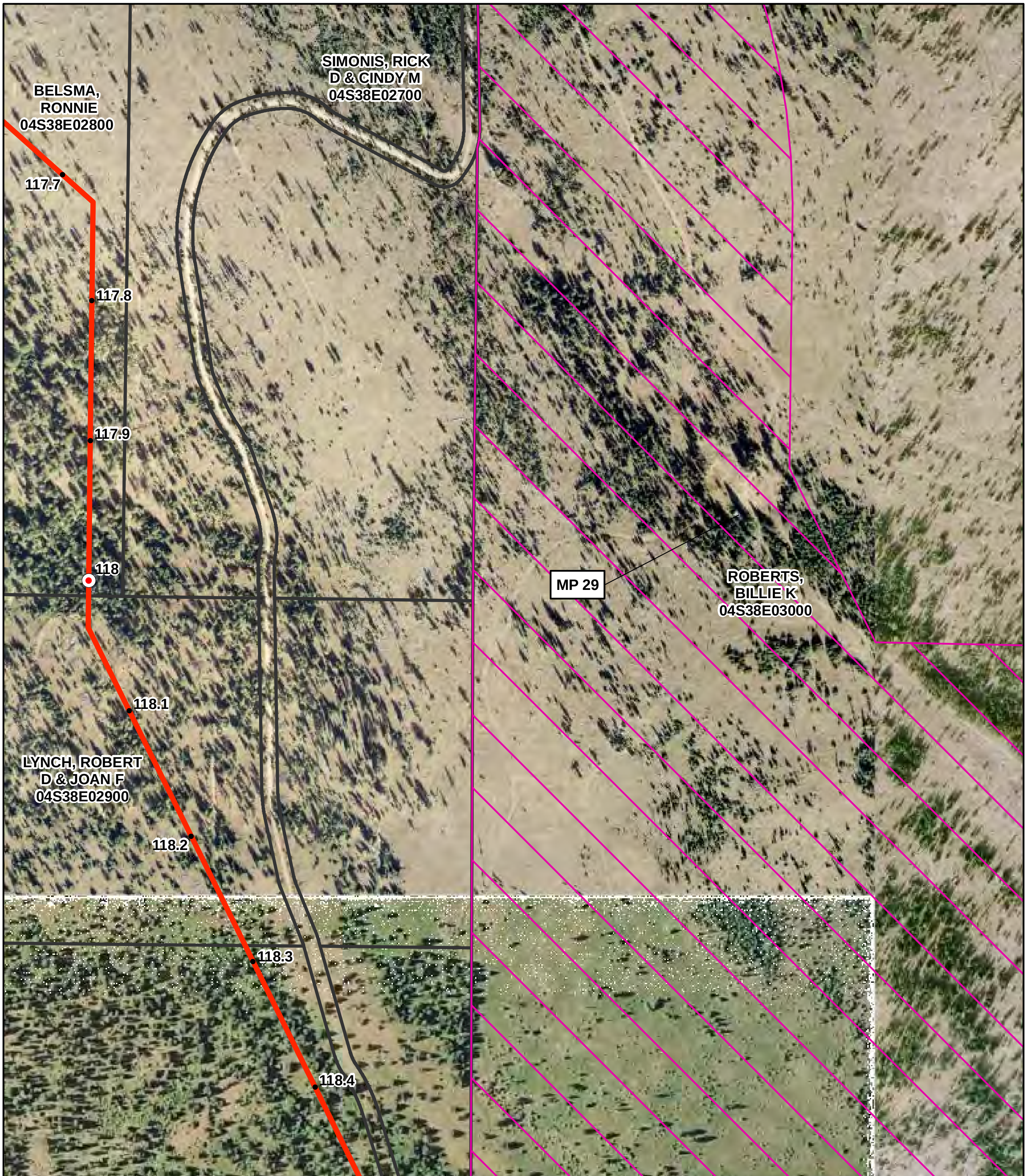

Monitoring Position 29
Union County

Map 18 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

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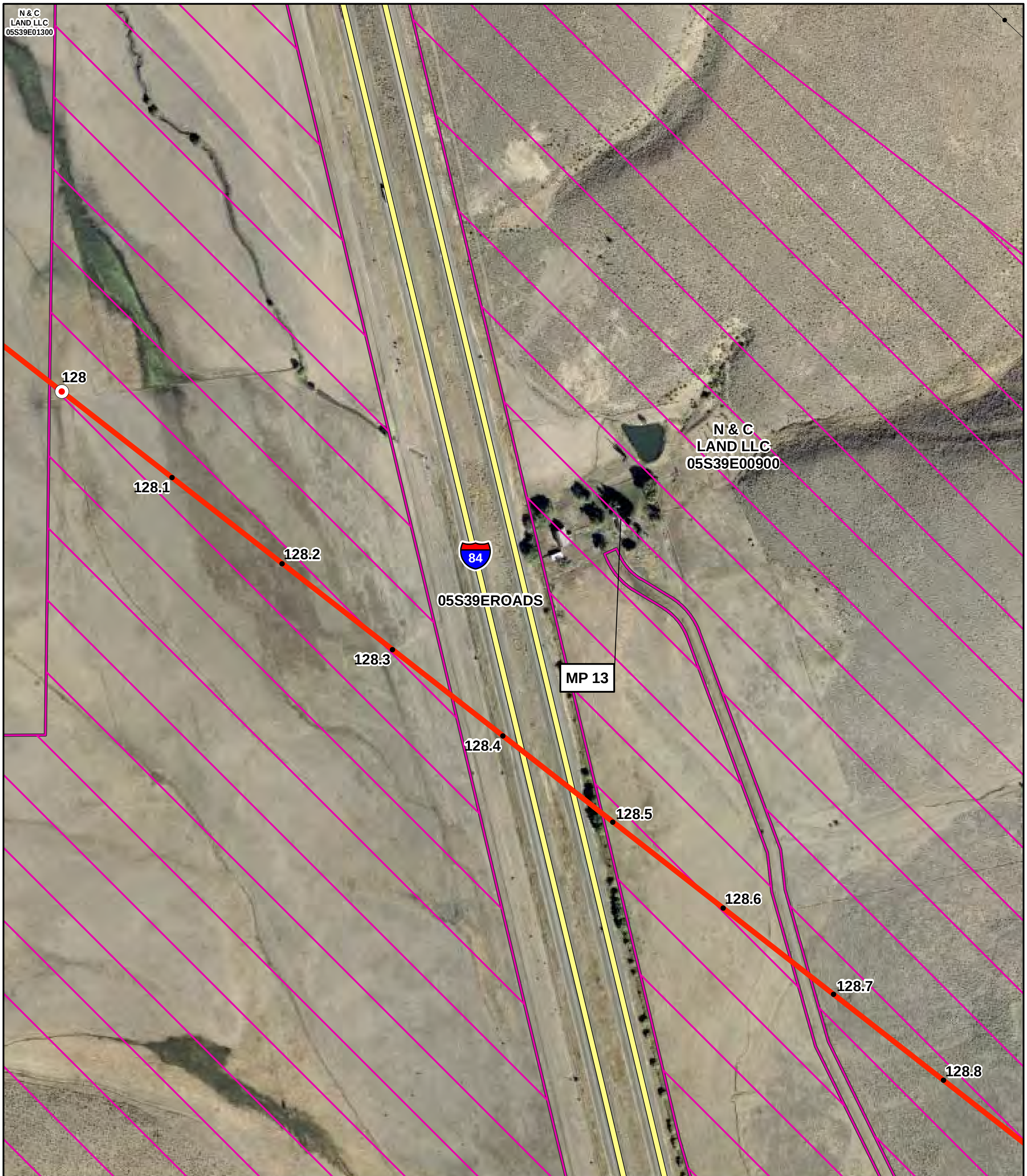


Monitoring Position 13
Union County

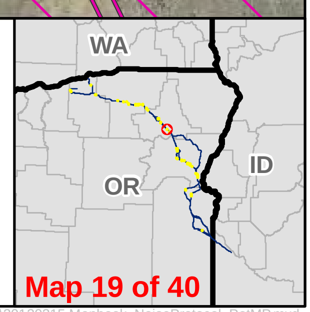
Map 19 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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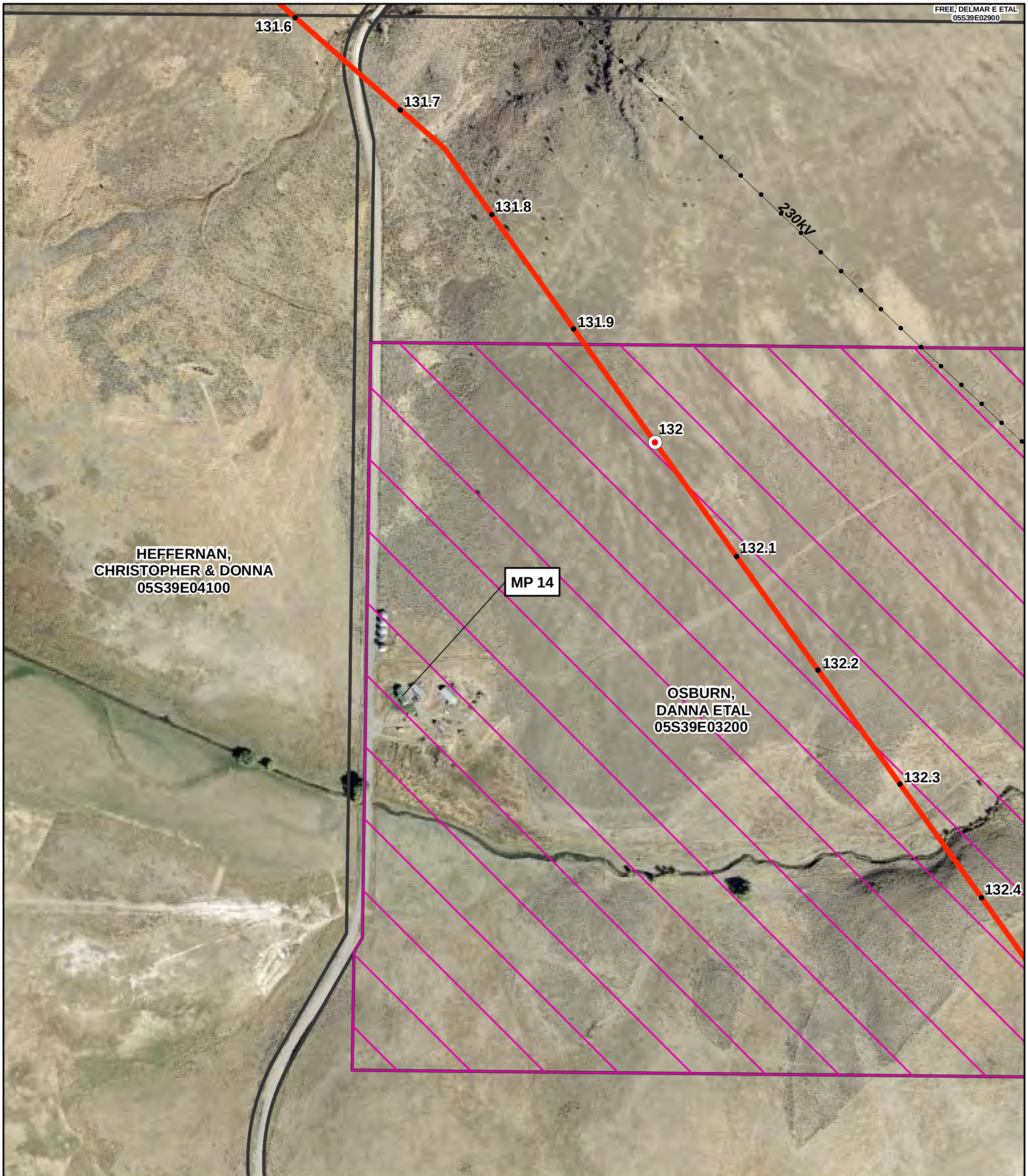


Monitoring Position 14
Union County

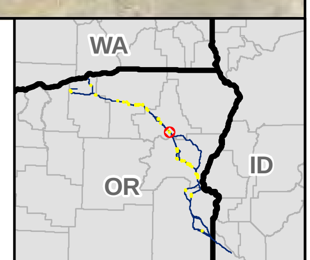
Map 20 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 20 of 40

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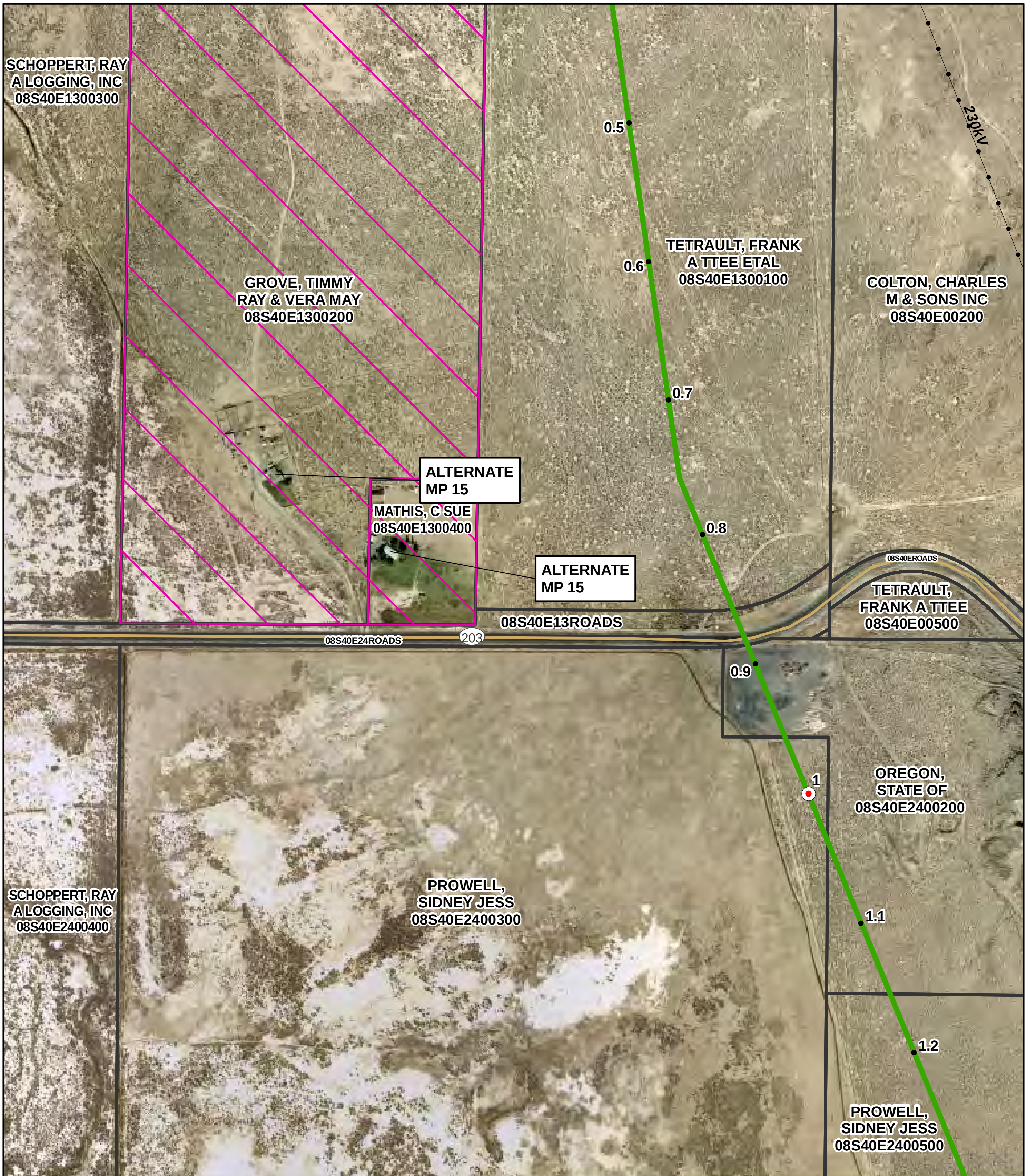


Alternate MP 15
Baker County

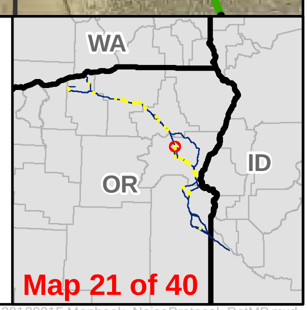
Map 21 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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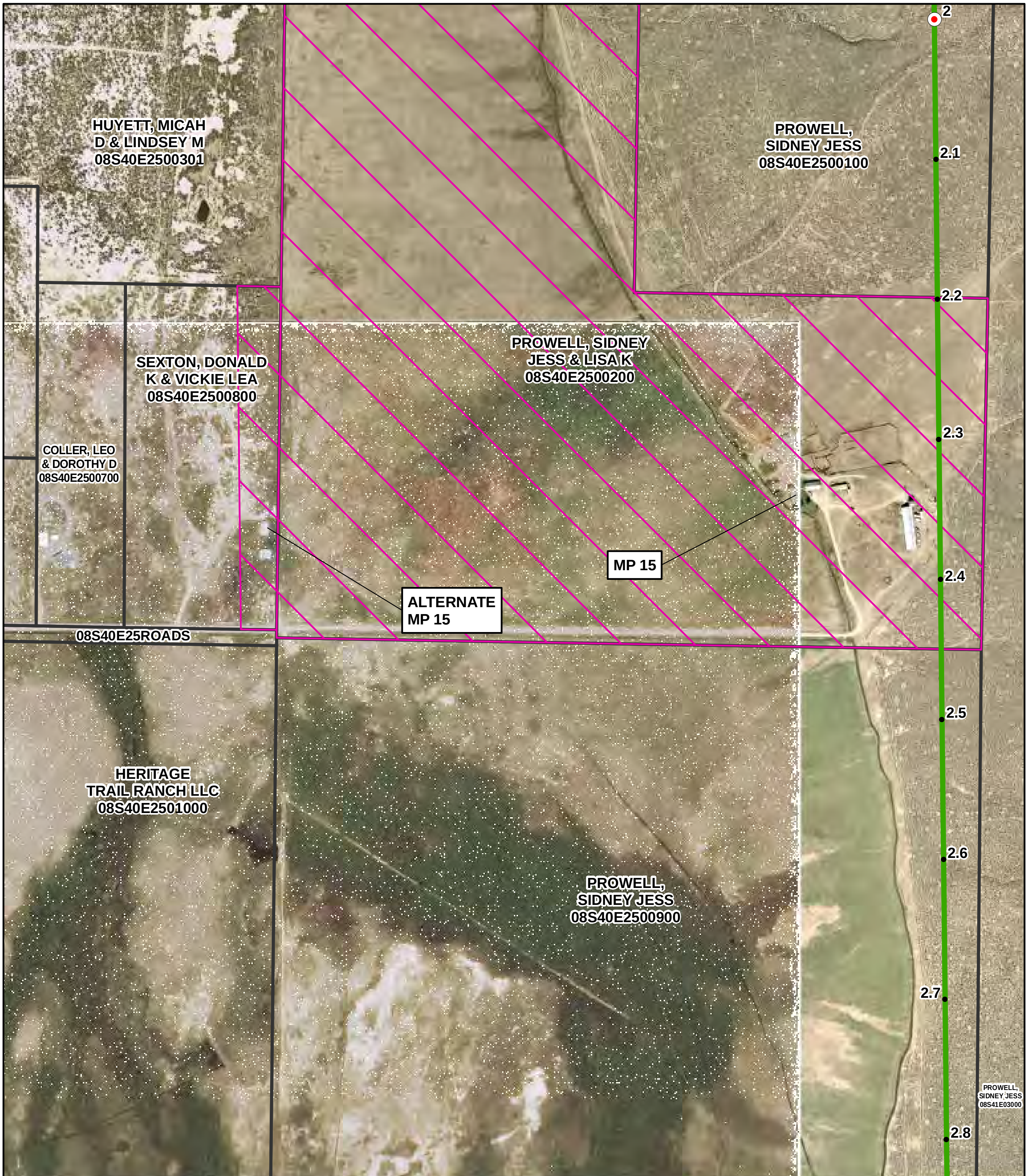


Monitoring Position 15

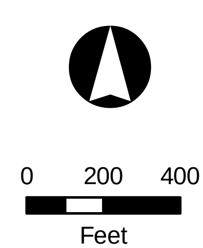
Baker County

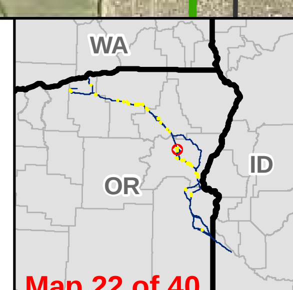
Map 22 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area





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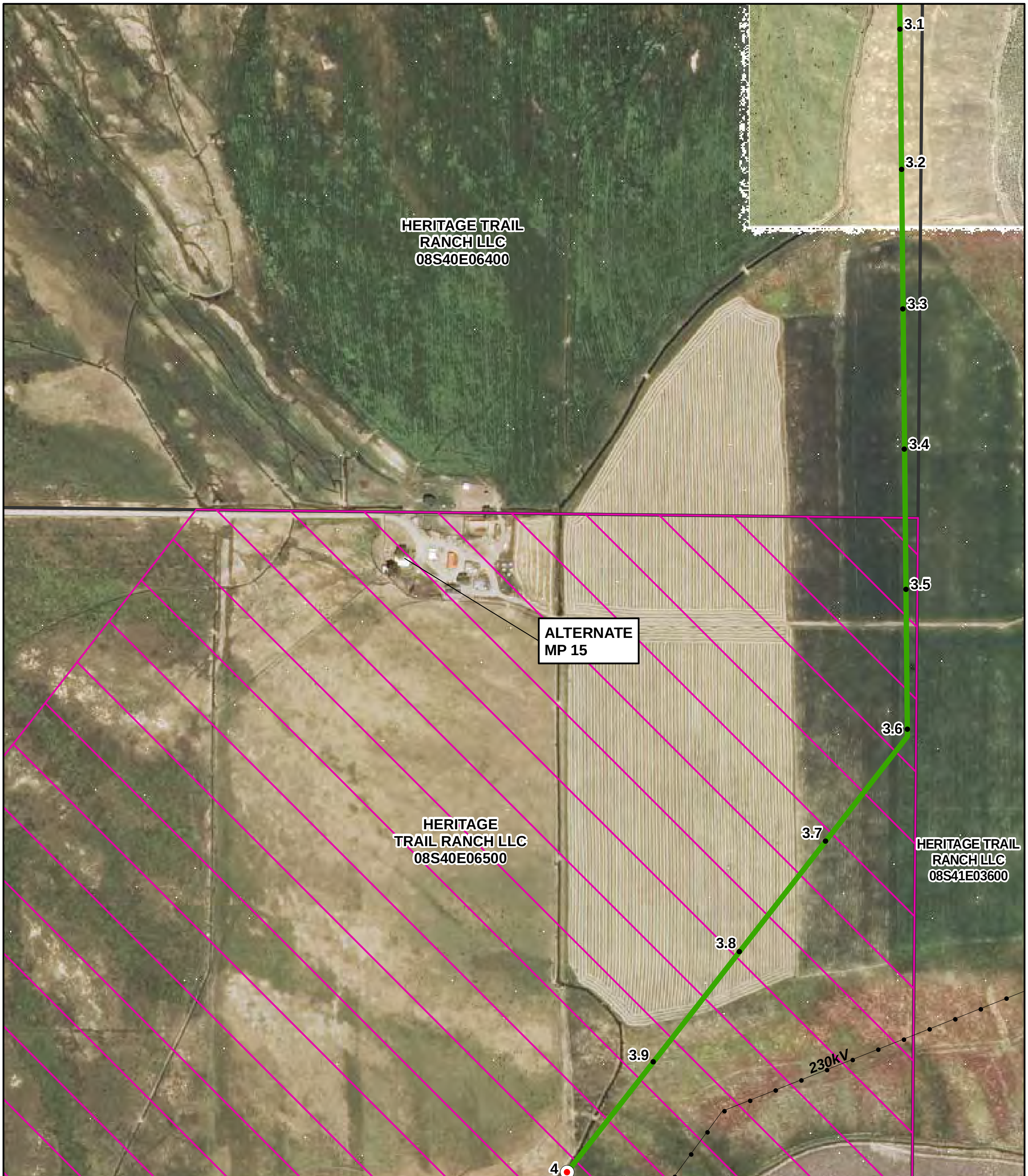


Alternate MP 15

Baker County

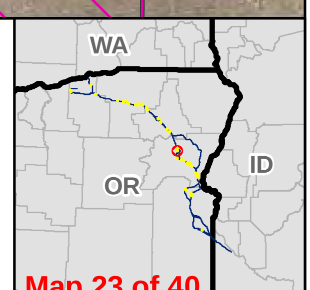
Map 23 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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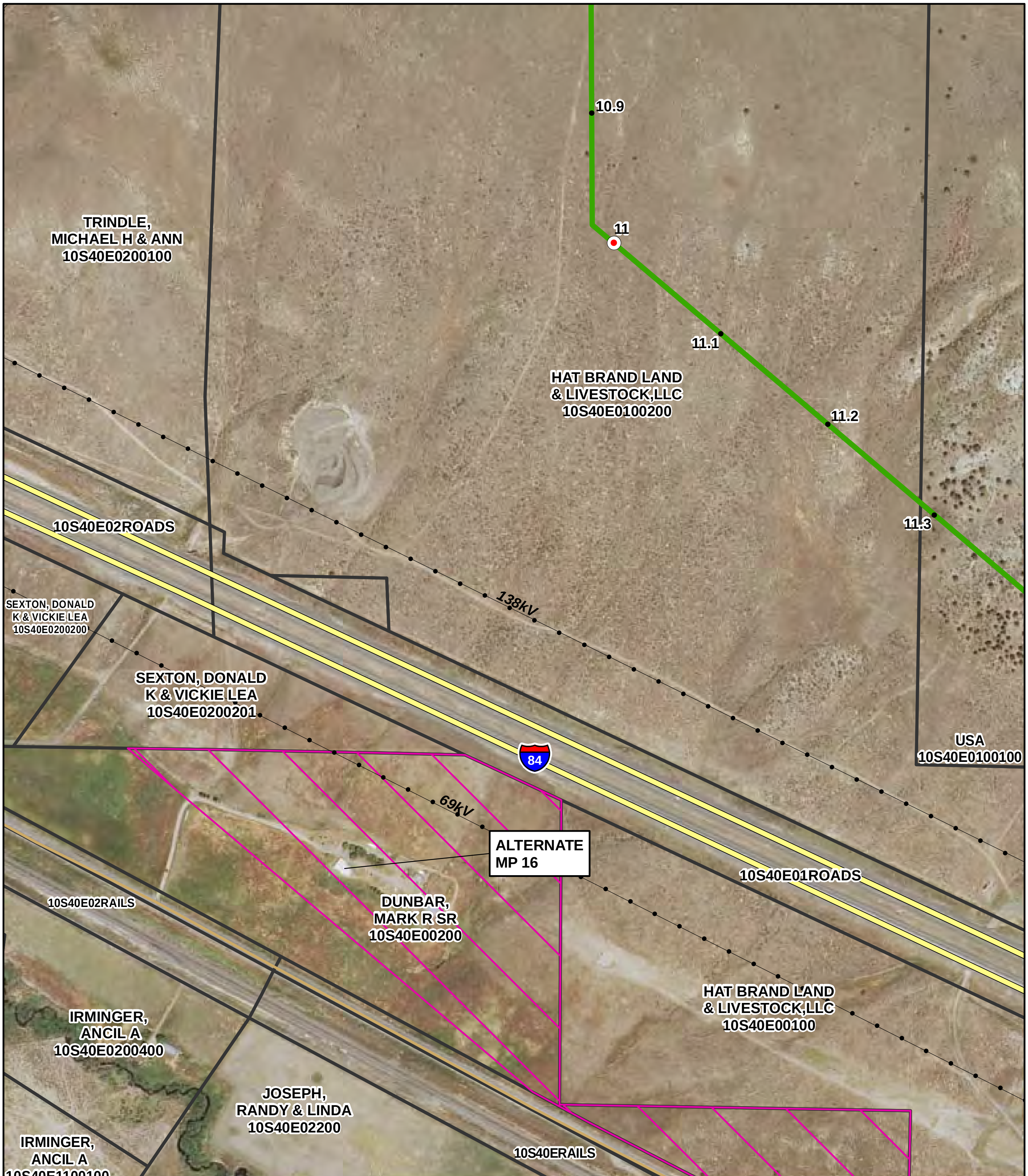


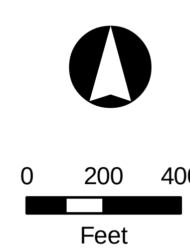
Alternate MP 16
Baker County

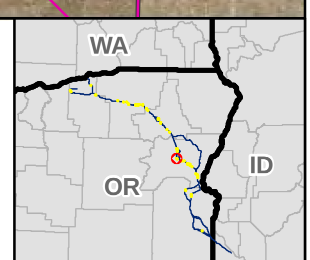
Map 24 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area





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Monitoring Position 16

Baker County

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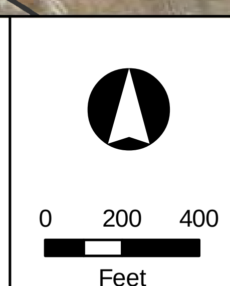
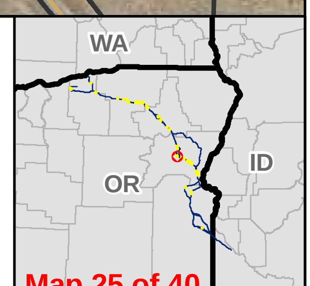
Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area





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Monitoring Position 17
Baker County

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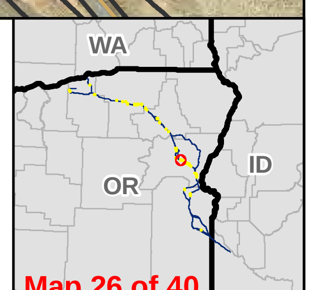
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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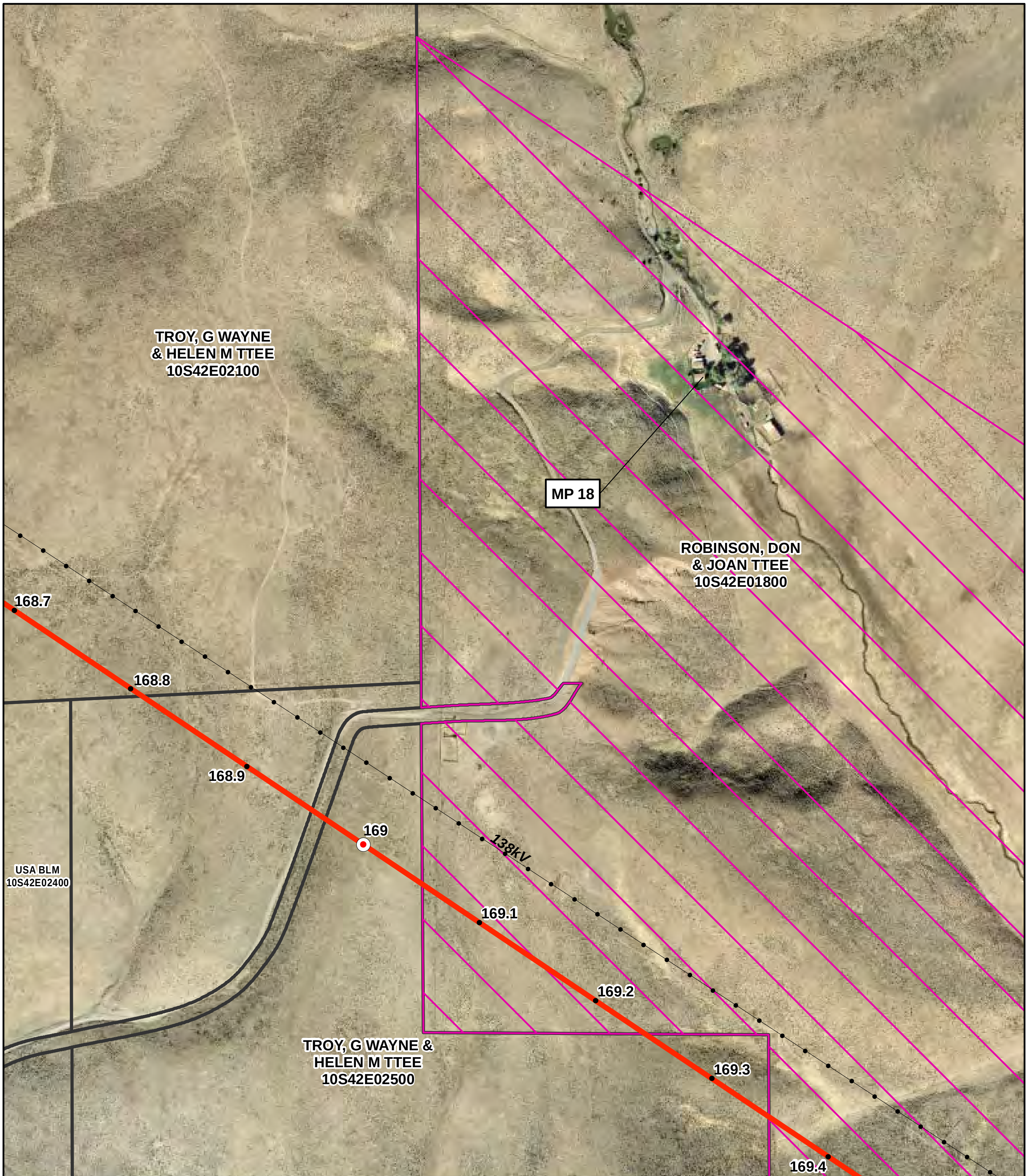


Monitoring Position 18
Baker County

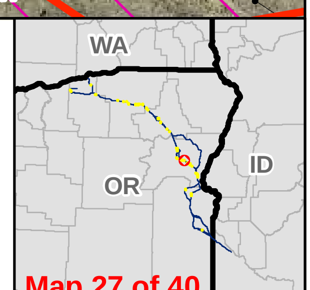
Map 27 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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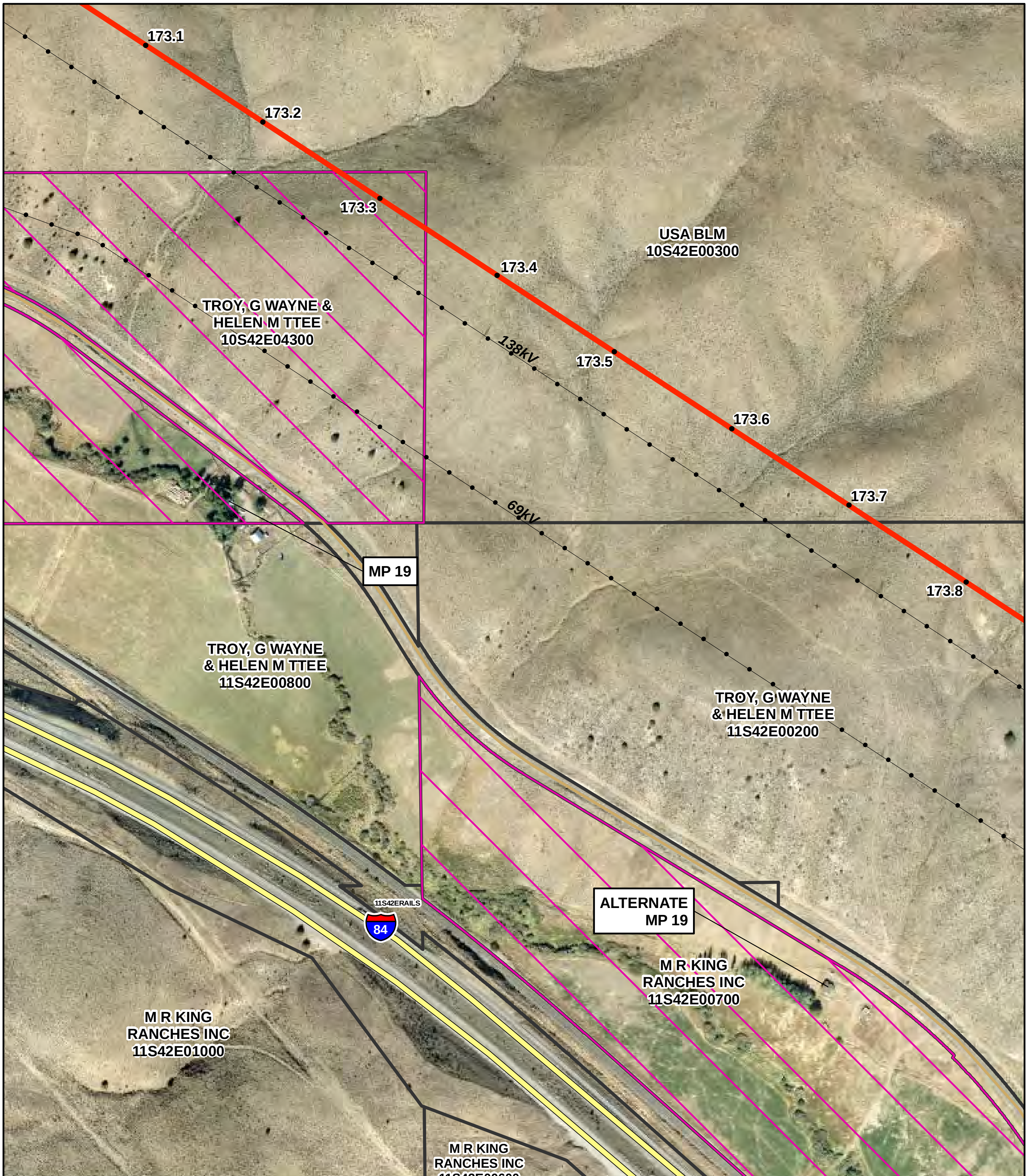

Monitoring Position 19
Baker County

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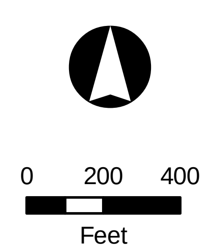
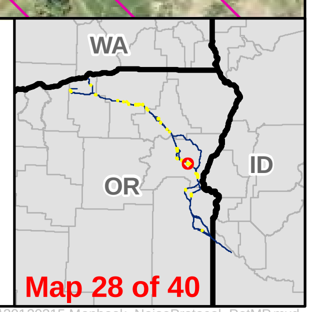
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area





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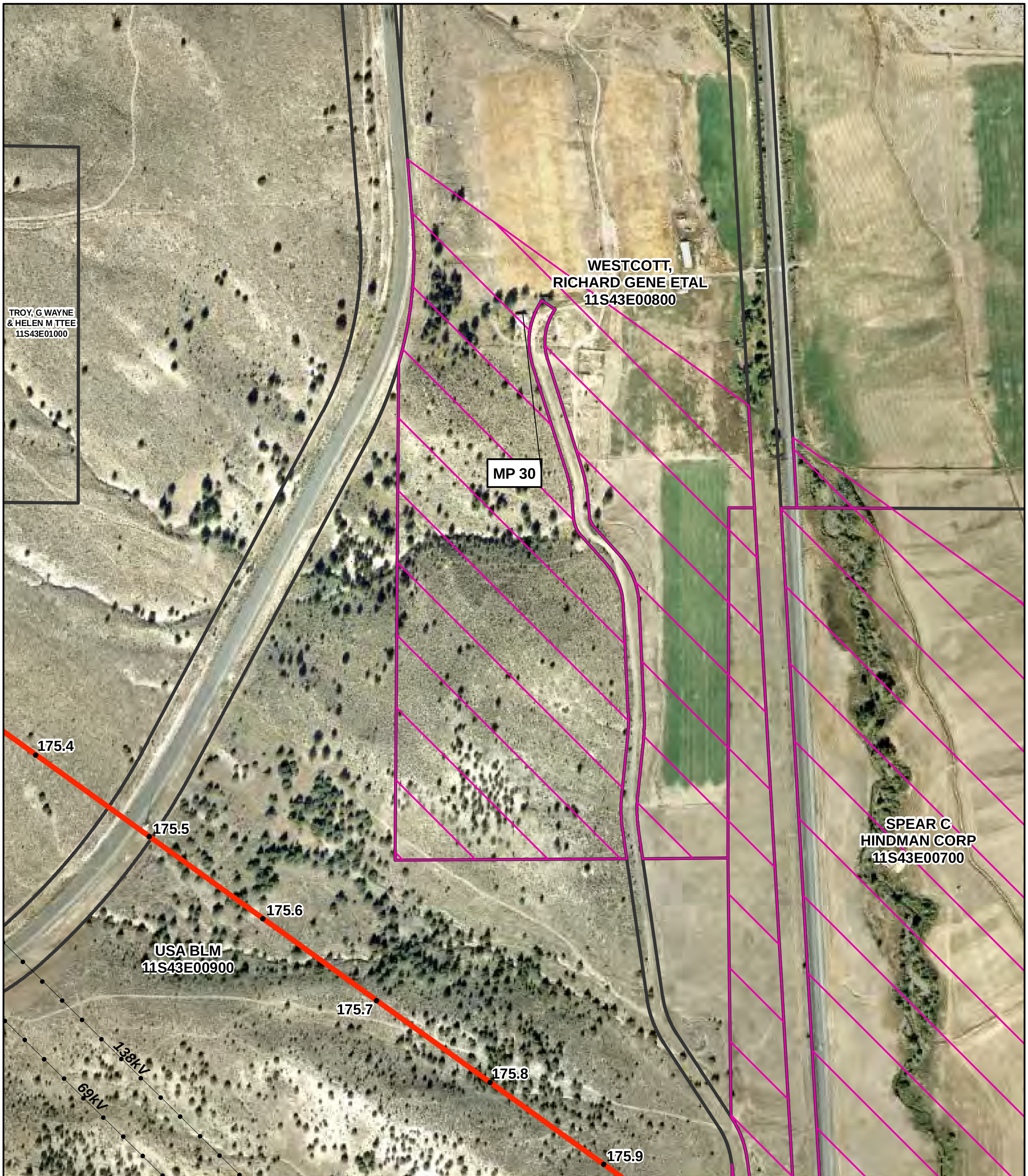

Monitoring Position 30
Baker County

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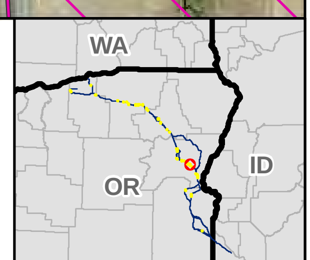
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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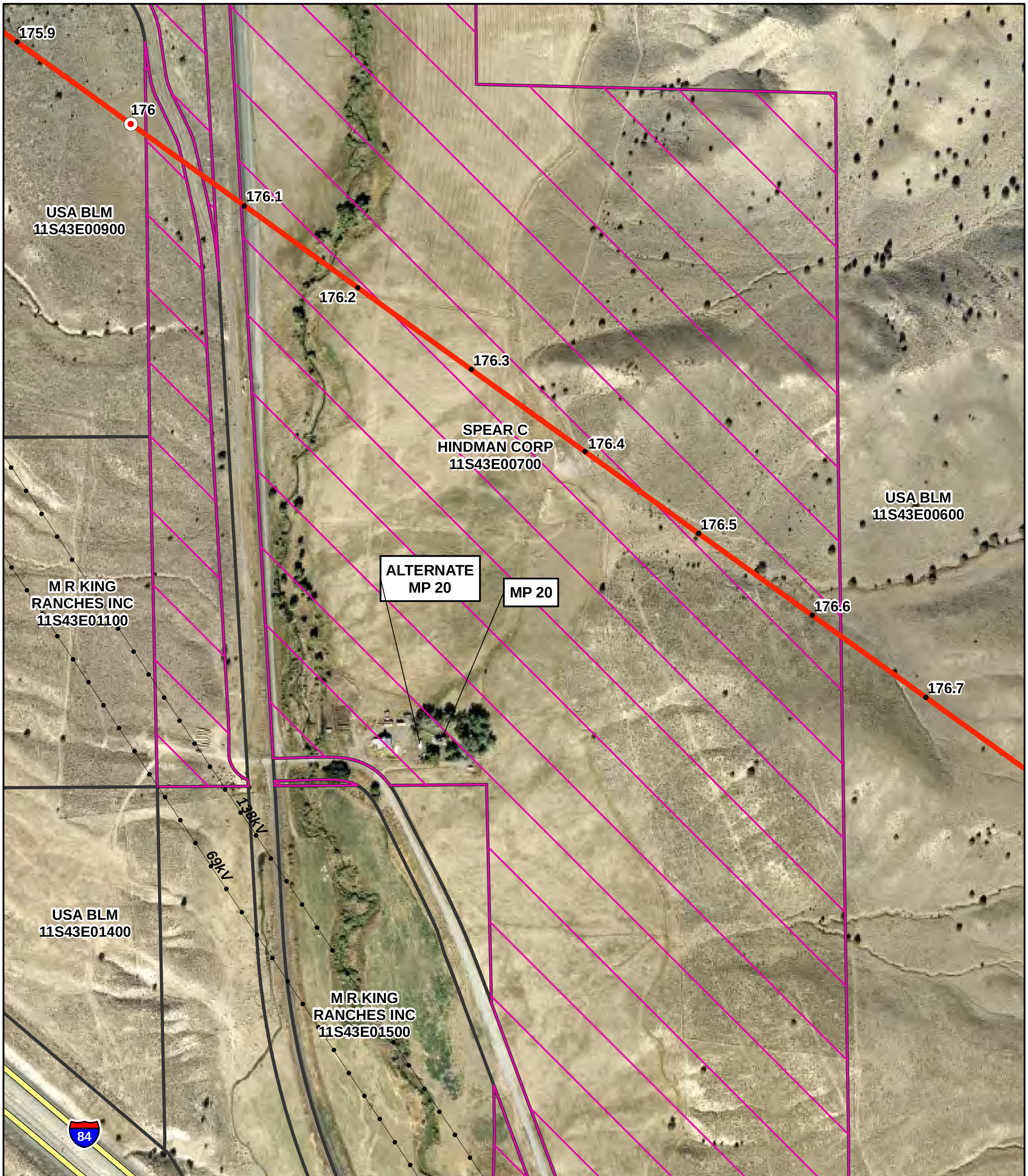

Monitoring Position 20
Baker County

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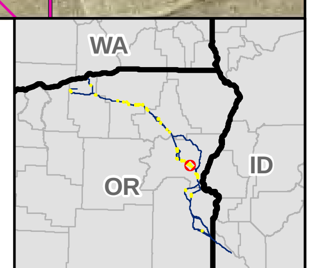
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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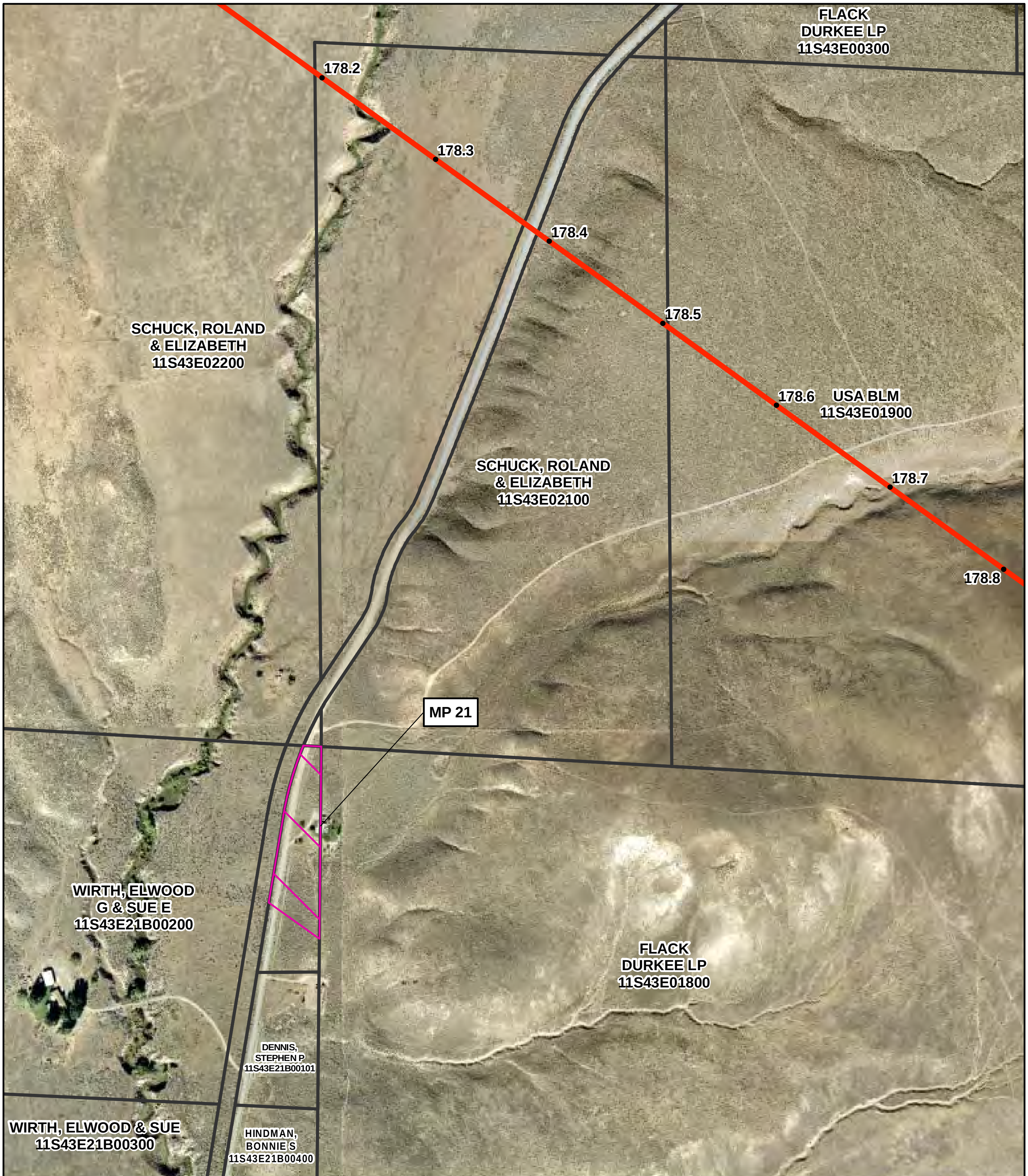

Monitoring Position 21
Baker County

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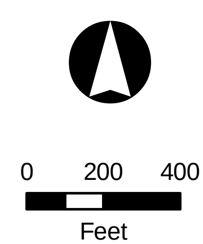
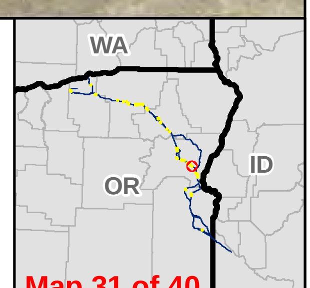
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area





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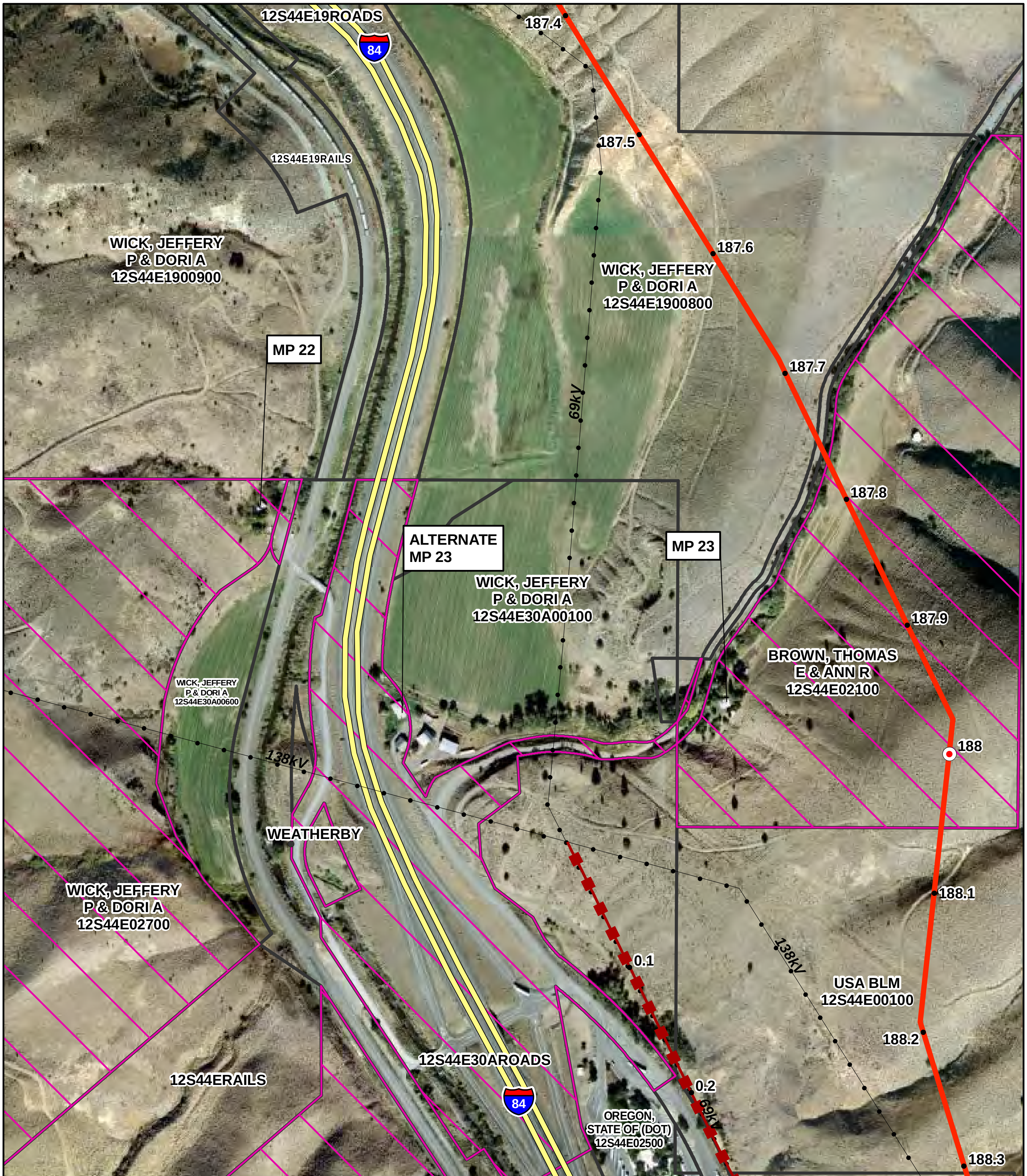

Monitoring Position 22 & 23

Baker County

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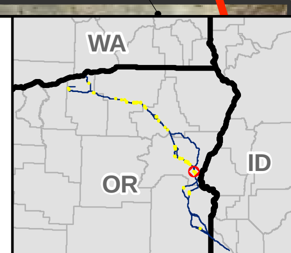
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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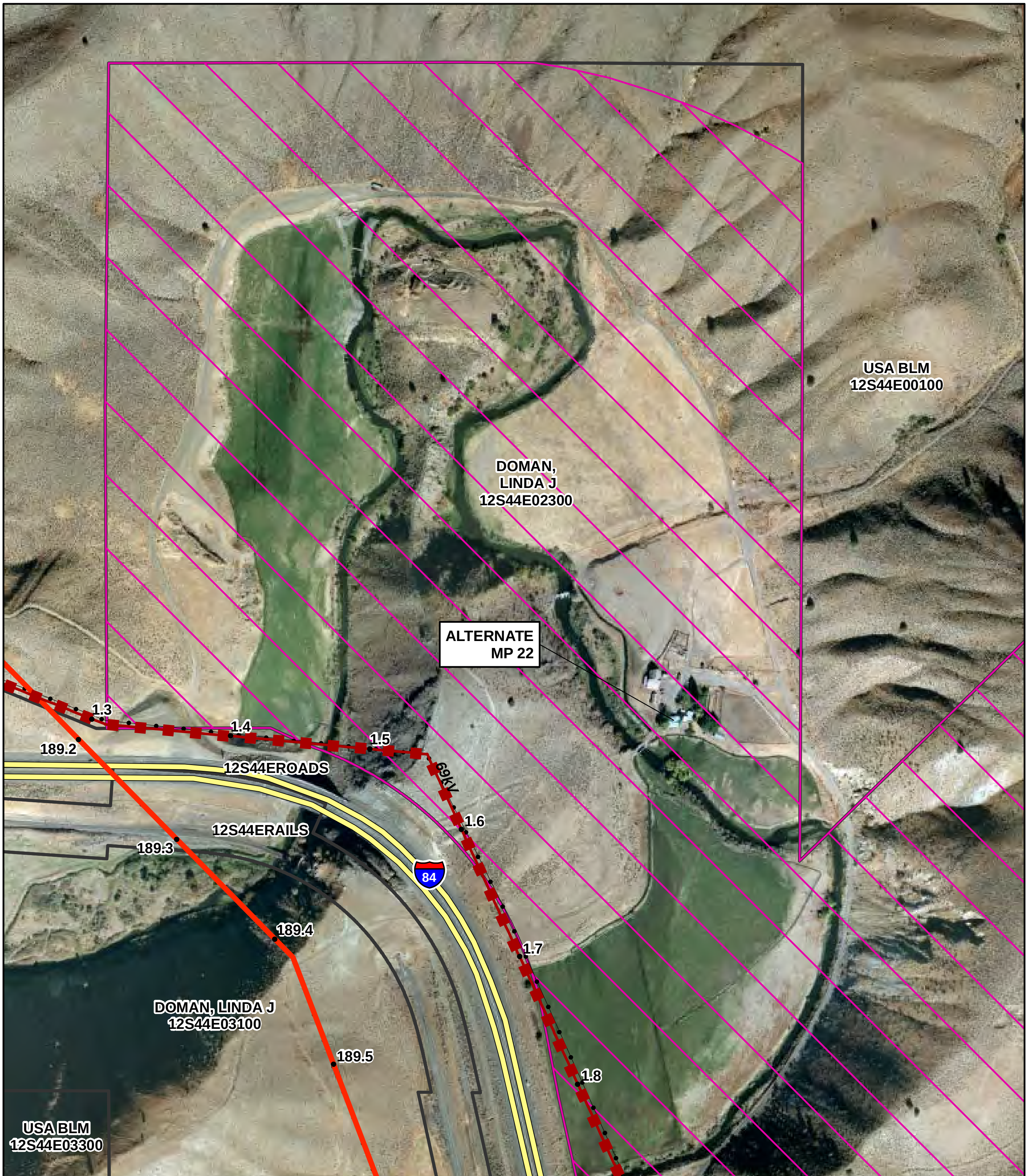

Alternate MP 22
Baker County

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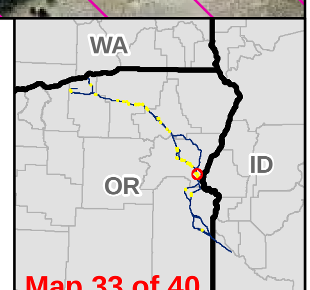
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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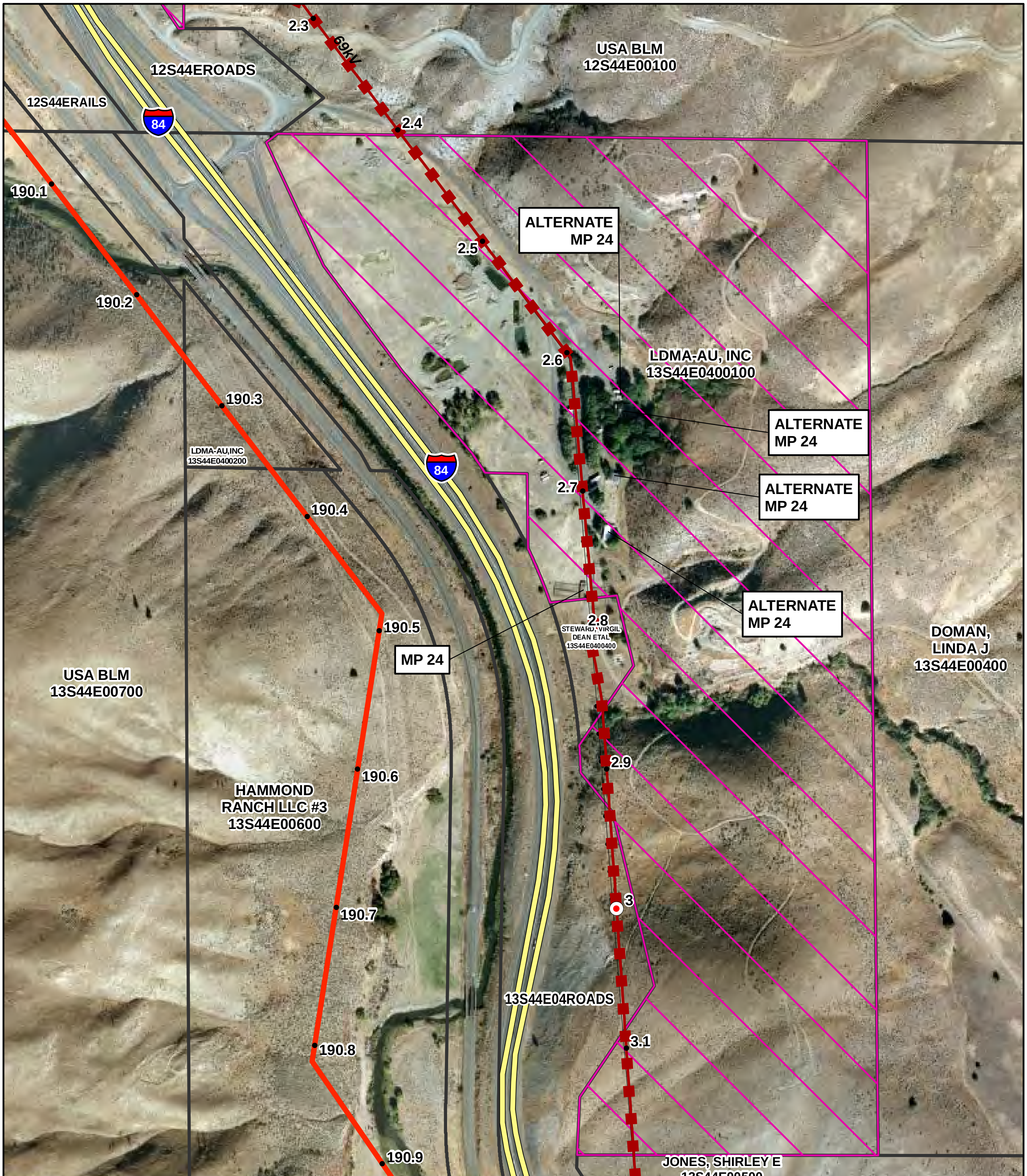

Monitoring Position 24
Baker County

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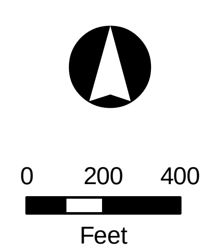
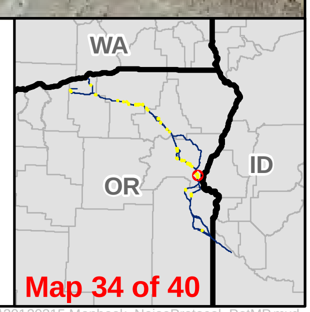
Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area





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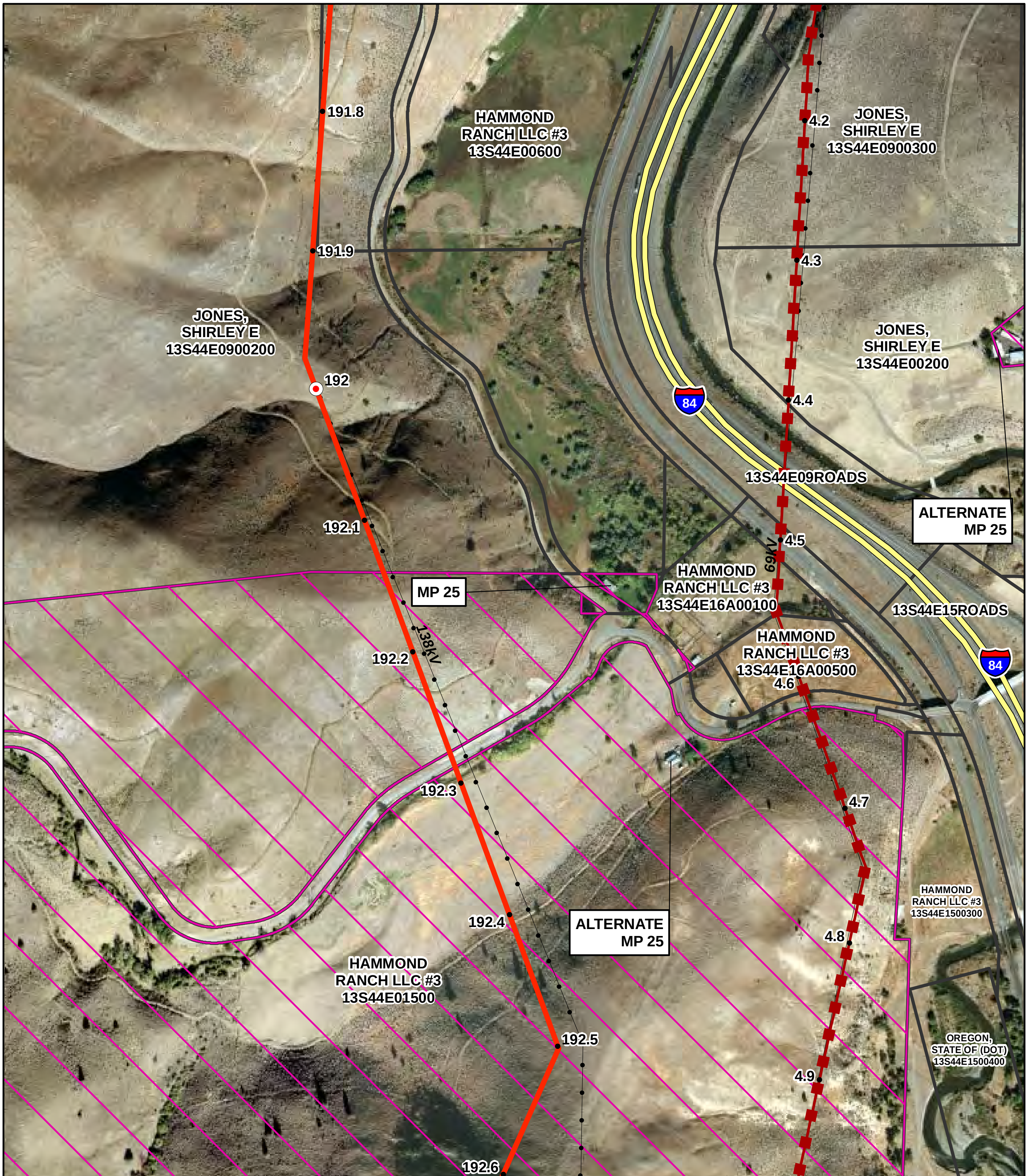

Monitoring Position 25

Baker County

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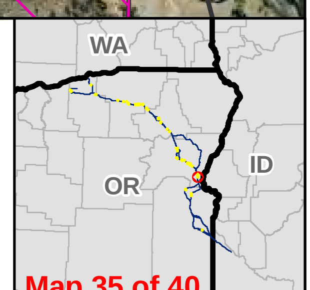
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

- Proposed Substation
- Alternative Substation
- Mile
- Tenth Mile
- Proposed Route
- Proposed Rebuild
- Alternative
- Parcel Boundary
- Existing Transmission Line
- City/Town
- State Boundary
- County Boundary
- Interstate
- Highway
- Road
- Acoustic Study Area

0 200 400

Feet



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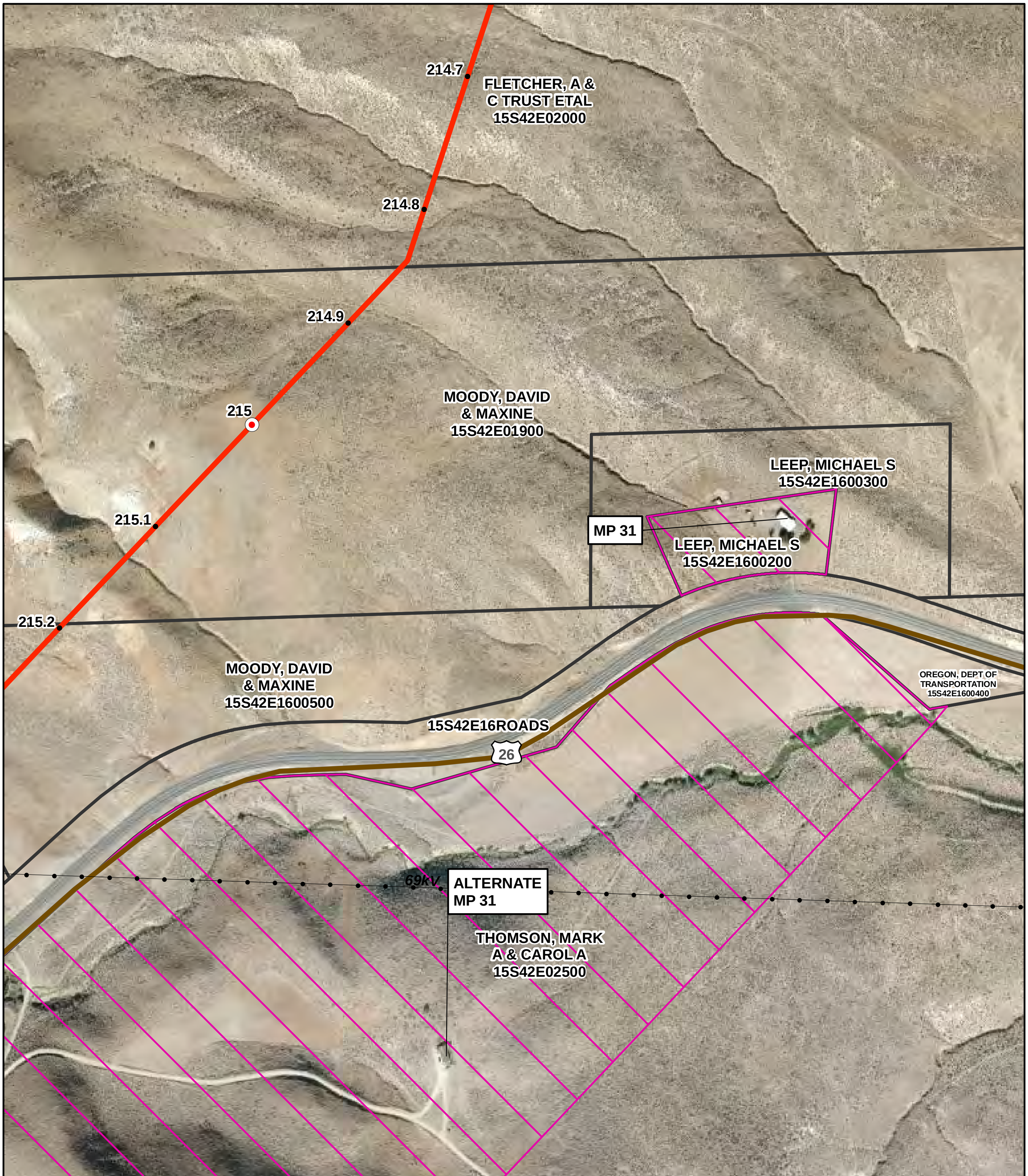

Monitoring Position 31
Malheur County

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Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet

WA
OR
ID
Map 36 of 40

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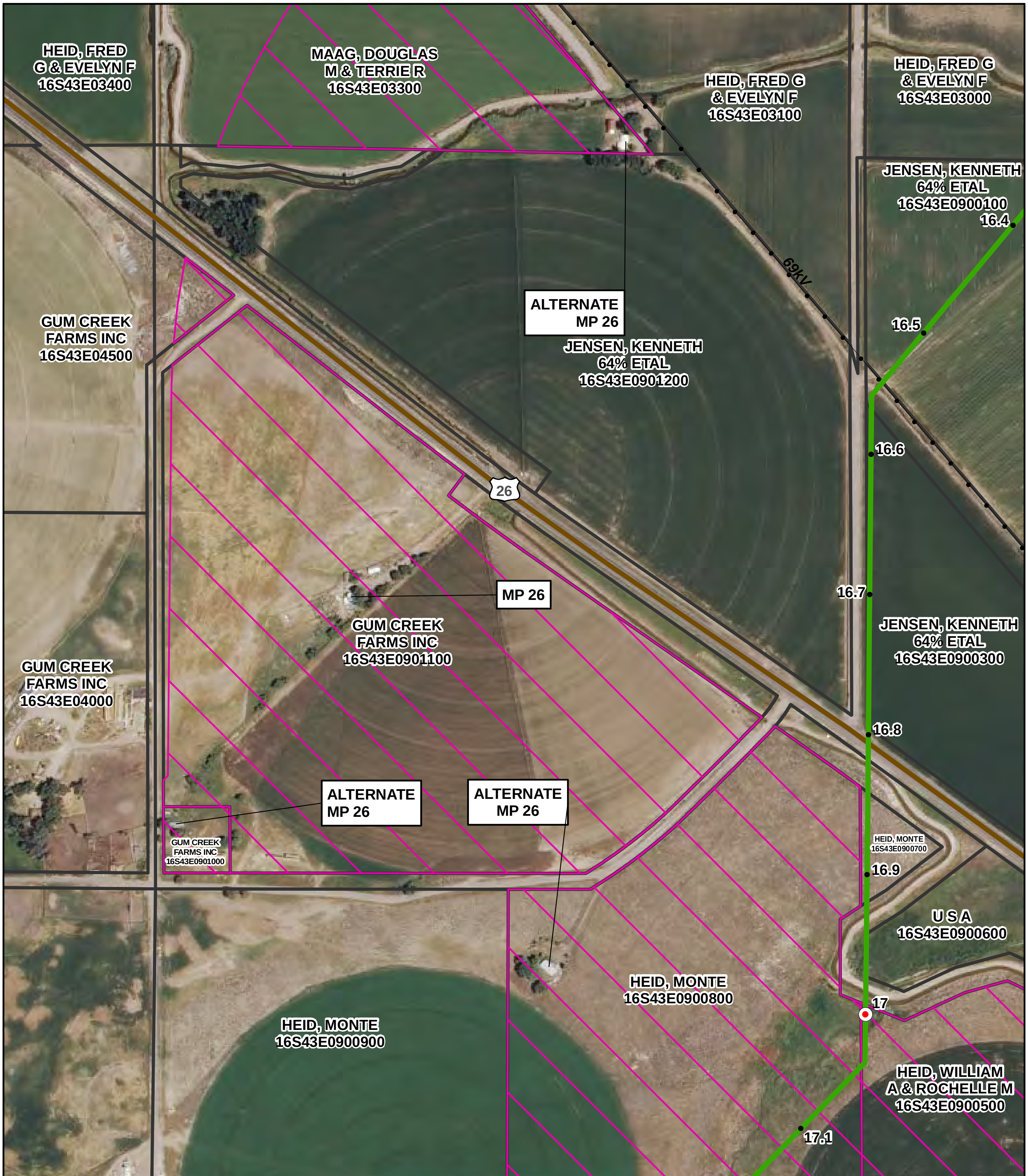

Monitoring Position 26
Malheur County

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Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
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Interstate
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0 200 400
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WA
OR
ID
Map 37 of 40

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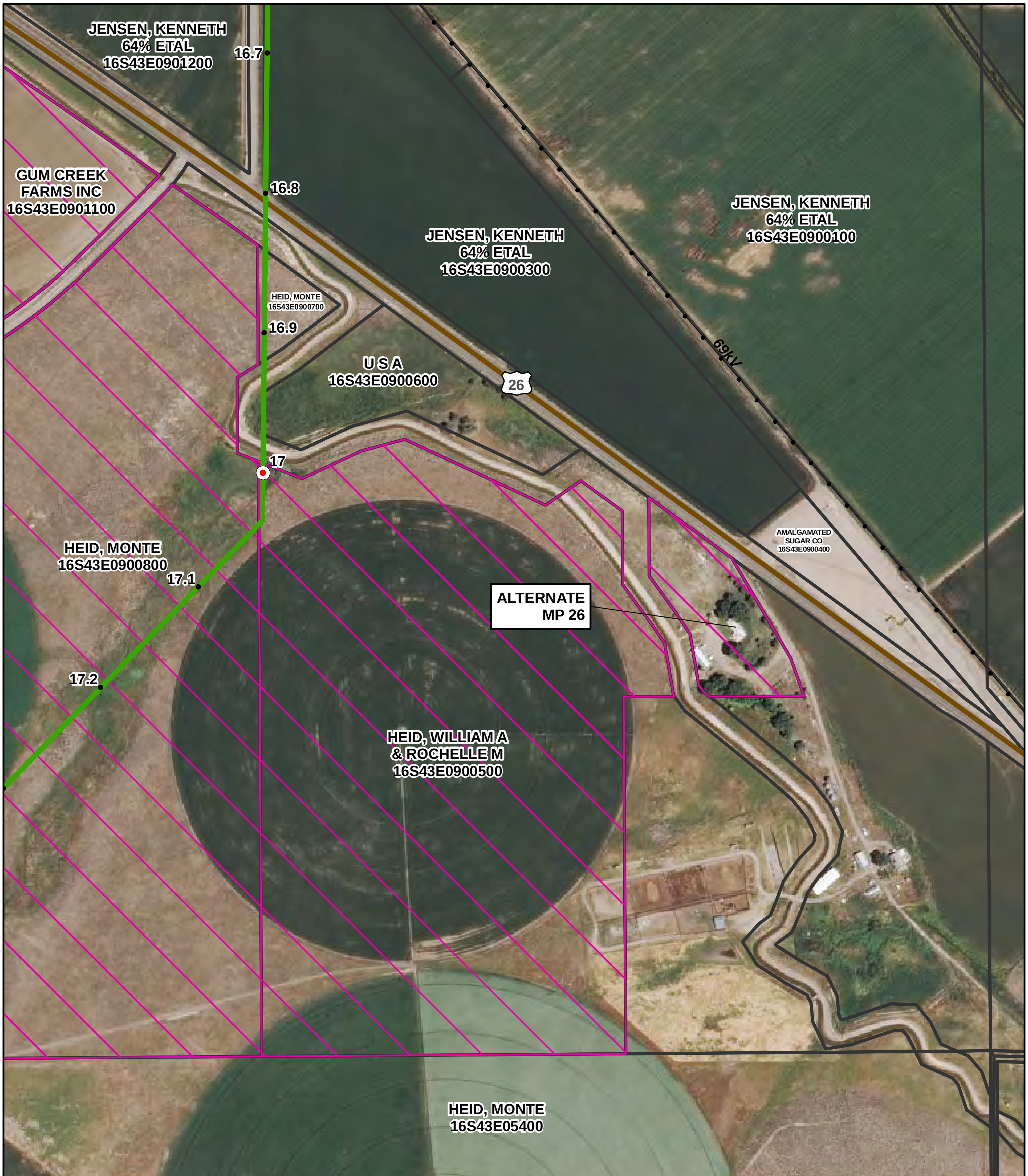


Alternate MP 26
Malheur County

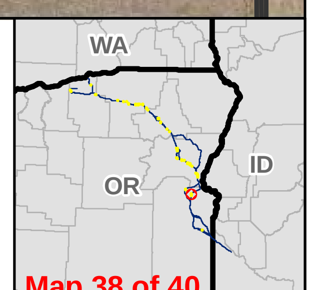
Map 38 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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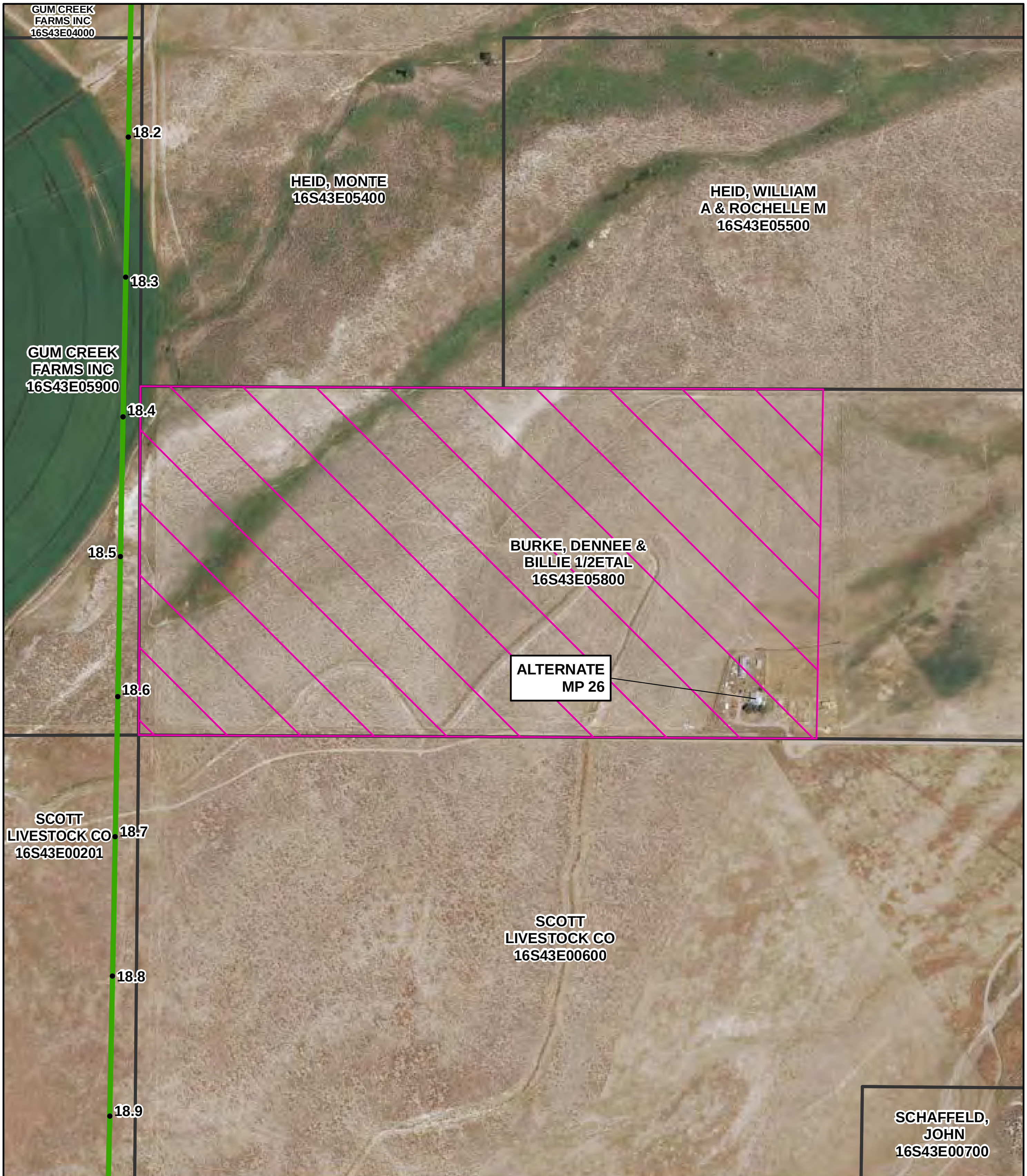

Alternate MP 26
Malheur County

Map 39 of 40

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
Proposed Rebuild
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
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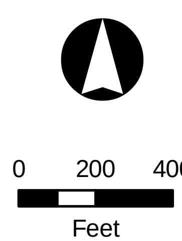

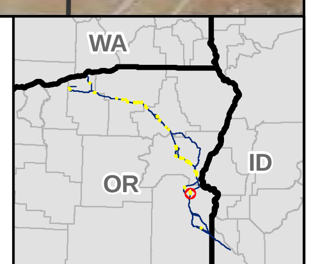

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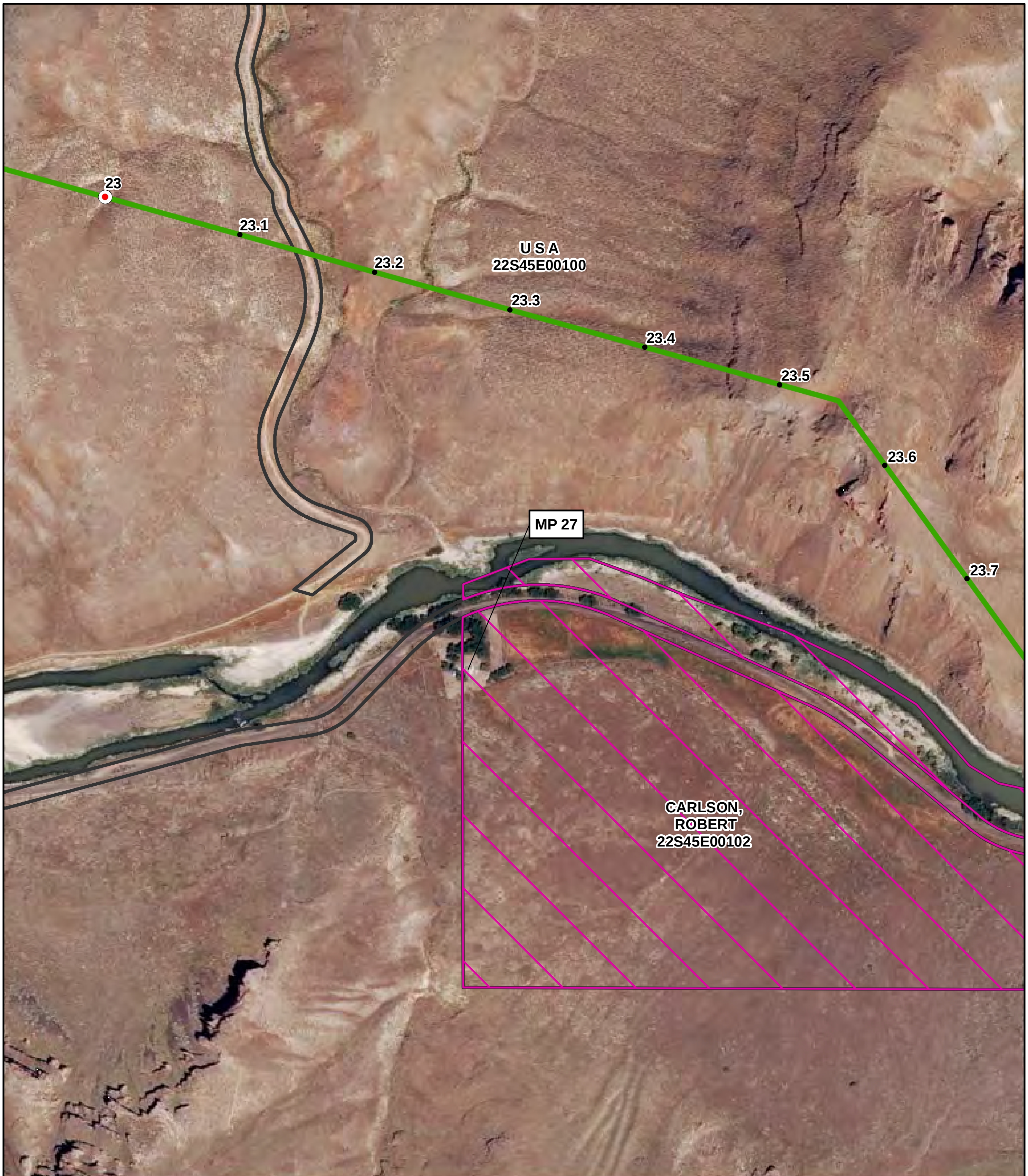

Monitoring Position 27
Malheur County

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Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
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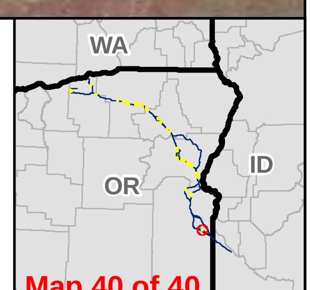
Alternative
Parcel Boundary
Existing Transmission Line
City/Town
State Boundary
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



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ATTACHMENT X-2
BASELINE SOUND SURVEY

Baseline Sound Survey

Prepared by
Tetra Tech
3380 Americana Terrace, Suite 201
Boise, ID 83706

Prepared for
Idaho Power Company
1221 W Idaho Street
Boise, ID 83702

January 2013

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ABBREVIATIONS AND ACRONYMS

ACEC	Area of Critical Environmental Concern
ANSI	American National Standards Institute
ASC	Application for Site Certificate
ATV	all-terrain vehicle
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
BPA	Bonneville Power Administration
CadnaA	Computer-Aided Noise Abatement
CAFE	Corona and Field Effects
dB	decibel
dBA	A-weighted decibel
DOE	U.S. Department of Energy
EFSC or Council	Energy Facility Siting Council
Hz	hertz
IPC	Idaho Power Company
ISO	Organization for International Standardization
kV	kilovolt
L_{eq}	equivalent sound level
L_n	statistical sound level
L_{90}	residual sound level
L_{50}	sound level exceeded 50% of the time
L_{10}	intrusive sound level (sound level exceeded 10% of the time)
MET	meteorological tower station
MP	monitoring position
NF	National Forest
NSR	noise sensitive receptors
NIST	National Institute of Standards and Technology
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODOE	Oregon Department of Energy
Project	Boardman to Hemingway Transmission Line Project
ROW	right-of-way
SR	State Route
SRMA	Scenic Recreation Management Area
UTM	Universal Transverse Mercator
WRCC	Western Regional Climate Center
WTG	wind turbine generator

1.0 INTRODUCTION

1.1 Overview

Idaho Power Company (IPC) is proposing to construct, operate, and maintain the Boardman to Hemingway Transmission Project (Project). The Project would encompass an approximately 305-mile-long electric transmission line Project site corridor between Boardman, Oregon, and the Hemingway Substation located in southwestern Idaho. Approximately 300 miles of the Project site corridor is located in the state of Oregon and approximately 25 miles is located in Idaho. IPC is pursuing a site certificate from the Oregon Energy Facility Siting Council (EFSC) for the portion of the Project located in Oregon. The Oregon Department of Energy (ODOE) requires that the proposed Project meet the Oregon Administrative Rule (OAR) standards. This Baseline Sound Survey is a supporting document for Exhibit X that provides information about existing ambient noise levels at noise sensitive receptors (NSRs) located near the Project (within approximately 0.5 mile). The results of this Baseline Sound Survey are used to demonstrate compliance with the Oregon Department of Environmental Quality (ODEQ) noise control standards in OAR 340-35-0035. OAR Chapter 345, Division 22 does not provide an approval standard specific to Exhibit X. The state of Idaho does not have an equivalent site certificate process as Oregon.

OAR Chapter 340, Division 35 prescribes noise regulations applicable throughout the state of Oregon in Section 340-035-0035, “Noise Control Regulations for Industry and Commerce.” The noise rule provides guidance for a new noise source if it will be located on a previously unused industrial or commercial site. IPC presumes that the transmission line will constitute an industrial or commercial use located on predominantly unused industrial/commercial sites. Therefore, to demonstrate compliance with ODEQ noise control standards, the Project must not increase the existing ambient noise level at NSRs (i.e., residences) by more than 10 A-weighted decibels (dBA) in any one hour, or exceed the levels specified in OAR 340-035-0035. Compliance is determined at the appropriate measurement points as specified in OAR 340-035-0035(3)(b). In order to determine the existing ambient noise level at NSRs, a Baseline Sound Survey was required.

Per requirements of the Project Order, a draft noise monitoring protocol was provided for ODOE review and approval prior to conducting any fieldwork. The protocol included a description of the sound survey methodology and assumptions, areas to be surveyed, and measurement parameters. The Project consulted with ODOE and received approval on the sound survey methodology, including the proposed monitoring positions (MPs; Figure 1-1). This report describes the survey instrumentation, methodology, and data analysis results for the proposed Project.

1.2 Analysis Area

As provided in the Project Order, the analysis area for Exhibit X is the Site Boundary and 0.5 mile from the Site Boundary. The Site Boundary is defined in OAR 345-001-0010 as “…the perimeter of the site of a proposed energy facility, its related or supporting facilities, all temporary laydown and staging areas, and all road and transmission line corridors proposed by the applicant.” The Site Boundary of the Project is further described in Exhibits B and C.

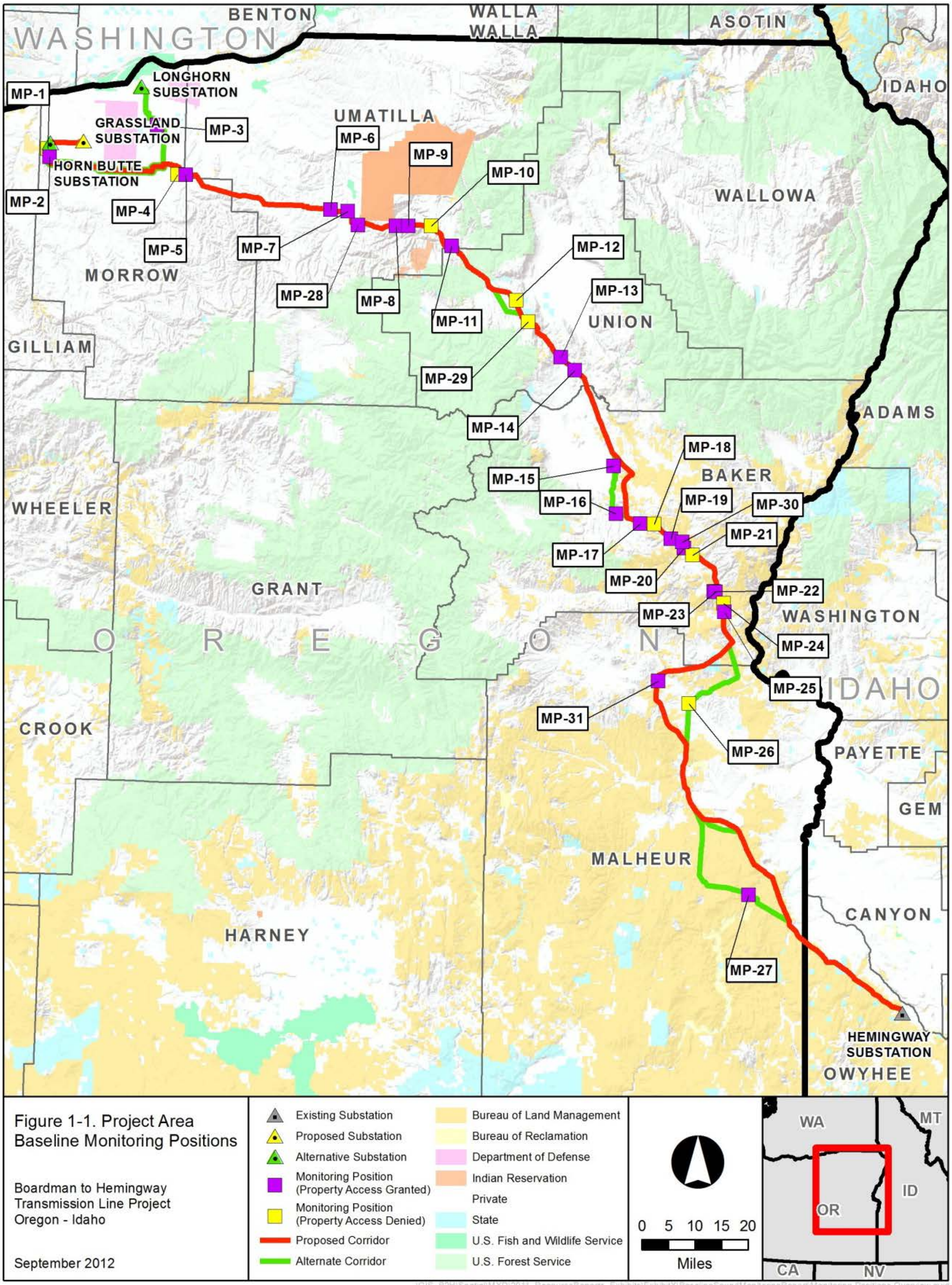


Figure 1-1. Project Area Baseline Monitoring Positions

Boardman to Hemingway Transmission Line Project
Oregon - Idaho

September 2012

2.0 PROJECT NOISE CRITERIA

The state of Oregon prescribes noise limits for new industrial or commercial uses. The state of Idaho does not have an equivalent noise rule to Oregon and instead leaves the regulation of noise levels to local governments. In Oregon, the OAR Chapter 340, Division 35 establishes noise limits for new noise sources located on a previously used or unused industrial or commercial site. Section 2.1 describes the OAR 340-035-0035 requirements in more detail. Sections 2.2 and 2.3 provide more information on the Project Order and Baseline Sound Monitoring Protocol, which was submitted to ODOE.

2.1 ODEQ Noise Regulations

The ODEQ Noise Rules relevant to the Project are provided in OAR 340-035-0035, and are incorporated in the Council's general standard of review, OAR 345-022-0000. Relevant to the Project, the ODEQ Noise Rules provide an antidegradation standard and maximum permissible statistical noise levels for new industrial or commercial noise sources on a previously unused site.[1]

> *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."*

Table 2-1, below, contains the Table 8 statistical noise limits referenced in the DEQ Noise Rules. 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."[2] 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
- That point on the noise sensitive property line nearest the noise source.[3]

[1] A "previously unused industrial or commercial site" 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.
[2] OAR 340-035-0035(3)(b).
[3] Id.

"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."[4] Noise sensitive properties, or NSRs, are identified in Exhibit X. Properties that were determined not to meet the definition of NSRs as a result of limited field verifications were eliminated from consideration when assessing compliance with OAR 340-035-0035(1)(b)(B)(i).

Table 2-1. New Industrial and Commercial Noise Standards[1]

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

[1] from OAR 340-035-0035, Table 8

In accordance with OAR Chapter 340, Division 35, the analysis presented in Exhibit X assumes that the transmission line will constitute an industrial or commercial noise source located predominantly on previously unused sites. Therefore, to demonstrate compliance with OAR 340-035-0035(1)(b)(B)(i), Exhibit X provides evidence that, as a result of operation of the Project, the ambient statistical noise level would not increase by more than 10 dBA in any one hour. In the limited instances in which the statistical noise level may potentially increase by more than 10 dBA in any one hour, such events would be limited to exceptional conditions when background sound levels are in the unusual quiet measurement range and the presence of foul meteorological conditions resulting in maximum corona noise emissions, which is concluded as so rare as to be considered an "infrequent event," or alternatively, that due to special circumstances the Project otherwise qualifies for a variance from the ODEQ Noise Rules.

2.2 Project Order Noise Requirements

The Oregon EFSC issued a Project Order on March 2, 2012, establishing the requirements for the Project's Application for Site Certificate (ASC). Section VI(X) includes specific permitting requirements for information and data to be included and analyzed in Exhibit X in order to comply with OAR Chapter 340, Division 35. The Project Order also states:

> *"If the applicant elects to conduct ambient baseline sound measurements at one or more locations, provide a draft noise monitoring protocol for Department review and approval prior to conducting any monitoring. The protocol should include a description of the sound survey methodology and assumptions, areas to be surveyed, and the measurement parameters needed to best respond to concerns of the applicable agencies and the public."*

The baseline sound monitoring protocol is discussed further in the Section 2.3.

2.3 Baseline Sound Monitoring Protocol

A noise monitoring protocol was submitted for ODOE review and approval prior to conducting fieldwork. The protocol included a description of the sound survey methodology and

[4] OAR 345-035-0015(5).

assumptions, areas to be surveyed and the measurement parameters needed to best respond to the concerns of the applicable agencies and the public (Baseline Sound Measurement Protocol, see Exhibit X, Attachment X-1). The acoustic testing was completed to achieve the following:

- Document existing ambient baseline sound conditions at discrete noise sensitive properties also known as NSRs, which are comprised of one or more noise sensitive properties located near (approximately 0.5 mile) the proposed right-of-way (ROW);
- Determine the ambient baseline sound conditions so that the expected increase in ambient baseline sound levels attributable to the proposed Project can be calculated with the use of acoustic modeling analysis results; and
- Monitor weather data concurrent with noise monitoring to assist in determining meteorological conditions coincident with the onset of corona noise.

To aid in the initial site selection, screening level noise modeling of Project corona noise was completed at NSRs near the Project (i.e., within 0.5 mile from the Project site boundary). The modeling methodologies involved two separate analytical methods.

1. The first was the U.S. Department of Energy's (DOE) Corona and Field Effects (CAFE) program, which was used to determine anticipated corona noise source levels.
2. The second modeling methodology was using the Datakustik Computer-Aided Noise Abatement (CadnaA) program, which conforms to the Organization for International Standardization (ISO) standard 9613-2 (1996), *Attenuation of Sound During Propagation Outdoors*. CadnaA was used to model how sound travels outward from the transmission line to receivers in three dimensions.

Initial screening level modeling results of the proposed transmission line were determined and assessment done to determine the possible future risk of non-compliance. If potential for increasing baseline sound levels by 10 dBA or less could be reasonably assumed, compliance with the OAR ambient degradation test given in *OAR 340-035-0035(1)(b)(B)(i)* was inferred. For NSRs that showed a potential exceedance condition, baseline sound measurements were conducted at or near these locations. From baseline measurements, the regularly occurring L_{50} sound levels were calculated using statistical means and new compliance thresholds were therefore defined on which to assess conformance with the ambient antidegradation standard. At the request of ODOE, screening level modeling results were recalculated to identify NSRs that showed a potential exceedance of 30 dBA, which was based on a threshold of 10 dBA over a conservative assumed ambient sound level of 20 dBA. This Baseline Sound Survey was ultimately expanded to incorporate additional areas and MPs to better address the concerns of the ODOE.

Due to the large number of potential NSRs identified within the analysis area, it was not feasible to conduct baseline monitoring at every individual noise sensitive property. Therefore, ambient measurements at a single MP were used to either represent one or a grouping of nearby NSRs with similar acoustical characteristics established by in-person field investigations. The approved baseline sound monitoring protocol identified 31 MPs; however, due to property owner access restrictions monitoring was completed at 22 of the MPs.

3.0 BASELINE SOUND LEVEL MEASUREMENTS

The purpose of this survey was to establish the existing acoustic environment in the study area and to determine what masking of Project noise could be expected. A number of statistical sound levels were measured in consecutive 10-minute and 1-hour intervals such as the equivalent (L_{eq}), intrusive (L_{10}), and median (L_{50}) sound levels. OAR 340-035-0035(1)(b)(B)(i) requires the use of the L_{10} or L_{50} statistical levels for the purposes of assessing compliance with the ambient degradation test. This survey involved the following:

- Measurement methodology was developed and reviewed by ODOE including instrument selection and setup.
- MPs for the sound survey were pre-selected as described in Section 2.3 and distributed to give a representative evaluation of baseline sound conditions over the Project site.
- IPC secured landowner permissions prior to the survey and locations were screened during deployment to determine final measurement positions.
- Execution of the Baseline Sound Survey consisting of continuous measurement and data-logging starting March 6, 2012.
- Roughly midway through the sound measurement program, the monitoring equipment was recalibrated and data were downloaded and reviewed by an acoustician.
- Analysis of noise data by correlating daytime (7:00 a.m. to 10:00 p.m.) and nighttime periods (10:00 p.m. to 7:00 a.m.), late night periods (12:00 a.m. to 5:00 a.m.), precipitation events, high humidity, and wind speed with their corresponding monitored noise level.

Long-term Baseline Sound Surveys, such as the one conducted in support of permitting the Project, provide relevant data to effectively document typical diurnal variation in sound levels and collect sound level data over a range of meteorological conditions.

3.1 Instrumentation

All measurements were taken with a Larson Davis 831 real-time sound level analyzer equipped with a PCB model 377B02 ½-inch precision condenser microphone. This instrument has an operating range of 5 decibels (dB) to 140 dB, and an overall frequency range of 8 to 20,000 hertz (Hz) and meets or exceeds all requirements set forth in the American National Standards Institute (ANSI) standards for Type 1 sound level meters for quality and accuracy (precision). All instrumentation was laboratory calibrated within the previous 12-month period with calibration documentation provided in Appendix A, Measurement Equipment and National Institute of Standards and Technology (NIST) Laboratory Calibration Certifications. Table 3-1 provides a summary of the measurement equipment used.

Table 3-1. Measurement Equipment Used

Description	Manufacturer	Type
Signal Analyzer	Larson Davis	831H/L
Weather Transmitter	Vaisala	WXT520
Microphone	PCB	377B02
Windscreen	ACO Pacific	7-inch
Calibrator	Larson Davis	CAL200

The monitoring stations are designed for service as a long-term environmental sound level data-logger measuring devices. Each sound level analyzer used was enclosed in a weatherproof case and equipped with a self-contained microphone tripod. The microphone and windscreen were tripod-mounted at an approximate height of 1.5 to 1.7 meters (4.9 to 5.6 feet) above grade. When sound measurements are attempted in the presence of elevated wind speeds, extraneous noise can be self-generated across the microphone and is often referred to a pseudonoise. Air blowing over a microphone diaphragm creates a pressure differential and turbulence. All sound level analyzer microphones were protected from wind-induced pseudonoise by a 180-millimeter (7-inch) diameter foam windscreen made of specially prepared open-pored polyurethane. By using this microphone protection, the pressure gradient and turbulence are effectively moved farther away from the microphone, minimizing self-generated wind-induced noise.

3.2 Field Measurement Methodology

A fixed outdoor MP was chosen at each location to be representative of the house and yard accommodations. MPs were placed in similar surroundings experiencing the same weather and acoustic conditions of where a resident was expected to spend the majority of time when outdoors. However, some property owners voiced opinions and preferences on the exact locations of the MP on their properties. To accommodate property owners' requests, field engineers sited the MPs per the property owners' requests if that location maintained the intended goals of the monitoring program. All monitoring stations were anchored in a manner to avoid interference from any large vertical reflective surfaces and photographed from two vantage points as shown in each detailed MP description.

At each of the 22 MPs, a sound level meter was set up, field calibrated, and programmed to the data log continuously during daytime (7:00 a.m. to 10:00 p.m.), nighttime (10:00 p.m. to 7:00 a.m.), and late-night (12:00 a.m. to 5:00 a.m.) periods. The measurement period commenced March 6, 2012, and ended on May 10, 2012. Each MP collected data for at least two to three weeks as stated in the protocol submitted to ODOE with some MPs collecting nearly a month of data to successfully capture meteorological conditions where corona noise might occur. Calibration was achieved with two ANSI Type 1 calibrators, which have accuracy traceable to the NIST. Calibration drift observed during pre-survey and post-survey calibration was well within acceptable tolerances.

Each sound analyzer was programmed to measure and log broadband A-weighted sound pressure levels in 10- and 1-minute time intervals, as well as a number of statistical sound levels (L_n). The statistical sound levels (L_n) provide the sound level exceeded for that percentage of time over the given measurement period. For example, the L_{10} level is often referred to as the intrusive noise level and is the sound level that is exceeded for 10% of the measurement period. The equivalent sound level (L_{eq}), L_{10}, L_{50} (median), and L_{90} (residual sound level) sound metrics were data-logged for the duration of the monitoring period to fully characterize the ambient acoustic environment. Data were collected for 1/1 and 1/3 octave band data spanning the frequency range of 8 Hz to 20 kilohertz. The locations of MPs were taken using a global positioning system unit and photographs were taken to document surroundings. Following the completion of the measurement period, all monitored data were downloaded to a computer and backed up to an external hard drive for further analysis.

Approximately midway through the sound measurement program, the monitoring equipment was recalibrated, and monitored data were downloaded and reviewed by an acoustic engineer. Midpoint calibrations were conducted to ensure the quality of the performance of the equipment and to identify any commonly occurring sound sources that might warrant in-person observation (Appendix B). Downloaded data were analyzed to identify any anomalous sound events or sound events that regularly occurred up to that point in the survey at a given MP. MPs that appeared to consistently have anomalous or regularly occurring sound events that did not occur during time periods that are typically associated with heightened periods of activity (e.g., increased traffic in the morning and evening) were selected for further field observations.

3.3 Meteorological Conditions

Measurement of existing sound levels is necessary to determine how much masking noise there might be at NSRs near the Project. Elevated levels of background noise, or masking noise, could act to reduce or preclude the audibility of the transmission line corona noise while low levels of regularly occurring noise could permit operational noise from the Project to be more readily perceptible. Transmission line projects compared to conventional industrial projects are somewhat unique in that the sound generated will slowly increase as the conductors become damp up to a certain maximum sound level. The highest audible noise levels occur in conditions of foul weather because of the potential for a large concentration of corona sources, such as water drops or snowflakes that collect on the conductor surface. Therefore, it is appropriate to compare the maximum corona sound level that occurs during meteorological conditions conducive to corona generation with the monitored sound level that occurred during those same conditions. Therefore, background sound levels must be presented as a function of meteorological conditions.

Weather data were collected using Vaisala portable weather transmitters at 18 of the 22 MPs during the full measurement period. Weather data were collected at three other MPs for a portion of the measurement period. Weather data were not collected at MP-14 because of its proximity to MP-13 where a meteorological (MET) station was already deployed. MP-13 experienced technical issues during the first 10 days of monitoring, and as a result meteorological data could not be attributed to MP-14 during this time period. The next closest MP that was deployed at the same time as MP-14 and at a similar altitude was MP-16. Therefore, meteorological data for MP-14 are a combination of data from both MP-13 and MP-16. The Vaisala unit monitors wind speed and direction via its ultrasonic anemometer, and also measures barometric pressure, temperature and humidity, total rainfall, intensity, and duration of rainfall. The Vaisala unit is also able to distinguish between precipitation type such as rain, hail, and snow. Table 3-2 summarizes the percentage of time where high humidity (i.e., relative humidity (RH) is greater or equal to 90%) without precipitation occurred and where precipitation occurred at each MP. Percentage precipitation greater than 0 mm/hr is presented, as well as percentage of precipitation with a rain rate of 0.8 and 5 mm/hr. The rain rate of 0.8-5 mm/hr was reviewed because it correctly excludes precipitation so heavy that the noise from the weather event is likely to increase ambient sound levels so much that corona noise will not be audible. In addition, Bonneville Power Administration (BPA) has, at least historically, considered this rain rate appropriate for concluding that foul weather conditions east of the Cascades constitute “infrequent events” for purposes of an exception to the ODEQ Noise Rules.

Table 3-2. Meteorological Station Summary by Monitoring Position

Station	Percentage of Time RH ≥ 90%	Percentage of Time Precipitation >0 mm/hr	Percentage of Time Precipitation 0.8 mm/hr – 5 mm/hr
MP-2	2%	13%	0.3%
MP-3	3%	26%	1.5%
MP-5	1%	18%	1.5%
MP-6	4%	21%	1.5%
MP-7	6%	19%	2.2%
MP-8	13%	20%	1.9%
MP-9	2%	17%	3.9%

Table 3-2. Meteorological Station Summary by Monitoring Position (continued)

Station	Percentage of Time RH ≥ 90%	Percentage of Time Precipitation >0 mm/hr	Percentage of Time Precipitation 0.8 mm/hr – 5 mm/hr
MP-11	22%	16%	1.0%
MP-13	6%	18%	1.1%
MP-14	4%	16%	0.7%
MP-15	7%	17%	2.0%
MP-16	4%	11%	0.5%
MP-17	5%	35%	1.0%
MP-19	4%	9%	0.5%
MP-20	2%	16%	0.5%
MP-22	10%	18%	2.1%
MP-23	17%	9%	0.8%
MP-25	2%	19%	1.4%
MP-27	6%	17%	1.0%
MP-28	3%	17%	3.3%
MP-30	2%	15%	1.3%
MP-31	3%	17%	1.8%

The Western Regional Climate Center (WRCC) is one of six regional climate centers in the United States and provides meteorological monitoring data for the Pacific Northwest region. The regional climate center program is administered by the National Oceanic and Atmospheric Administration. Specific oversight is provided by the National Climatic Data Center of the National Environmental Satellite, Data and Information Service. Five years of meteorological data were reviewed at four of the WRCC's remote automated weather stations that are close to the Project site. Data from these stations (i.e., Umatilla, La Grande, Flagstaff Hill, and Owyhee Ridge) were used to determine whether the foul weather conditions may be considered as unusual and/or infrequent events. Table 3-3 shows the frequency of foul weather conditions for the overall Project area at each of the meteorological stations analyzed.

Table 3-3. WRCC Meteorological Data Frequency of Condition

Condition	Project Area	Flagstaff Hill	La Grande	Owyhee Ridge	Umatilla
Rainfall (0.8 mm/hr - 5 mm/hr)[1/]	1.30%	0.87%	2.66%	1.08%	0.60%
Rainfall (>= 5 mm/hr)	0.08%	0.05%	0.20%	0.04%	0.02%
Rainfall (> 1 mm/hr)[2/]	1.38%	0.92%	2.86%	1.12%	0.62%
Relative Humidity > 90%[3/]	14.32%	14.17%	18.24%	8.37%	16.49%
Low Corona Noise Conditions	85.21%	85.51%	80.88%	91.16%	83.28%

[1/] In 2011, Bonneville Power Administration (BPA) applied its Audible Noise Policy (DOE 2006) in the Big Eddy Knight transmission line Environmental Impact Statement (EIS). As BPA provided in its EIS for the Big Eddy Knight transmission line project audible noise levels, and in particular corona-generated audible noise, vary depending on weather. The Big Eddy EIS indicates that a rainfall conditions of 0.8 mm to 5 mm/hr as foul weather conditions.
[2/] This condition is the model input of BPA Corona and Field Effects (CAFE) Program (DOE (US Department of Energy) and BPA (Bonneville Power Administration). Undated. "Corona and Field Effects Program Version 3.0 Computer Program."
[3/] This condition was included as per guidance provided by ODOE in the Project Order.

As demonstrated in Table 3-3, foul weather conditions in which maximum levels of corona noise are generated will occur infrequently within the Project area.

4.0 MEASUREMENT LOCATIONS AND OBSERVATIONS

Measurements were taken at representative locations roughly within 0.5 mile of the Project site boundary encompassing portions of five segments of the Proposed Corridor:

- *Segment 1 (Morrow County)*: Approximately 47 miles of the Proposed Corridor and all of the Longhorn Alternate Corridor Segment are located in Segment 1. The Proposed Corridor exits the Grassland Substation to the west, generally paralleling the existing Boardman to Slatt 500-kilovolt (kV) transmission line for about 6.5 miles. The Longhorn Alternate Corridor Segment would run roughly north to south with the northernmost point located near the intersection of the McNary-Slatt 500-kV line, US 730, and the Union Pacific Railroad. Land uses along both the Proposed Corridor and the Longhorn Alternate Corridor Segment in Morrow County are mostly dry land farming and rangeland. The Blue Mountain Scenic Byway offers a variety of recreation and scenery along with historical sites and it is crossed by the Proposed Corridor, paralleled for 2.4 miles, and crossed again before proceeding southeast. In this same area, near the town of Cecil, the Proposed Corridor passes along the western boundary of the Boardman Grasslands Preserve before angling east and following its southern boundary, crossing the Oregon National Historic Trail and an existing BPA 115-kV transmission line. The Site Boundary also passes along the southern boundary of the Naval Weapons Systems Training Facility, approximately 2 miles south of Boardman, Oregon. Two alternate corridor segments and termination points to the proposed Grassland Substation would be located in Morrow County: the Horn Butte Alternate Corridor Segment and Substation and the Longhorn Alternate Corridor Segment and Substation. There are no NSRs along the Horn Butte Alternate Corridor. Sound levels were monitored at two MPs (MP-2 and MP-3) for this segment.
- *Segment 2 (Umatilla County)*: Approximately 50 miles of the Proposed Corridor is located in Segment 2 on privately owned land. Land uses near the Proposed Corridor are primarily dry land and rangeland farming. The Project site is located 0.4 to 1.4 miles south of the Umatilla Indian Reservation. Neither the Proposed Corridor nor its support facilities would be located within the reservation. Approximately 2.5 miles southwest of the community of Meacham, the corridor passes between scattered parcels owned by the Confederated Tribes of the Umatilla Indian Reservation and continues west of a segment of the Blue Mountain Forest State Scenic Corridor passing into Union County. Sound levels were monitored at six MPs (MP-5, MP-6, MP-7, MP-8, MP-9, and MP-28) for this segment.
- *Segment 3 (Union County)*: Approximately 40 miles of the Proposed Corridor and all of the Glass Hill Alternate Corridor Segment are located in Segment 3. The Proposed Corridor would cross approximately 5.9 miles of the Wallowa-Whitman National Forest (NF); 1.0 mile of Vale District of the Bureau of Land Management (BLM)-managed lands; and approximately 32.9 miles of privately owned lands. The Proposed Corridor continues east, passing between two segments of the Blue Mountain Forest State Scenic Corridor before turning southeast adjacent and offset to the southwest from the existing BPA 230-kV transmission line. The area of the Wallowa-Whitman NF traversed by the Project is used for a wide range of recreation activities but is also designated NF Management Area 17 (Power Transportation Facility Retention corridor). The Proposed Corridor shares this utility corridor with an interstate highway, a railway, a 230-kV transmission line, a petroleum products pipeline, and two large natural gas pipelines. The Proposed Corridor traverses Railroad Canyon and proceeds south passing about 0.4 mile west of Hilgard Junction State Park. Hilgard Junction State Park offers daytime

activities, and vehicle camping or tent camping sites along the Grande Ronde River (OPRD 2011b). The Proposed Corridor continues to run parallel to the existing 230-kV line and crosses the Grande Ronde River and State Highway passing about 1.0 mile west of Morgan Lake. This city park is situated a few miles southwest of the city of La Grande. The Proposed Corridor continues generally southeast through a mix of rangeland and forested areas with scattered homes and cabins for the next 14 miles to Clover Creek Valley. The Eastern Oregon University Rebarrow Research Forest land is located within this segment and is used as an outdoor laboratory for science classes and for student or faculty research projects. The Proposed Corridor avoids the forest. The Proposed Corridor traverses Glass Hill and proceeds southeasterly staying to the west and south of the existing IPC 230-kV transmission line crossing mostly rangeland to the Union County/Baker County line. The Elkhorn Valley Wind Farm is approximately 4 miles northeast of North Powder and is adjacent to the east side of the existing 230-kV transmission line near the Proposed Corridor. The Glass Hill Alternate Corridor Segment is also under evaluation within Union County. Sound levels were monitored at three MPs along Segment 3 (MP-11, MP-13, and MP-14).

- *Segment 4 (Baker County)*: Approximately 69 miles of the Proposed Corridor, all of the Flagstaff Alternate Corridor Segment, and approximately 4 miles of the Willow Creek Alternate Corridor Segment are located in Segment 4. The Proposed Corridor crosses 16.7 miles of BLM-managed lands in the Vale District, about 2.9 miles of state land, and 49.5 miles of private land. The Proposed Corridor in Segment 4 passes through primarily irrigated agricultural lands and rangelands. Segment 4 is often situated either parallel or offset to existing IPC transmission lines. The Proposed Corridor is approximately 2 miles west of the Thief Valley Reservoir located on the North Powder River and provides year-round fishing and seasonal camping. The Proposed Corridor extends approximately 1.1 miles southeast of the National Historic Oregon Trail Interpretive Center and 0.3 mile of the Oregon Trail Area of Critical Environmental Concern (ACEC) segment. The Proposed Corridor crosses the westernmost portion of the Virtue Flat off-highway vehicle Park, but should not affect its usage for mountain bikes and horseback riding. The Proposed Corridor again becomes part of the existing transportation-utility corridor with I-84, IPC's existing 69-kV and 138-kV transmission lines, and the Union Pacific Railroad. Approximately 1.4 miles of the Proposed Corridor would be located on a West-wide Energy corridor designated by the DOE. A 0.7-mile segment of the 138/69-kV rebuild would cross the Lost Dutchman's Mining Association's private Blue Bucket Camp. The site has flat areas for camping and limited electrical and water hook-ups for recreational vehicles and fulltime caretakers. Two alternate corridor segments are under evaluation within or partially within Segment 4: the northern segment of the Willow Creek Alternate Corridor Segment and the Flagstaff Alternate Corridor Segment. Sound levels were monitored at nine MPs along Segment 4 (MP-15, MP-16, MP-17, MP-19, MP-20, MP-22, MP-23, MP-25, and MP-30).
- *Segment 5 (Malheur County)*: Approximately 72 miles of the Proposed Corridor, all of the Malheur S Alternate Corridor Segment and approximately 21 miles of the Willow Creek Alternate Corridor Segment are located in Segment 5. The Proposed Corridor crosses 20.6 miles of privately owned lands, 50.5 miles of BLM-managed lands, and 0.8 mile of Bureau of Reclamation (BOR)-managed lands. Most of the land along Segment 5 is rangeland and sagebrush with little or no development. The Proposed Corridor crosses existing IPC transmission lines, U.S. Highways 20 and 26, the Union Pacific Railroad, and various canyon, reservoir, and wilderness areas. This segment passes within 250 feet of the northern boundary of the Owyhee River about 11 miles southwest of Adrian, Oregon, and the Owyhee Reservoir, which experiences heavy

recreational use. Lands around the reservoir are mostly public lands under control of the BOR. The reservoir contains four boat ramps, provides excellent waterfowl hunting, and the surrounding hills and canyons offer many opportunities for the pursuit of upland game birds (BOR 2009). The Scenic Recreation Management Area (SRMA) provides recreational activities within the ACEC/SRMA, including scenery, driving and walking/hiking, varied wildlife and historic resource viewing, photography, camping, hunting, fishing, and water play. The Proposed Corridor re-enters the BLM utility corridor where it remains as it proceeds to the south crossing the existing Summer Lake and proceeding parallel to and offset approximately 1,500 to 3,500 feet from the southwest side of the existing 500-kV line to the Oregon/Idaho state line. Three alternate corridor segments are under evaluation within or partly within Malheur County: the Willow Creek Alternate, the Malheur S Alternate, and the Double Mountain Alternate. There are no NSRs within 0.5 mile of the Double Mountain Alternate Corridor Segment. Sound levels were monitored at two MPs (MP-27 and MP-31) along Segment 5.

Table 4-1 lists the Project site segment, Universal Transverse Mercator (UTM) coordinates, population density per square mile of the census tract each MP is located within, and the serial numbers of the Larson Davis 831 sound level meters.

Table 4-1. Monitoring Position Location Summary

Monitoring Position	Project Site Segment	UTM Coordinates (NAD83 UTM Zone 11 m)		Population Density per Square Mile	Serial Number
		Easting (m)	Northing (m)		
MP-2	Segment 1	269419.41	5059126.57	2	02575
MP-3	Segment 1	302032.70	5068766.64	2	01711
MP-5	Segment 1	310612.36	5053676.76	2	02663
MP-6	Segment 2	354489.20	5043167.76	11	02665
MP-7	Segment 2	359601.98	5042710.82	2	02442 & 02665
MP-8	Segment 2	374307.46	5038207.77	2	02667
MP-9	Segment 2	377925.47	5038245.73	2	02665
MP-11	Segment 3	391083.22	5032164.76	6	01708
MP-13	Segment 3	424173.04	4998501.39	5	02574 & 01710
MP-14	Segment 3	428352.64	4994496.28	5	01671
MP-15	Segment 3	440066.80	4965579.95	14	02667 & 01710
MP-16	Segment 3	440856.44	4951165.75	4	02667 & 01710
MP-17	Segment 4	448159.87	4948165.39	4	02661 & 02670
MP-19	Segment 4	457353.12	4943603.16	4	01350 & 01711
MP-20	Segment 4	461426.11	4940774.09	2	02668
MP-22	Segment 5	470446.82	4927668.28	4	02661
MP-23	Segment 5	470890.55	4927449.81	2	02662 & 02668
MP-25	Segment 5	473624.79	4921435.06	4	02664
MP-27	Segment 5	480970.35	4835750.44	1	01009
MP-28	Segment 5	362786.26	5038512.51	11	02573 & 01009
MP-30	Segment 5	460873.55	4942536.95	2	01708 & 02661
MP-31	Segment 5	453509.44	4900454.60	1	01671 & 02668

These Baseline Sound Survey measurement data incorporate all sounds at each MP, including contributions from roadway traffic, railroad activities, sounds of nature, existing industrial facilities, and other human-related activities. Monitoring stations equipped with weather data collection systems provided further information, including wind speed, temperature, relative humidity, and precipitation events. For those MPs that did not have a MET station installed, the closest MET station was used to assess local meteorological conditions.

Upon completion of this Baseline Sound Survey, results were tabulated into relevant time periods of interest based on the received sound levels, diurnal variations, and meteorological conditions that may influence the resulting data set such as conditions when transmission line corona noise could be present. Time history plots were generated for each of the L_{eq}, L_{10}, and L_{50} sound pressure levels in 1-hour measurement intervals over the entire survey period. The sound level measurement data were also correlated to meteorological data, including high humidity (i.e., >90%) and precipitation events. The composite 1/3 octave band (16, 2 31.5, 63, 125, 250, 500, 1K, 2K, 4K, and 8K Hz) sound pressure levels were plotted under these meteorological conditions according to precipitation and high humidity to determine if the analysis area is predisposed to a discrete tonal condition. Subsections 4.1 to 4.22 present the following:

- A general description of the noise monitoring location;
- Identification of sounds audible during the field observations (and Attachment B);
- Anomalous or regularly occurring sound events identified over the course of the monitoring program;
- Nearby major infrastructure such as major roads, airports, railroads, and transmission lines; and
- Results of the data analyses, including the time histories and spectral plots for each MP.

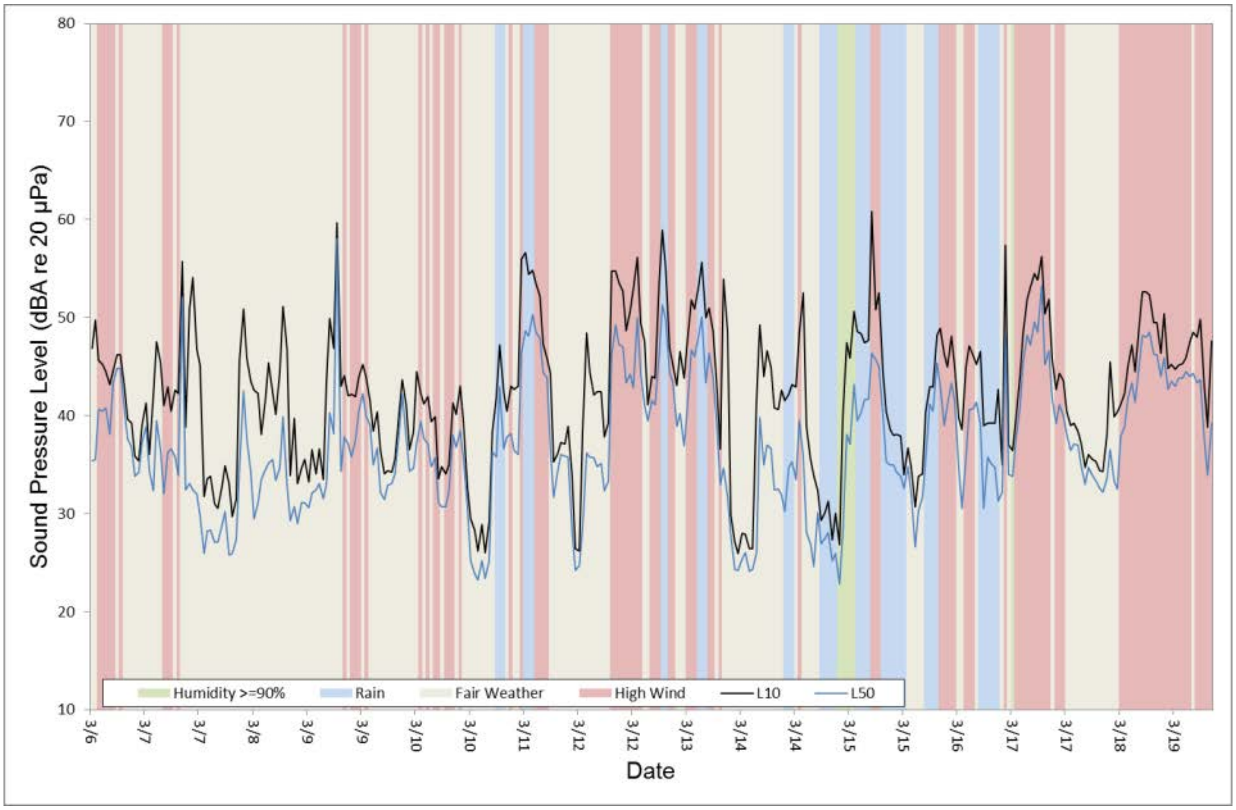
4.1 Monitoring Position 2 – Description and Results

MP-2 was located between two residences that are approximately 2 miles north of Cecil, Oregon in Segment 1 (Morrow County). Distances to the nearest major roadway (SR 74) and the BNSF Railroad from MP-2 are approximately 0.2 and 3.4 miles respectively. The distances to the nearest existing transmission line and substation from MP-2 are both approximately 1.4 miles and located at the adjacent Willow Creek Wind Farm. Agricultural operations and the Willow Creek Wind Farm may contribute to ambient sound levels at MP-2. The presence of dogs and a beehive were observed during daytime. Nighttime field observations included audible swooshing of wind turbine generators, crickets, and frogs. Figure 4-1 includes photographs of the MP relative to one of the residential structures and the viewpoint from the MP in the direction of the Project. Figure 4-2 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

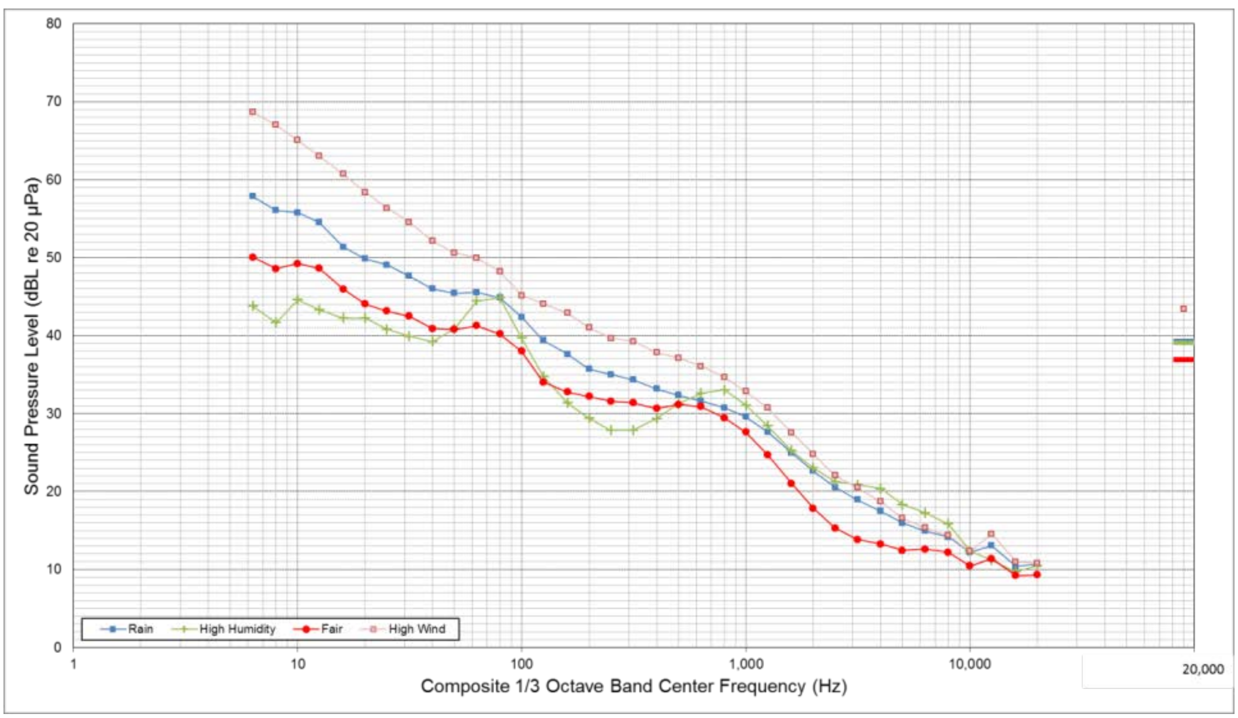
Photograph taken in the direction of one of the residential structures

Photograph taken in the direction of the Project

Figure 4-1. Photographs of Monitoring Position 2



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

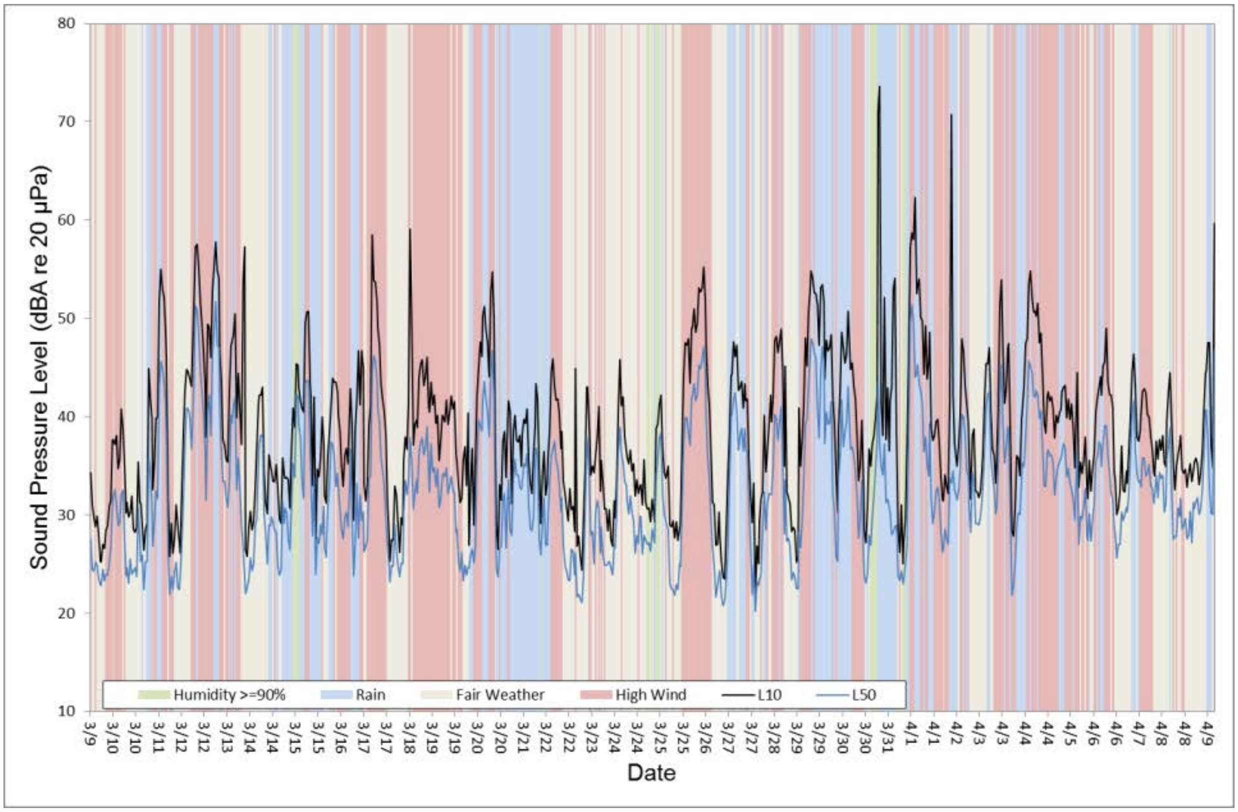
Figure 4-2. Monitoring Position 2 Summary of Measured Sound Pressure Levels

4.2 Monitoring Position 3 – Description and Results

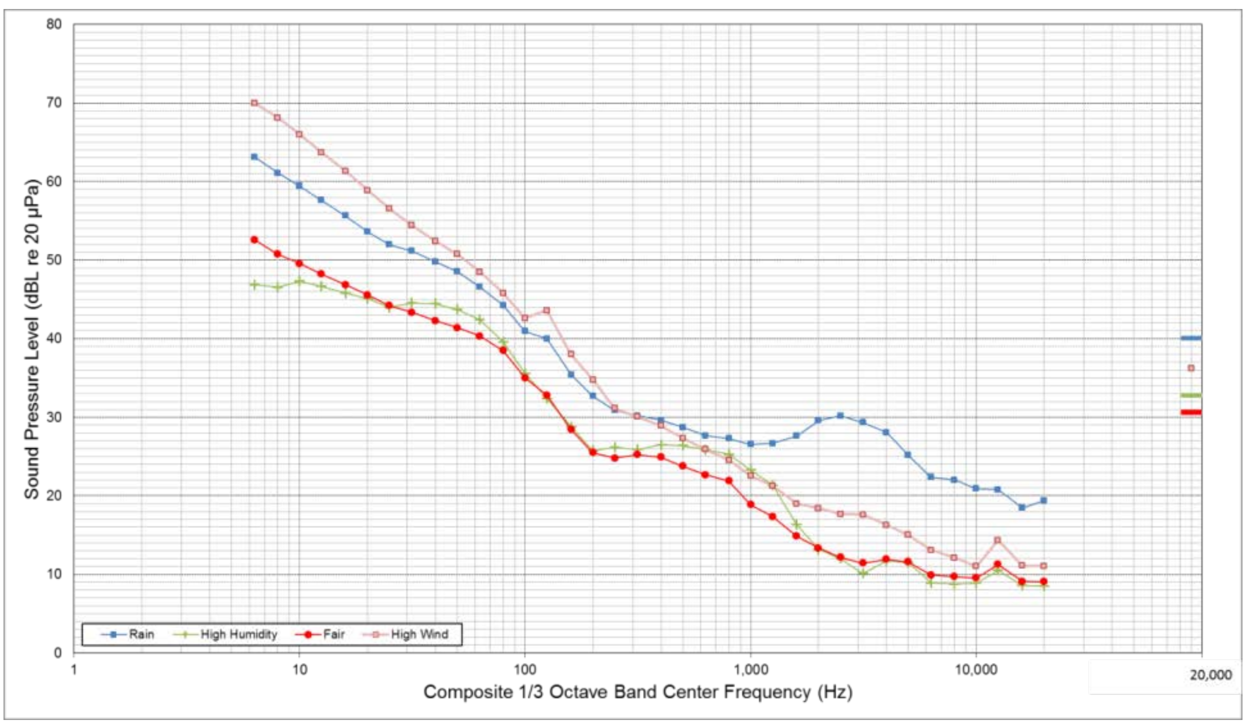
MP-3 was located in an agricultural field approximately 10 miles southeast of Boardman, Oregon, along Segment 1 (Morrow County). The MP could not be located at the nearest residence because of access restrictions imposed by the property owner. Field engineers worked with the neighboring property owner (Boardman Tree Farm) to place the MP as close as possible to the residence while not disrupting farm operations. The noise monitoring equipment was placed in a vacant field that was not in use by the tree farm but in a similar acoustical setting to that of the residence. Distances to the nearest major roadway (Bombing Range) and Union Pacific Railroad from MP-3 are approximately 3.8 and 5.3 miles, respectively. The distance to the nearest existing transmission line from MP-3 is approximately 0.3 mile and is owned by Umatilla Electric Cooperative. Daytime field observations included harvesting activity in the fields approximately 1.0 mile from the MP and semi-truck traffic on the adjacent road. An active staging area was also present nearby where trucks were observed loading and/or unloading. Other audible sound sources included overflights (one jet and three propeller planes) and birds chirping. Nighttime field observations included a sprinkler system and irrigation equipment (water pump). Figure 4-3 is a photograph of the MP in the direction of the Project. Figure 4-4 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

Photograph taken in the direction of the Project

Figure 4-3. Photograph of Monitoring Position 3



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-4. Monitoring Position 3 Summary of Measured Sound Pressure Levels

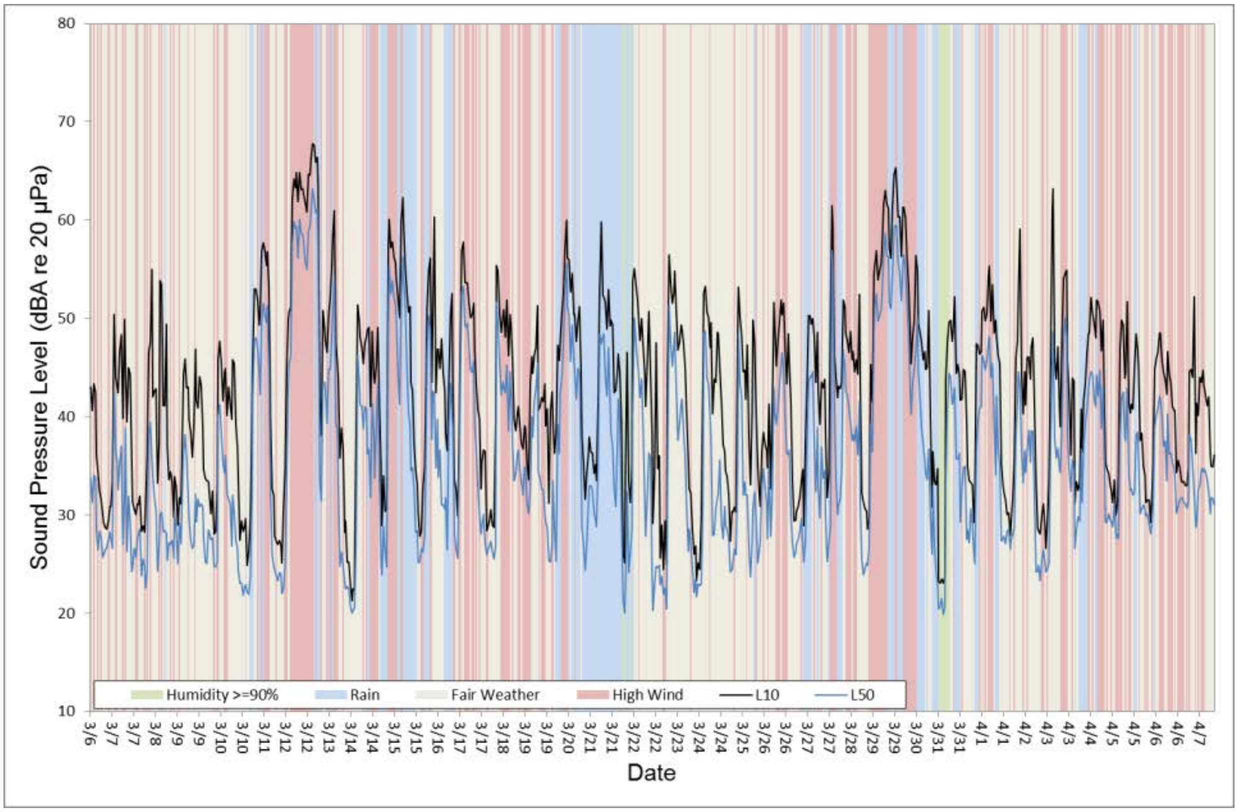
4.3 Monitoring Position 5 – Description and Results

MP-5 was located at a residence approximately 2 miles from Pine City, Oregon, along Segment 2 (Umatilla County). Distances to the nearest major roadway (Butter Creek Road) and airport (Echo) from MP-5 are approximately 147 feet and 4.3 miles, respectively. The distance to the nearest existing transmission line from MP-5 is approximately 9.6 miles and is owned by BPA. Observations conducted during the baseline field work included heavy trucks on Butter Creek Road, irrigators, dogs barking, birds chirping, aircraft overflights, and an all-terrain vehicle (ATV) operated by the landowner. Figure 4-5 includes photographs of the MP relative to the primary residential structure and the viewpoint from the MP in the direction of the Project. Figure 4-6 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

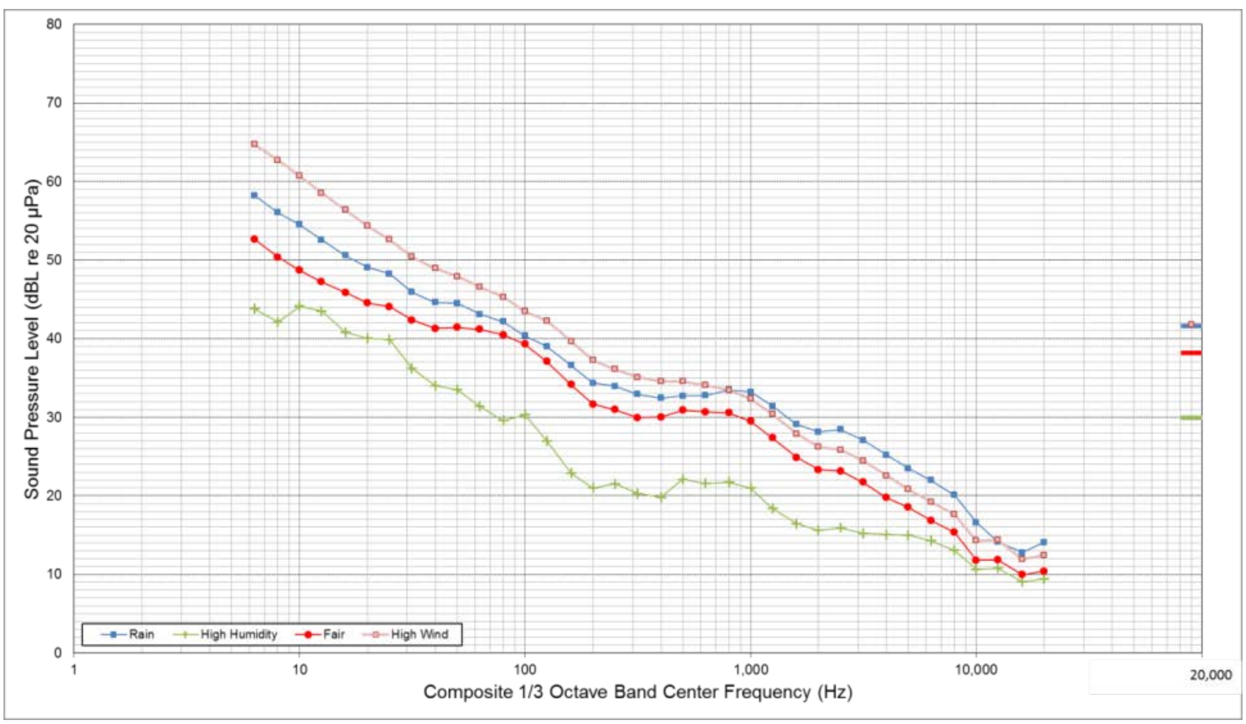
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-5. Photographs of Monitoring Position 5



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-6. Monitoring Position 5 Summary of Measured Sound Pressure Levels

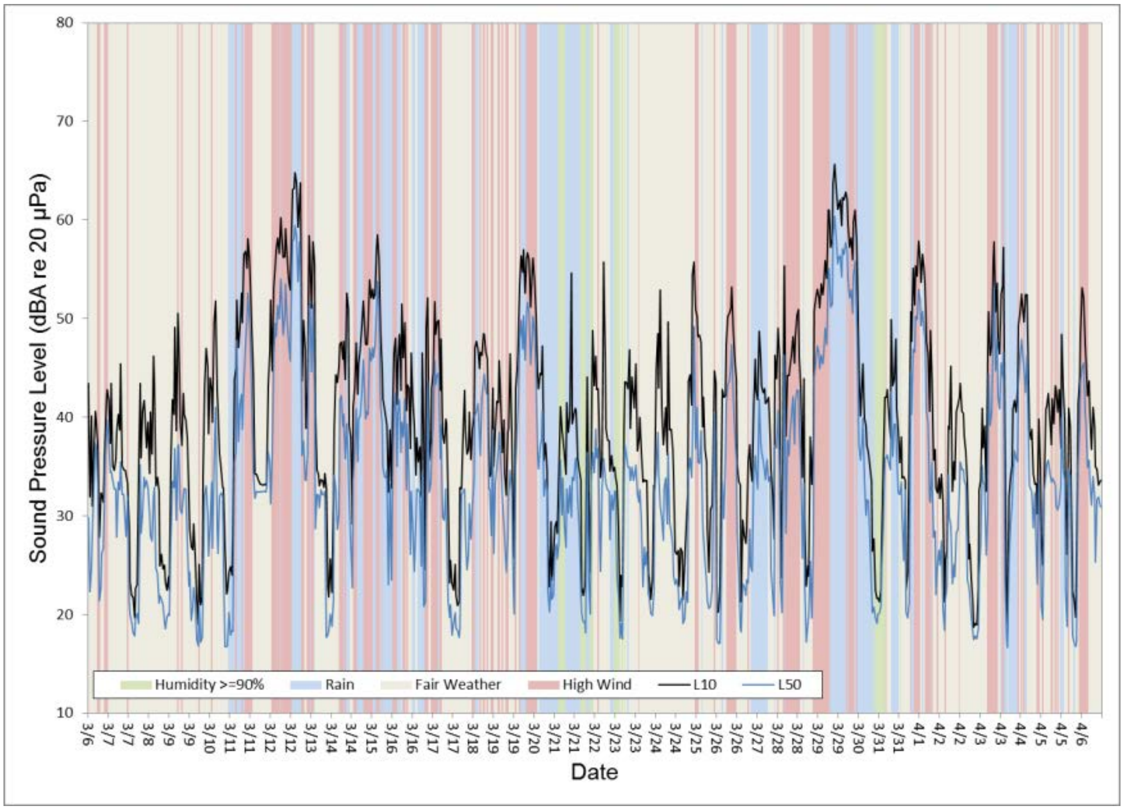
4.4 Monitoring Position 6 – Description and Results

MP-6 was located at a residence approximately 3.5 miles northwest of Pilot Rock, Oregon, along Segment 2 (Umatilla County). Distances to the nearest major roadway (US 395) and the Union Pacific Railroad from MP-6 are approximately 2.9 and 2.4 miles, respectively. The distance to the nearest existing transmission line from MP-6 is approximately 2.4 miles and is part of PacifiCorp. Horses are raised on the property and were audible during both daytime and nighttime field observations. Additional observations included birds and high winds during the daytime. The landowner indicated that he often starts his workday at 5:00 a.m. operating farming equipment such as a tractor. Figure 4-7 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP in the direction of the Project. Figure 4-8 shows the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

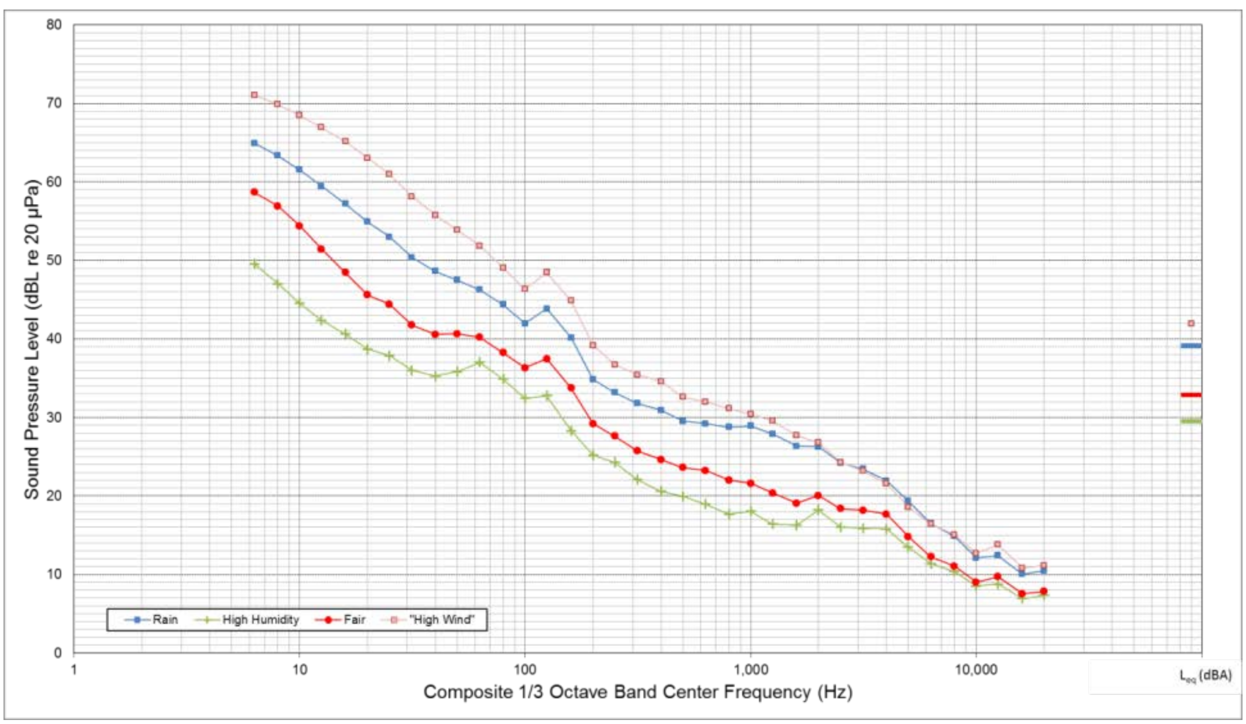
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-7. Photographs of Monitoring Position 6



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-8. Monitoring Position 6 Summary of Measured Sound Pressure Levels

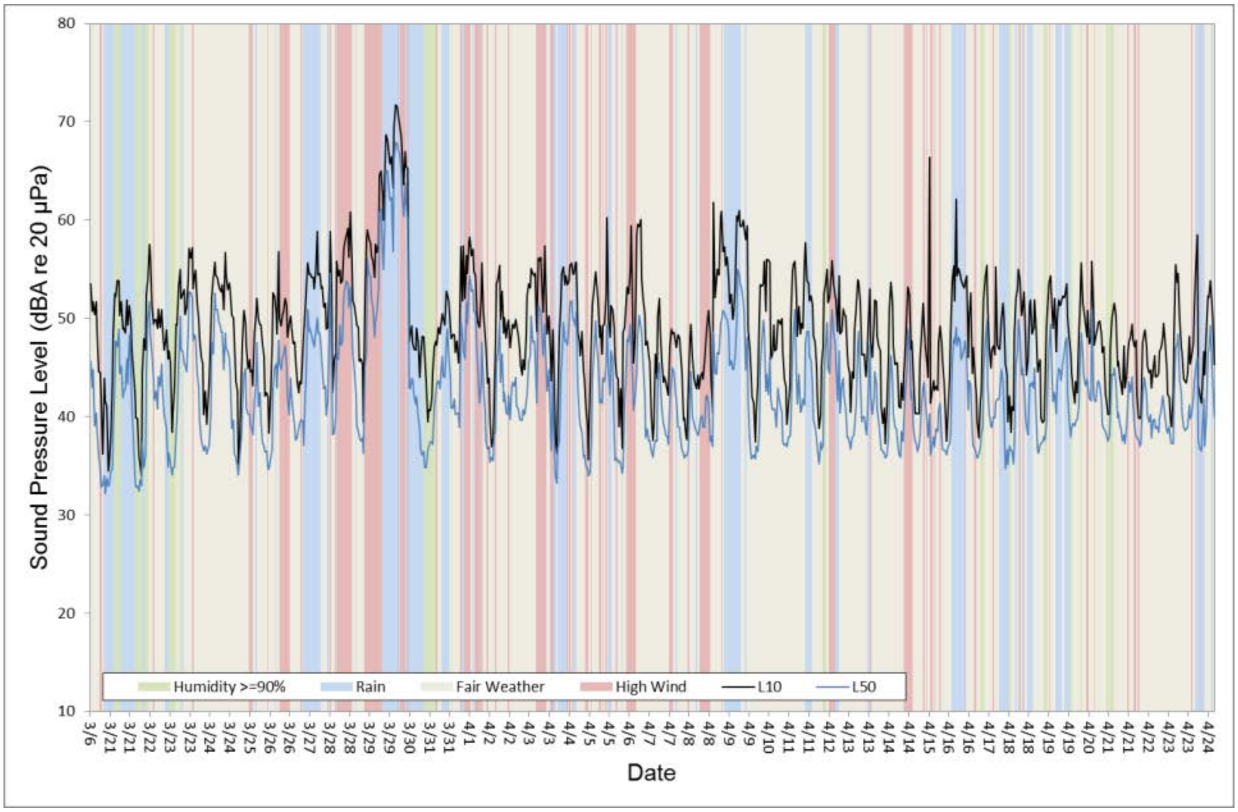
4.5 Monitoring Position 7 – Description and Results

MP-7 was located at a residence approximately 3.2 miles northeast of Pilot Rock, Oregon, along Segment 2 (Umatilla County). Distances to the nearest major roadway (US 395) and the Union Pacific Railroad from MP-7 are approximately 623 feet and 727 feet, respectively. The distance to the nearest existing transmission line from MP-7 is approximately 0.37 mile and is owned by PacifiCorp. Audible daytime observations included heavy winds, farm equipment, a helicopter overflight, highway traffic, and birds. Audible nighttime observations included distant traffic on US 395 (4 vehicles over 15 minutes), a nearby creek, dogs barking, cows mooing, and light rain showers. Figure 4-9 includes photographs of the MP relative to the primary residential structure and the viewpoint from the MP in the direction of the Project. Figure 4-10 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

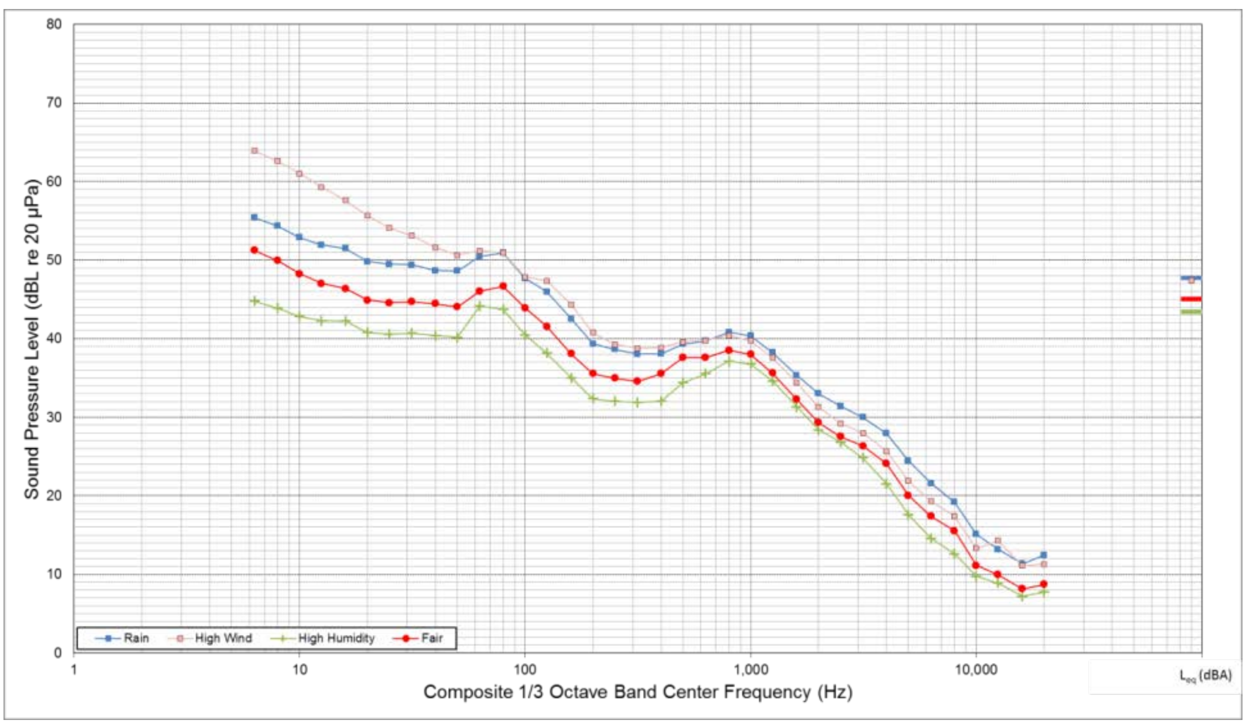
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-9. Photographs of Monitoring Position 7



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-10. Monitoring Position 7 Summary of Measured Sound Pressure Levels

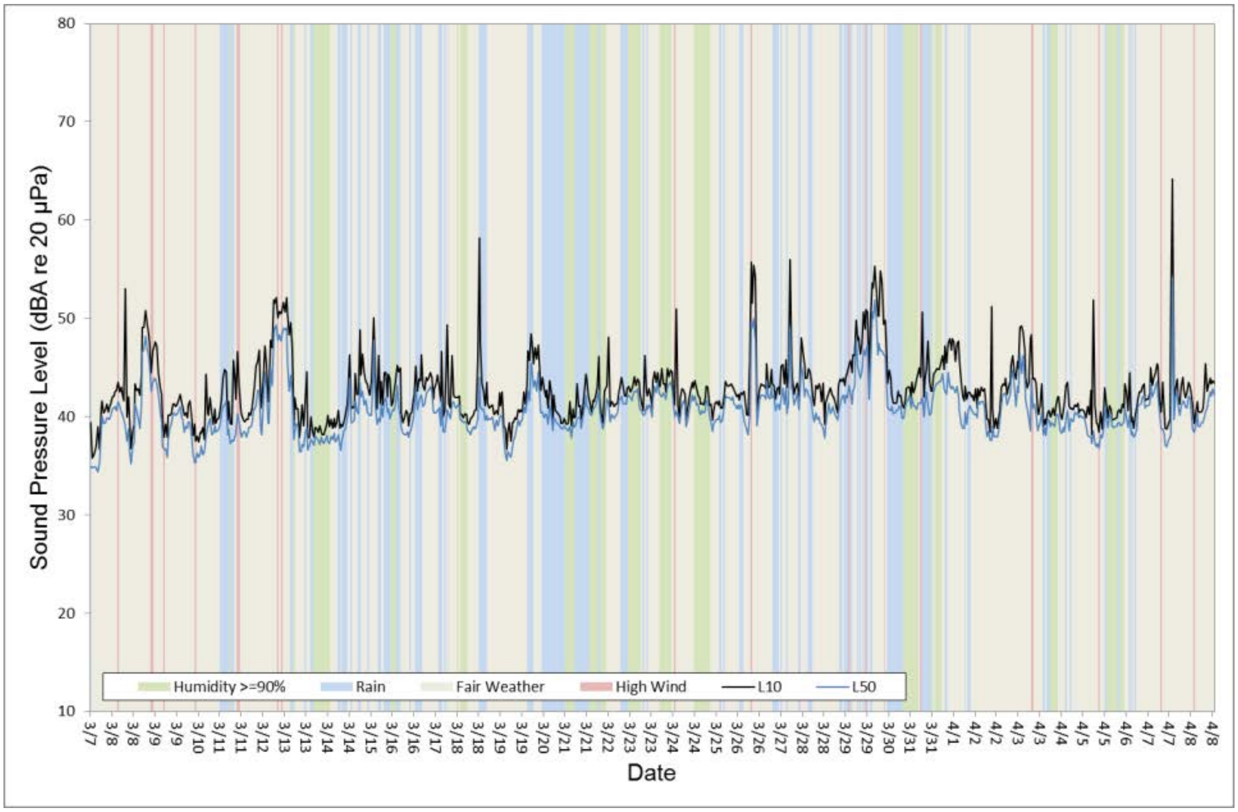
4.6 Monitoring Position 8 – Description and Results

MP-8 was located at a residence approximately 1.0 mile south of McKay, Oregon, along Segment 2 (Umatilla County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-8 are approximately 6.3 and 8.9 miles, respectively. Field observations indicated that the general area was sheltered from heavy winds due to the surrounding hills, which are approximately 200 to 300 feet high. Audible daytime sound observations included the McKay Creek and birds chirping. Figure 4-11 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP in the direction of the Project. Figure 4-12 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

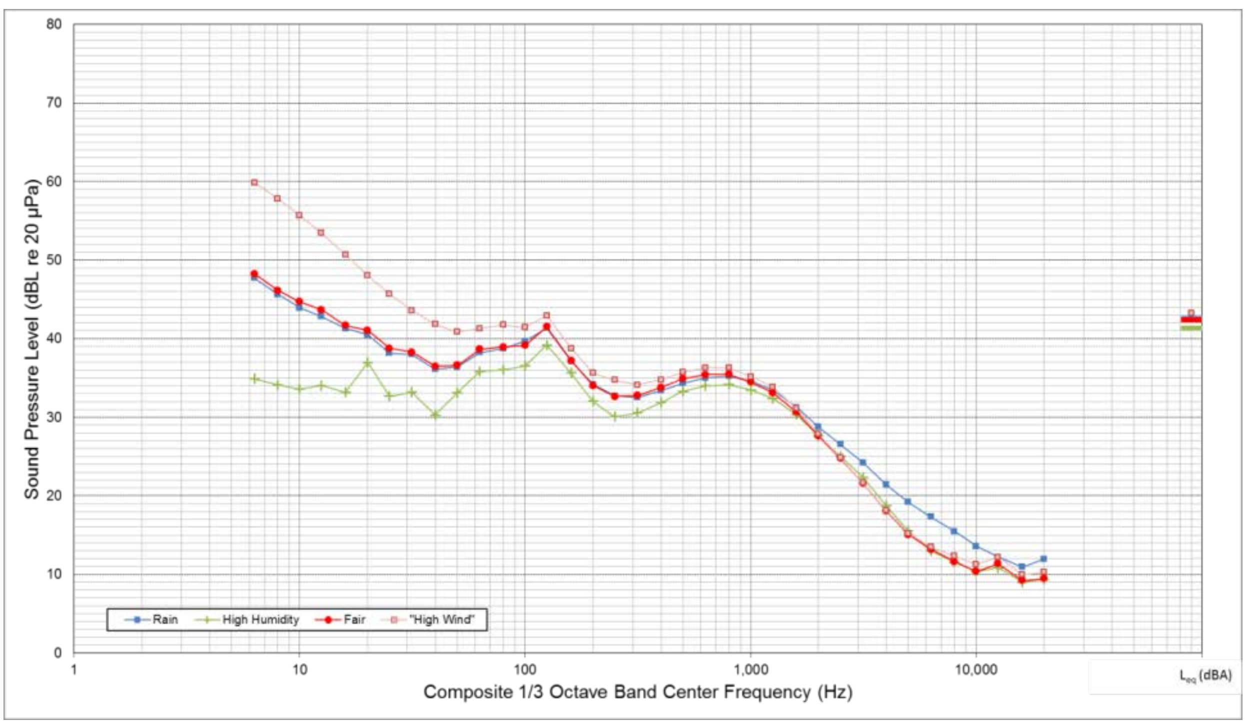
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-11. Photographs of Monitoring Position 8



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-12. Monitoring Position 8 Summary of Measured Sound Pressure Levels

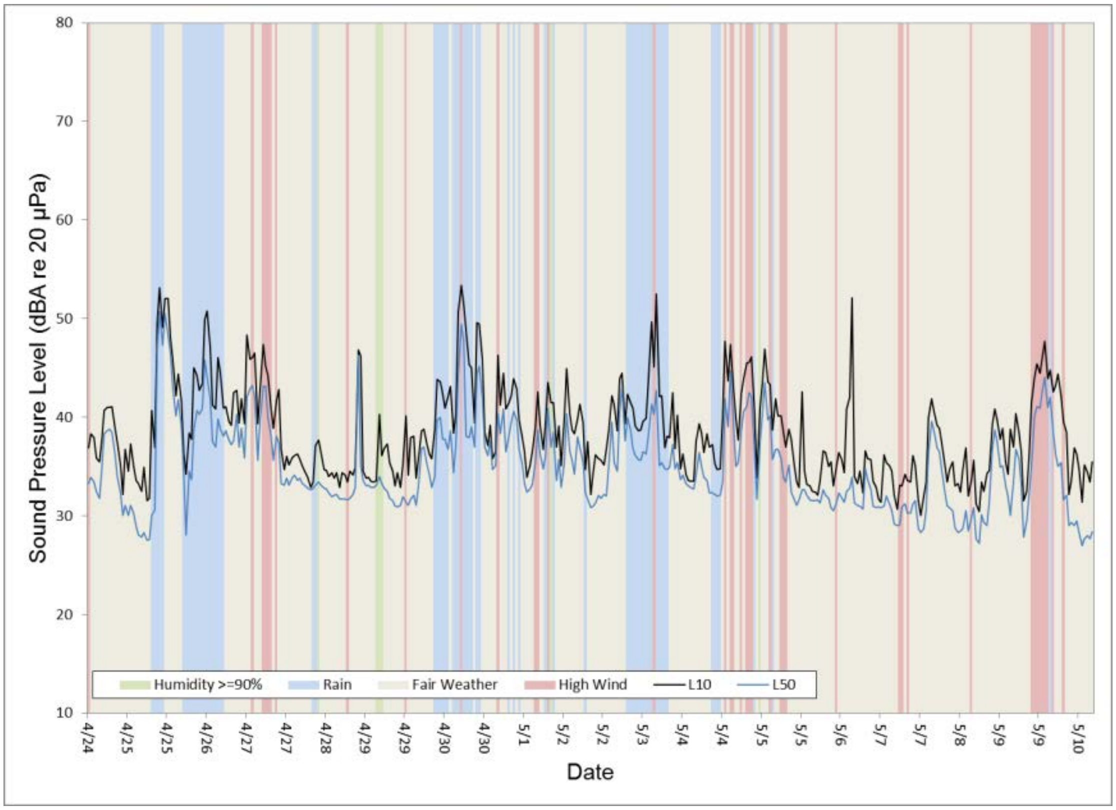
4.7 Monitoring Position 9 – Description and Results

MP-9 was located at a cabin approximately 2.7 miles southeast of McKay, Oregon, along Segment 2 (Umatilla County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-9 are approximately 6.2 and 6.6 miles, respectively. The distance to the nearest existing transmission line from MP-9 is approximately 8.9 miles and is owned by BPA. Daytime field observations noted conditions as generally quiet with distant audible sources from a nearby creek, birds chirping, and wind interacting with the terrain and other vegetation. Nighttime observations included audible sounds from frogs and insects in addition to wind interacting with the tops of the trees. Figure 4-13 includes photographs of the MP relative to the cabin (left portion of photo) and the viewpoint of the MP towards the Project. Figure 4-14 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

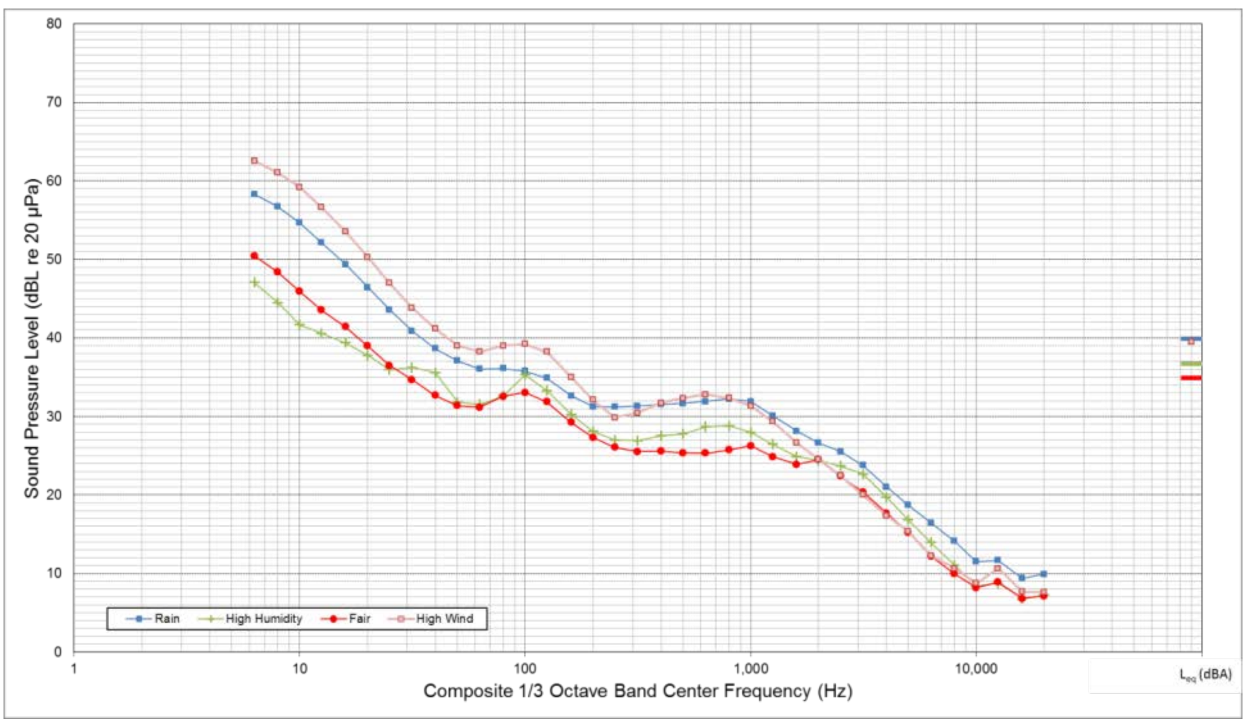
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-13. Photographs of Monitoring Position 9



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-14. Monitoring Position 9 Summary of Measured Sound Pressure Levels

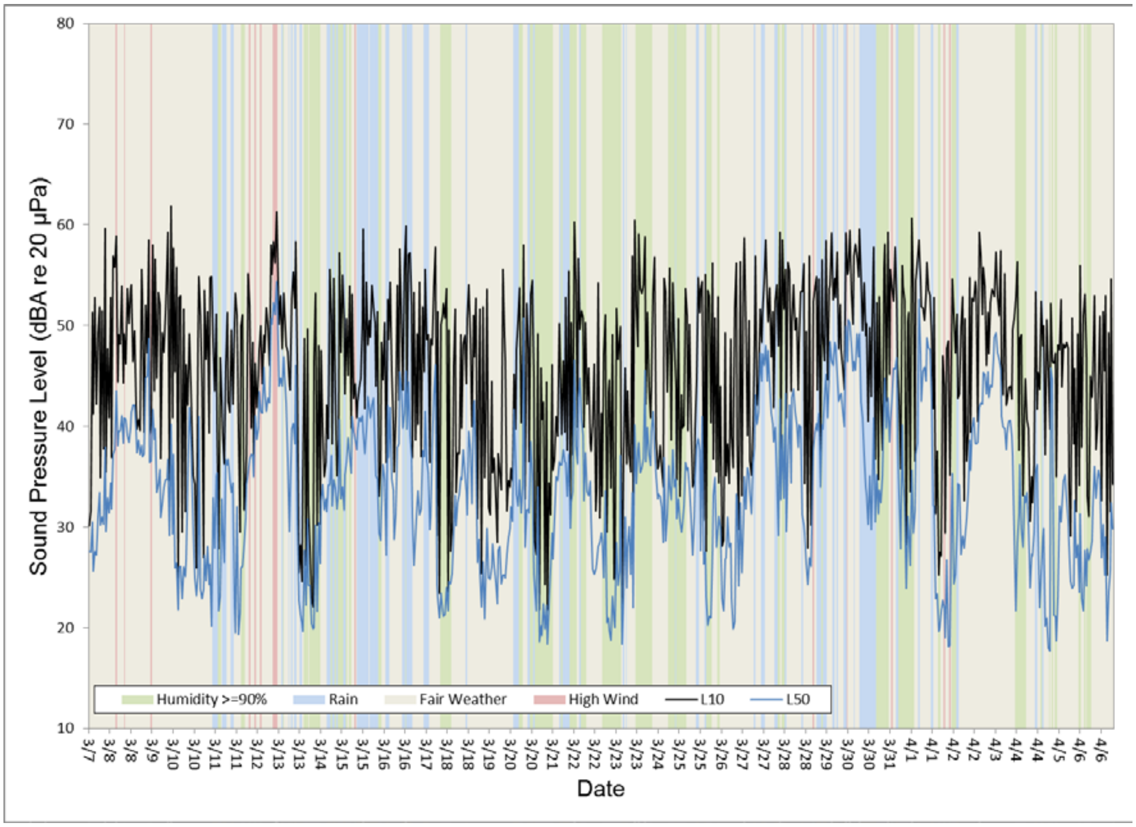
4.8 Monitoring Position 11 – Description and Results

MP-11 was located at a cabin approximately 5 miles south of Meacham, Oregon, along Segment 3 (Union County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-11 are approximately 1.1 miles and 207 feet, respectively. The distance to the nearest existing transmission line from MP-11 is approximately 0.5 mile and is owned by BPA. Field observations noted that several cabins are located in the area. Some of the cabins are used to house field crews working to keep the railroad and access roads free of snow in the winter. One cabin is owned by the Oregon Department of Forestry. Daytime field observations noted 8 to 10 heavy trucks (some with snowplows) that passed the meter within one hour. Snowplows passing by the meter were measured at approximately 80 dBA. Freight train traffic was present on the Union Pacific Railroad situated immediately adjacent to the property. Nighttime field observations noted generally quiet conditions with no traffic, sounds of water running in a creek, light snow/rain showers, and light winds. Figure 4-15 includes photographs of the MP relative to the cabin and the viewpoint of the MP to the Project. Figure 4-16 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

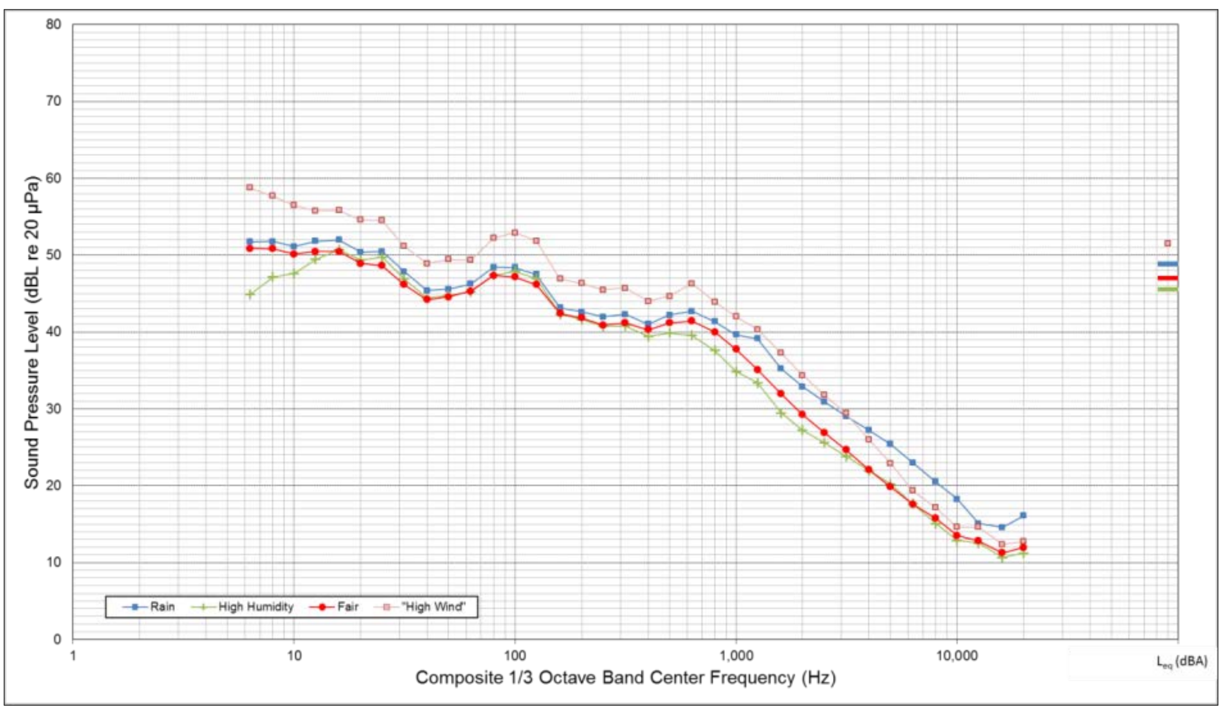
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-15. Photographs of Monitoring Position 11



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-16. Monitoring Position 11 Summary of Measured Sound Pressure Levels

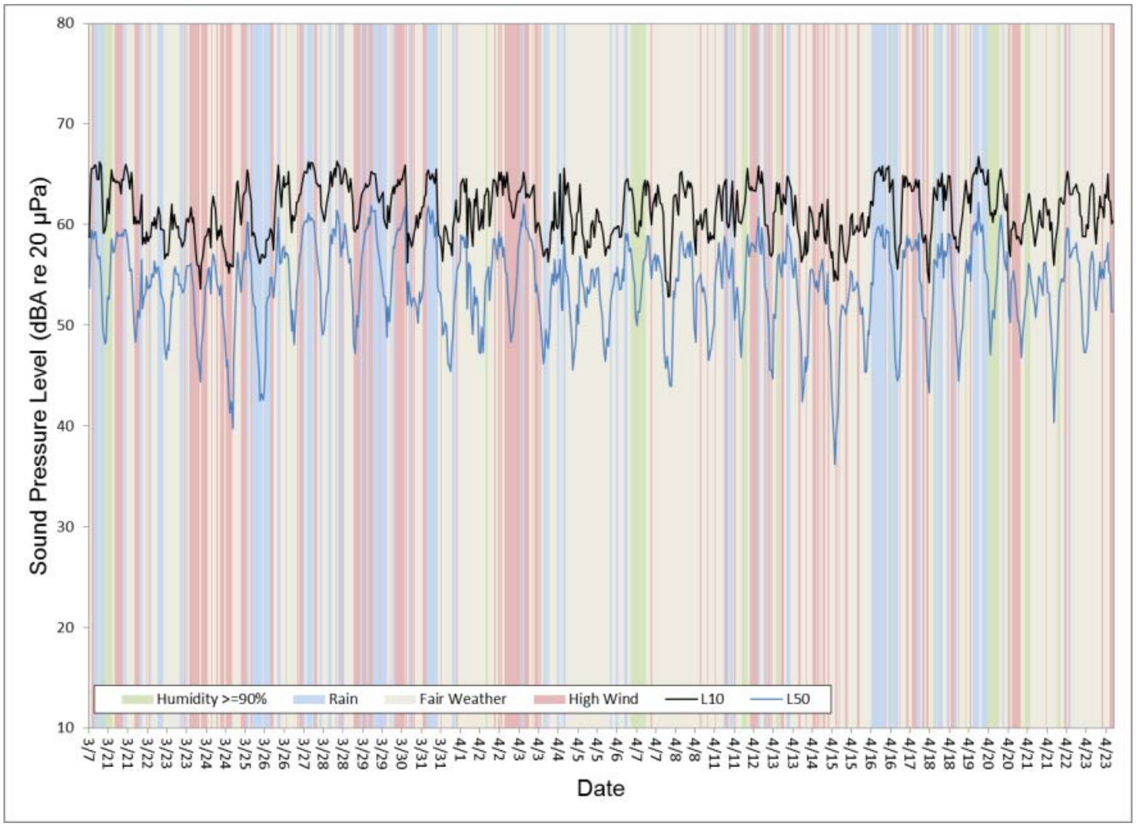
4.9 Monitoring Position 13 – Description and Results

MP-13 was located at a residence approximately 7 miles southwest of Union, Oregon, along Segment 3 (Union County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-13 are approximately 580 feet and 4.7 miles, respectively. The distance from MP-13 to the nearest existing transmission line, owned by IPC, is approximately 0.43 mile. Daytime field observations included steady highway traffic, heavy winds, and horses. Nighttime observations included light winds and highway traffic. Nighttime 15-minute traffic counts were five heavy trucks (one westbound and four eastbound) and five automobiles (three eastbound and two westbound). Figure 4-17 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-18 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

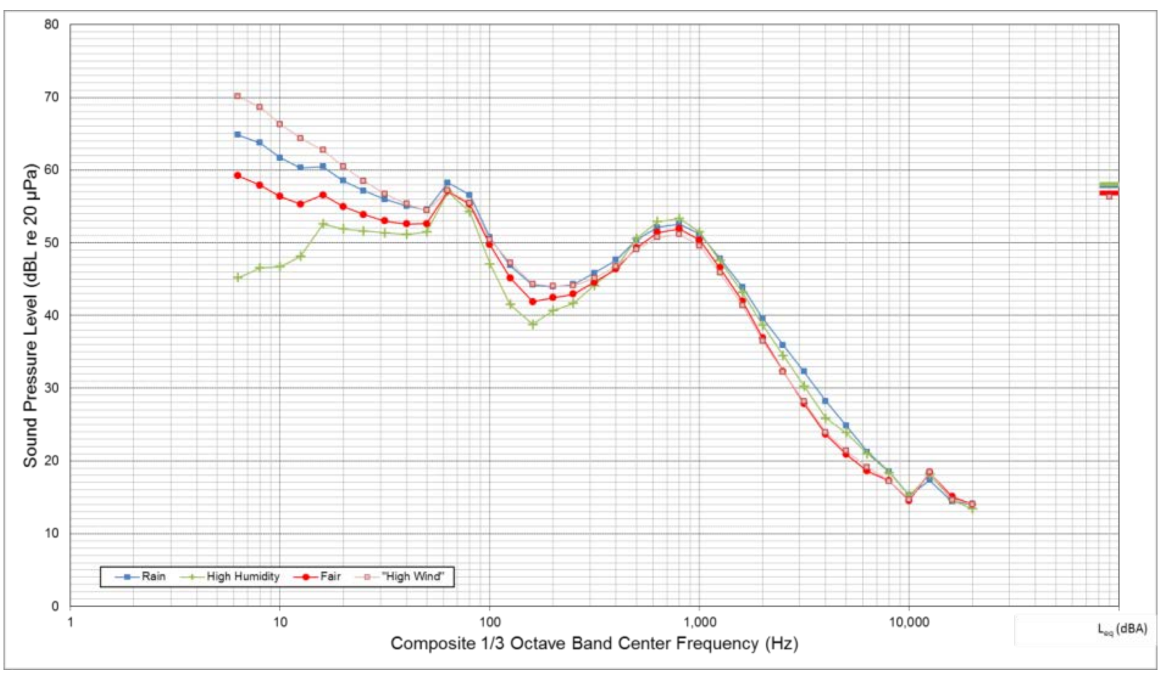
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-17. Photographs of Monitoring Position 13



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-18. Monitoring Position 13 Summary of Measured Sound Pressure Levels

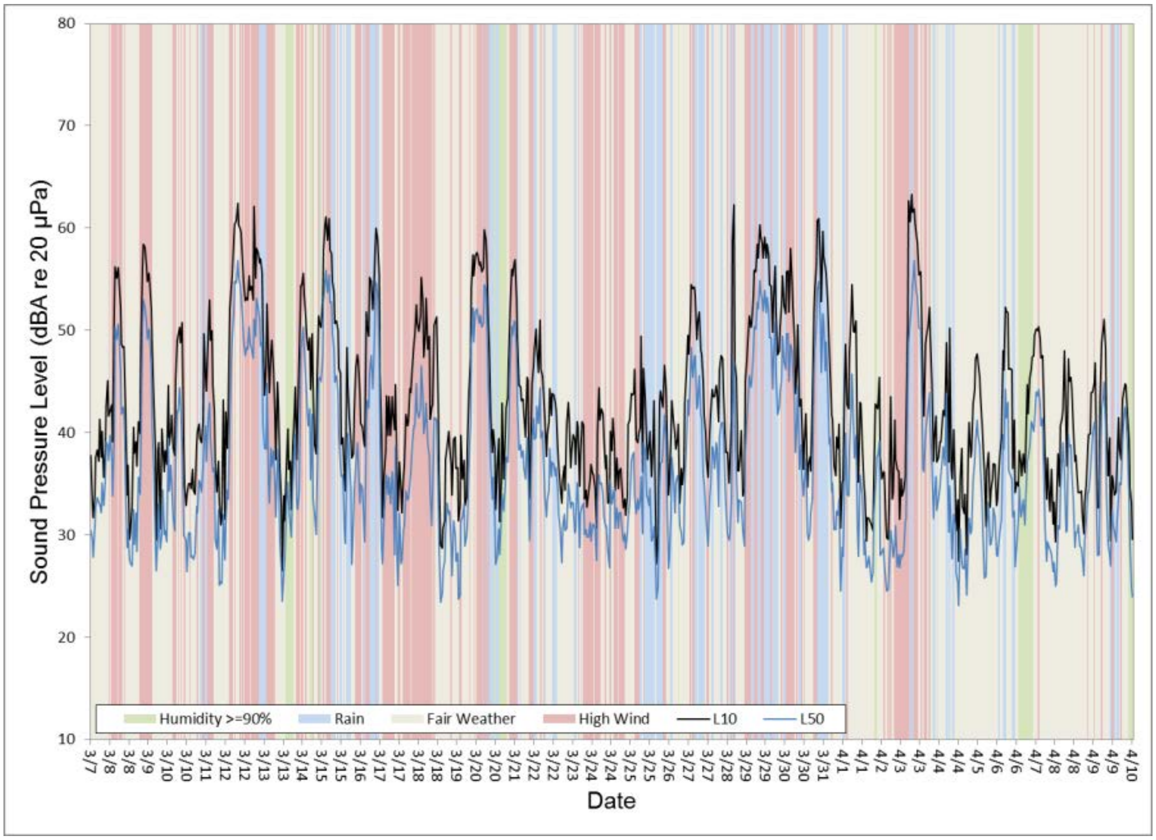
4.10 Monitoring Position 14 – Description and Results

MP-14 was located at a residence approximately 5 miles north of Powder, Oregon, along Segment 3 (Union County). The distances to the nearest major roadway (Olsen) and the Union Pacific Railroad from MP-14 are approximately 1.2 and 2.9 miles, respectively. The distance to the nearest existing transmission line from MP-13 is approximately 0.46 mile and is owned by IPC. Daytime audible noise was present from dogs barking, antelope, loose metal shingles on the home and barns blowing in the wind, distant highway traffic, and local roadway traffic. Additionally, the property owner noted that he often fires his guns and uses his earth mover equipment on his property. Nighttime observations included distant traffic on I-84, low winds, insects and wildlife. Figure 4-19 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-20 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

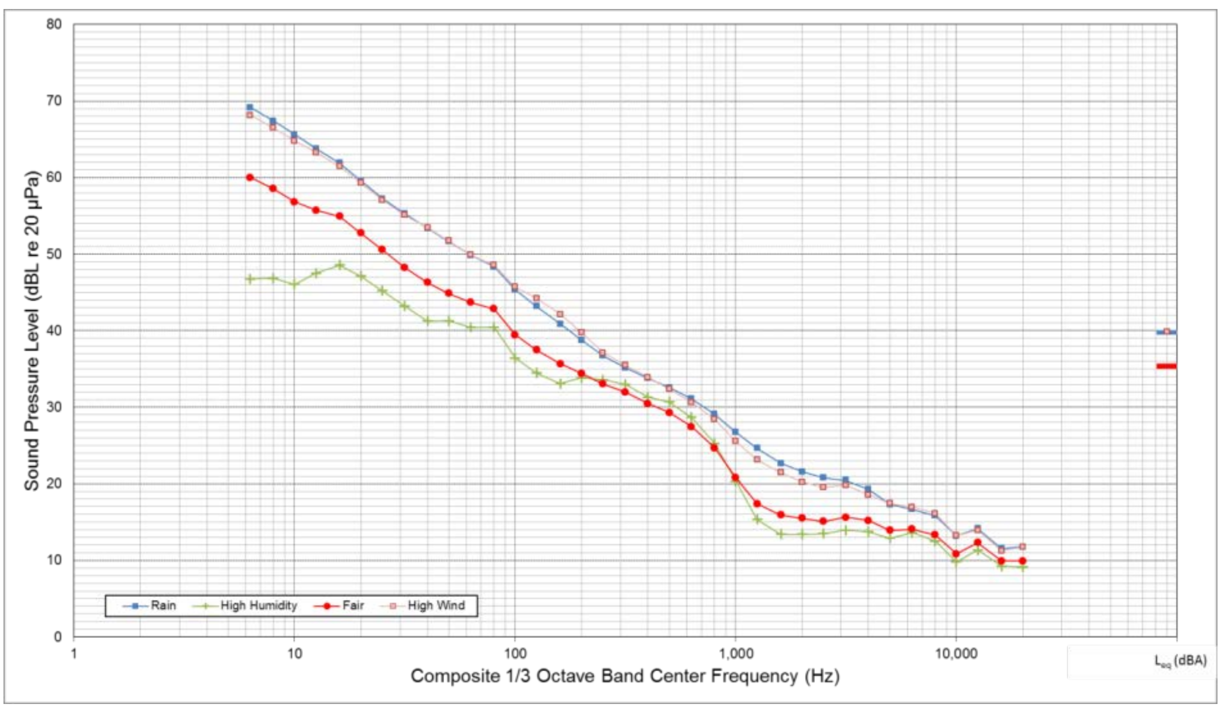
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the proposed Project

Figure 4-19. Photographs of Monitoring Position 14



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-20. Monitoring Position 14 Summary of Measured Sound Pressure Levels

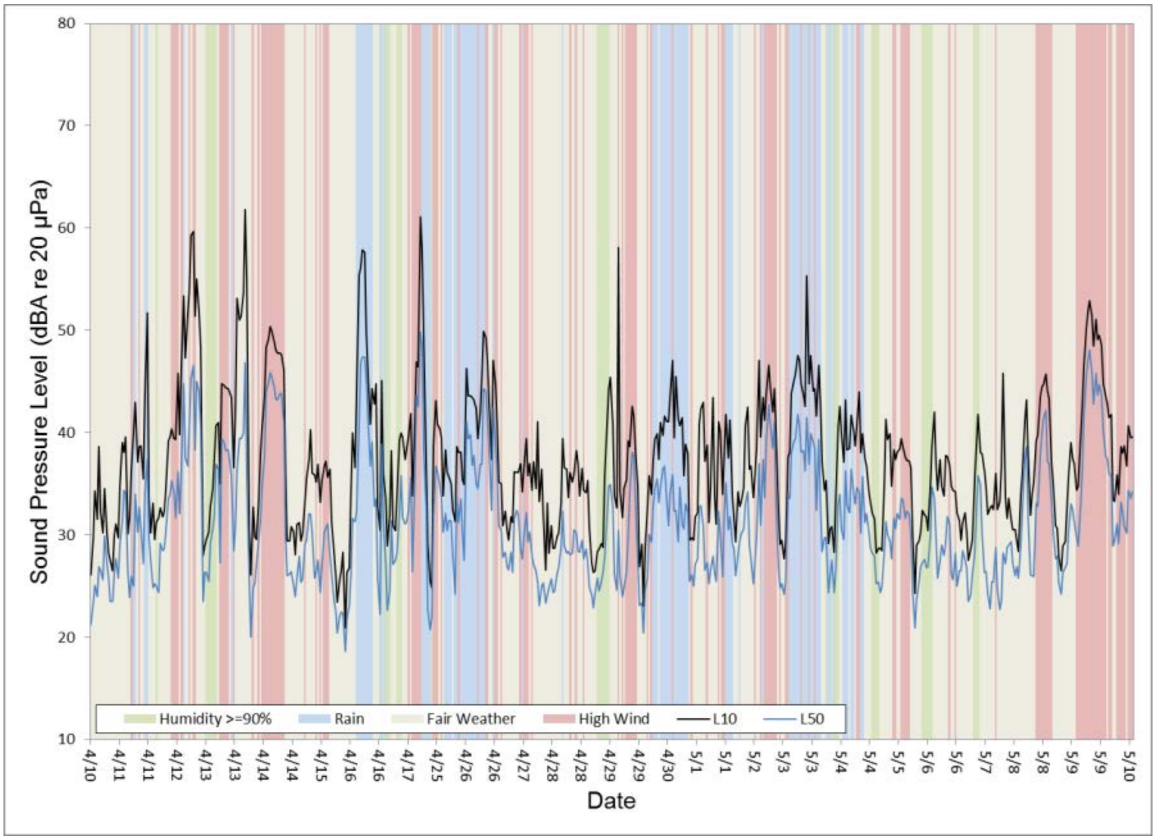
4.11 Monitoring Position 15 – Description and Results

MP-15 was located at a residence approximately 6 miles northeast Baker City, Oregon, along Segment 4 (Baker County). The distances to the nearest major roadway (Sunnyslope) and the Baker City Airport from MP-15 are approximately 0.5 and 2.5 miles, respectively. The distance to the nearest existing transmission line from MP-15 is approximately 0.6 mile and is owned by IPC. Daytime field observations included audible sources from birds, trucks, and intermittent propeller aircraft activity possibly originating from Baker City Airport. Nighttime audible sources included a train horn and engine at approximately 4 a.m., distant traffic noise on I-84, and strong winds howling over ground and structures. Figure 4-21 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-22 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

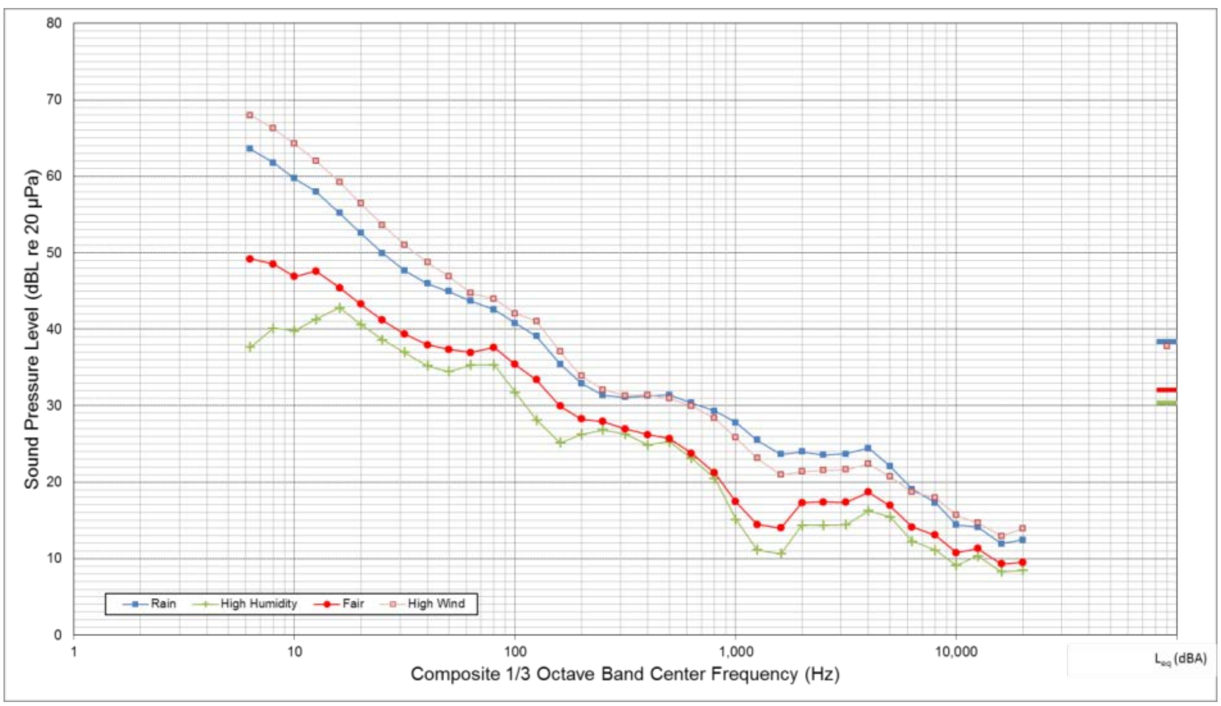
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-21. Photographs of Monitoring Position 15



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-22. Monitoring Position 15 Summary of Measured Sound Pressure Levels

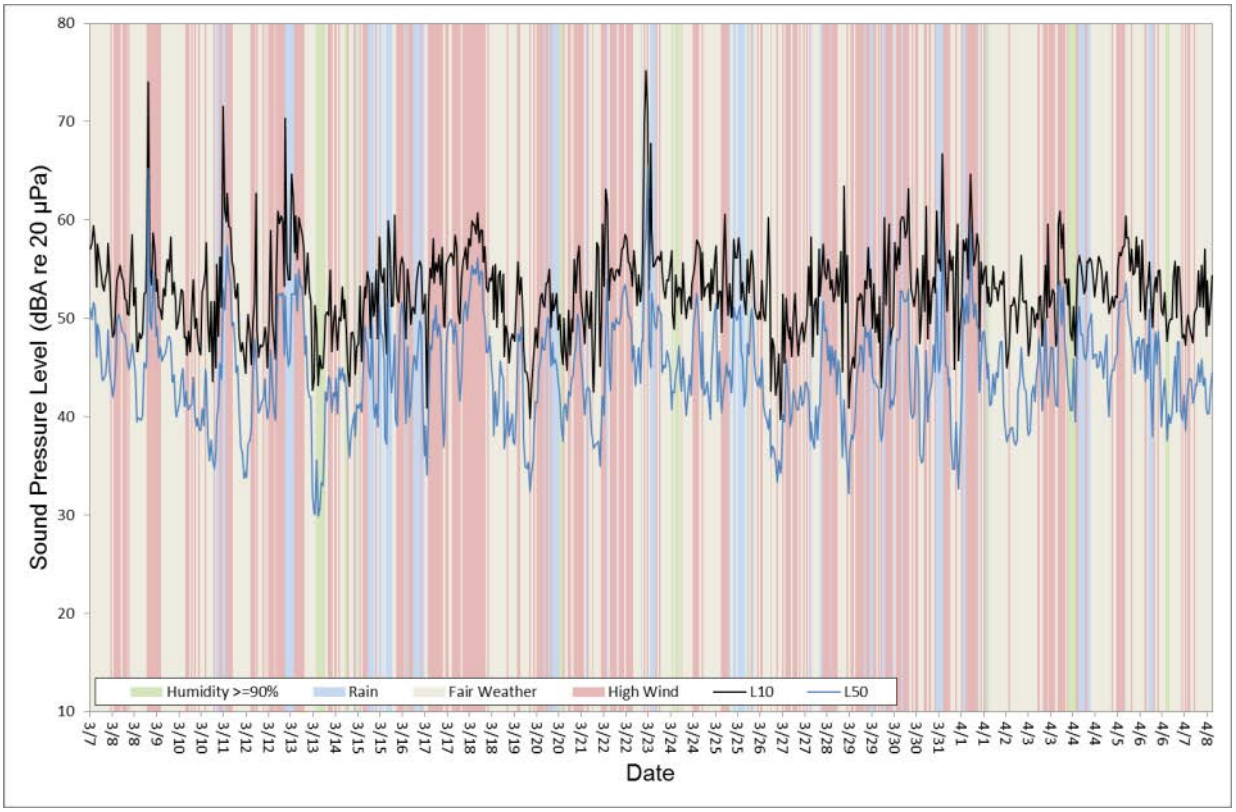
4.12 Monitoring Position 16 – Description and Results

MP-16 was located at a residence approximately 6 miles southeast of Baker City, Oregon, along Segment 4 (Baker County). Distances to the nearest major roadway (Old Highway 30) and the Union Pacific Railroad from MP-16 are approximately 340 feet and 0.23 mile, respectively. The distance to the nearest existing transmission line from MP-16 is approximately 342 feet and is owned by IPC. Daytime field observations included sounds from a dog barking, distant traffic from I-84 and Old Highway 30, and driveway traffic adjacent to the meter. Nighttime observations included highway traffic and two trains with rumbling wheels and blowing horns. Additionally, 15-minute traffic counts included six heavy trucks (four westbound and two eastbound) and two automobiles (one westbound and one eastbound). Figure 4-23 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-24 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

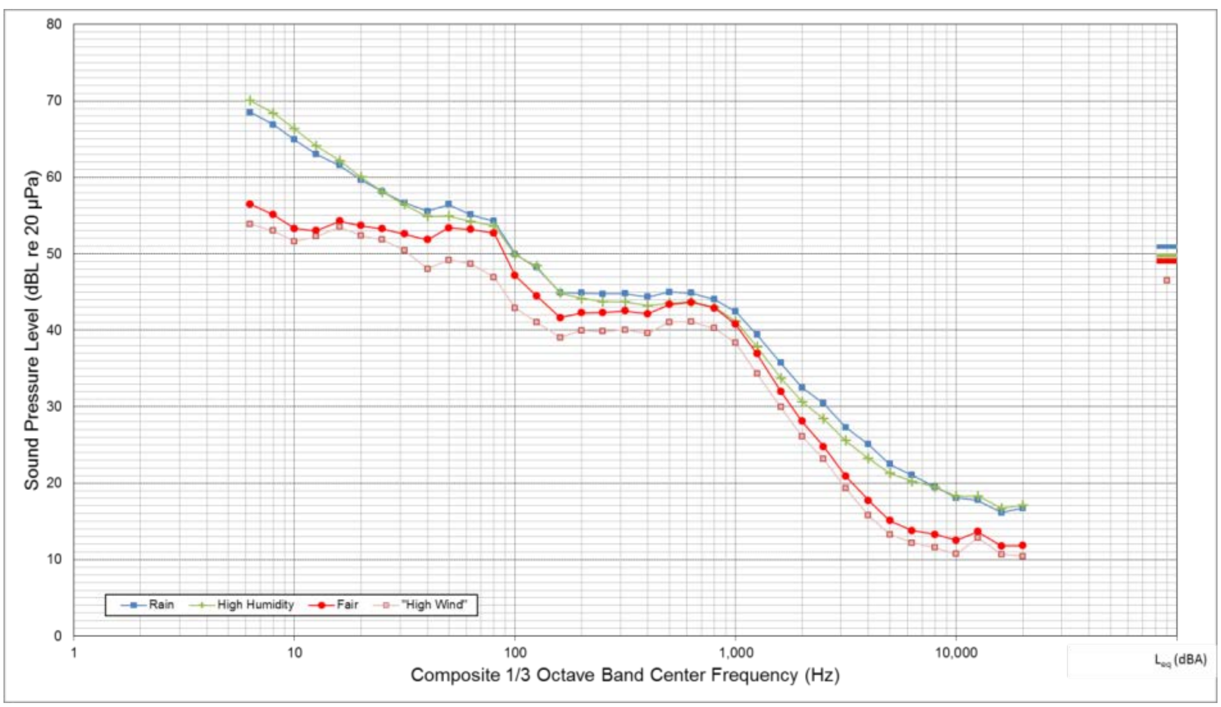
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-23. Photographs of Monitoring Position 16



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-24. Monitoring Position 16 Summary of Measured Sound Pressure Levels

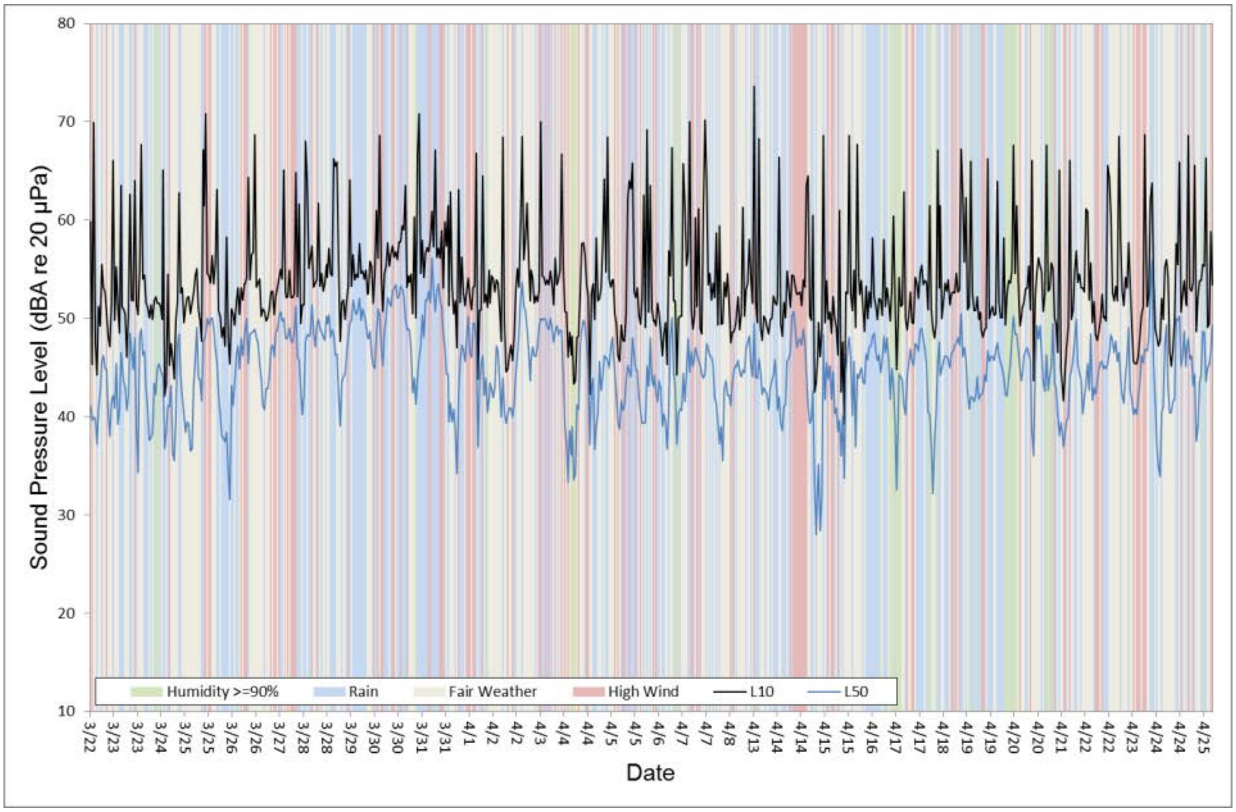
4.13 Monitoring Position 17 – Description and Results

MP-17 was located at a residence approximately 1.0 mile northwest Pleasant Valley, Oregon, along Segment 4 (Baker County). The distances to the nearest major roadway (Old Highway 30) and the Union Pacific Railroad from MP-17 are approximately 363 and 161 feet, respectively. The distance from MP-17 to the nearest existing transmission line, owned by IPC, is approximately 0.22 mile. Daytime observations included sounds from roadway traffic on I-84 and birds chirping. Nighttime observations included strong wind, highway traffic on I-84, and a train pass-by at approximately 12:30 a.m. Fifteen-minute traffic counts included seven heavy trucks (one westbound and six eastbound) and eight automobiles (four westbound and four eastbound). Figure 4-25 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-26 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

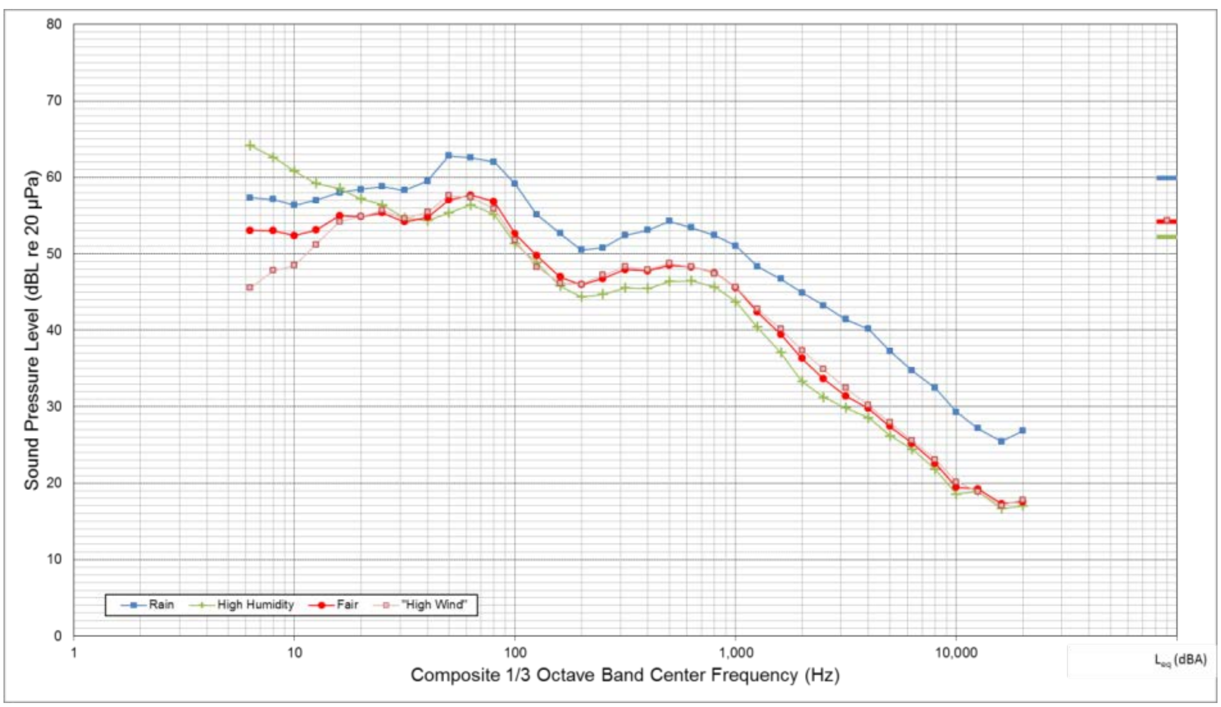
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-25. Photographs of Monitoring Position 17



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-26. Monitoring Position 17 Summary of Measured Sound Pressure Levels

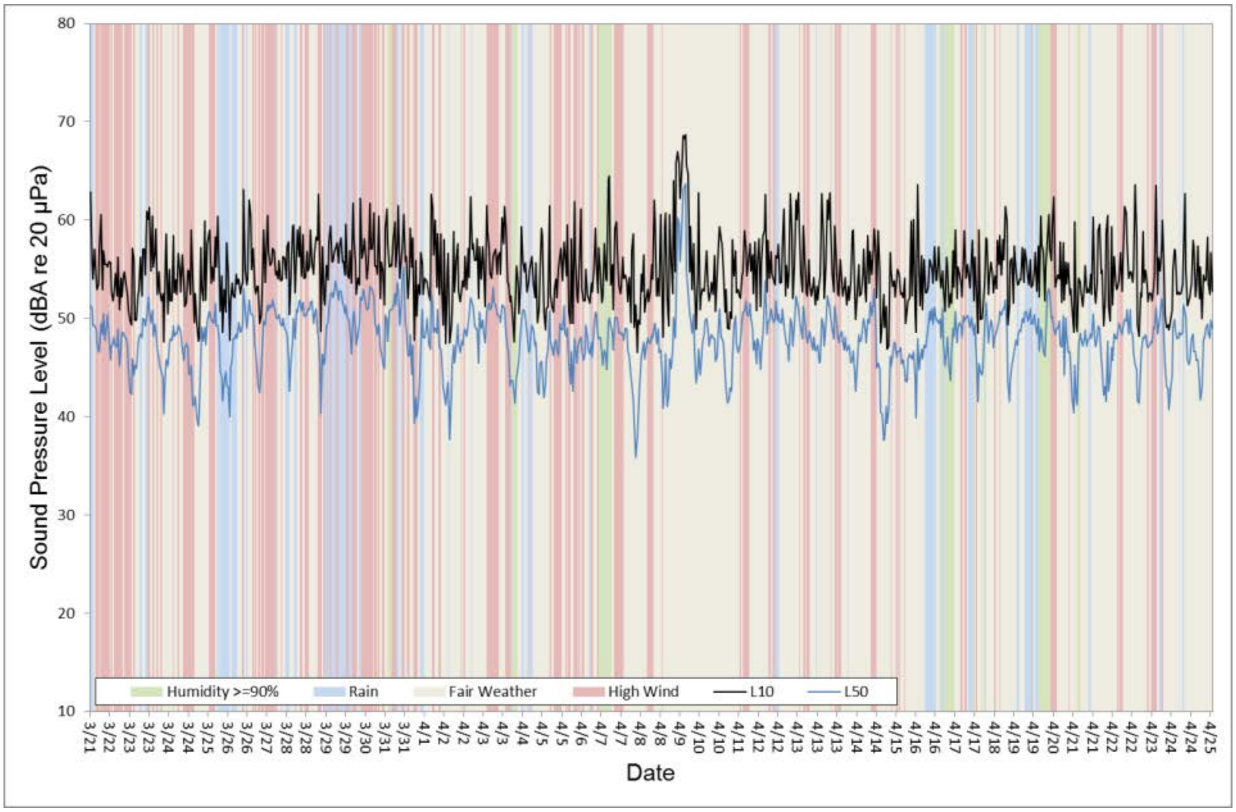
4.14 Monitoring Position 19 – Description and Results

MP-19 was located at a residence approximately 5.6 miles northwest of Durkee, Oregon, along Segment 4 (Baker Count). Distances to the nearest major roadway (Old Highway 30) and the Union Pacific Railroad from MP-19 are approximately 145 and 882 feet, respectively. The distance from MP-19 to the nearest existing transmission line, owned by IPC, is approximately 494 feet. Daytime observations included sounds from highway traffic with semi-trucks using compression braking while descending downhill, a train pass-by, a helicopter flyover, birds, and wind. Although not operating during field observations, a tractor was present at the MP and appeared to be used regularly. Nighttime observations included sounds from a train pass-by at approximately 12:15 a.m. using its horn several times, compression braking by heavy trucks descending downhill, and wind. Fifteen-minute traffic counts included 12 heavy trucks (five eastbound and seven westbound) and two automobiles (one eastbound and one westbound). Figure 4-27 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-28 shows the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

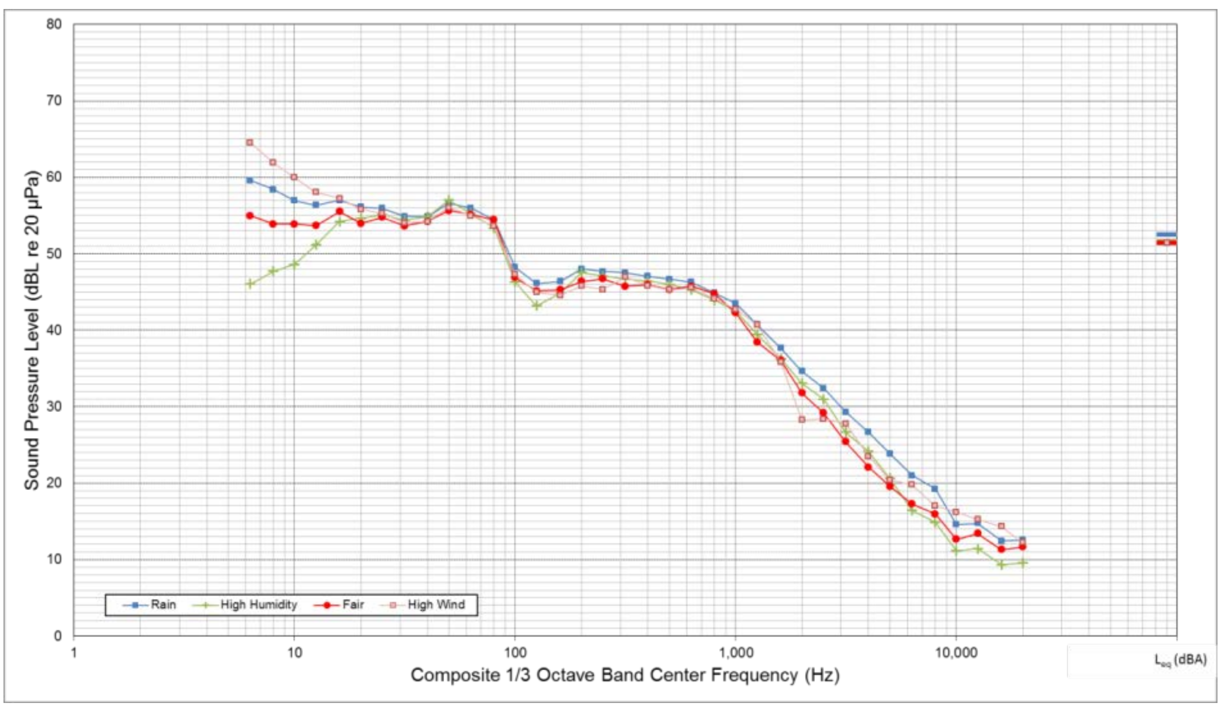
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-27. Photographs of Monitoring Position 19



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-28. Monitoring Position 19 Summary of Measured Sound Pressure Levels

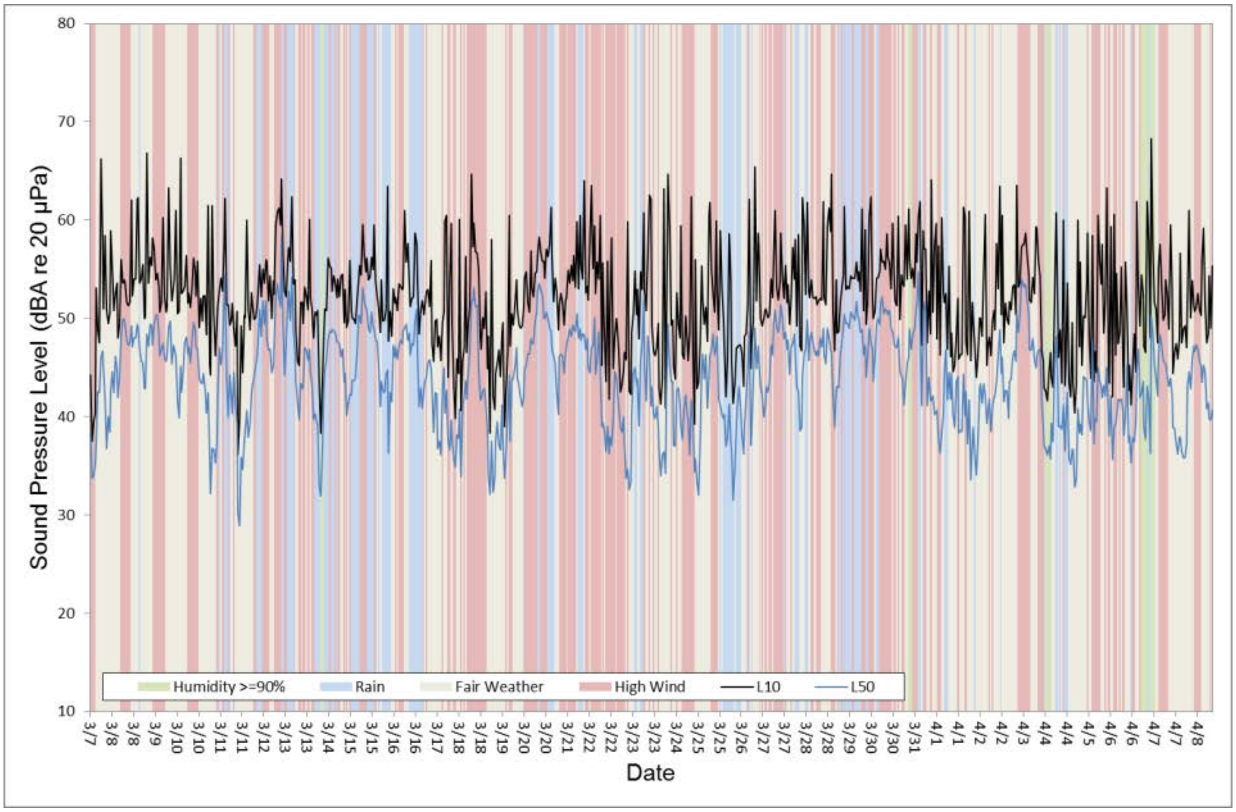
4.15 Monitoring Position 20 – Description and Results

MP-20 was located at a residence approximately 4 miles north of Durkee, Oregon, along Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-20 are approximately 0.4 mile and 550 feet, respectively. The distance from MP-20 to the nearest existing transmission line, owned by IPC, is approximately 658 feet. Daytime observations included sounds from adjacent highway traffic, a train idling and parked on the tracks next to the property, loose metal roofing on a garage flapping in the wind, birds, wind, a rooster, and cows mooing. Although cows were not immediately present at the MP during observations, cow patties were found at the base of the meter and surrounding area. Nighttime observations included 15-minute traffic counts of 20 heavy trucks (12 eastbound and eight westbound) and nine automobiles (six eastbound and three westbound). Figure 4-29 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-30 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

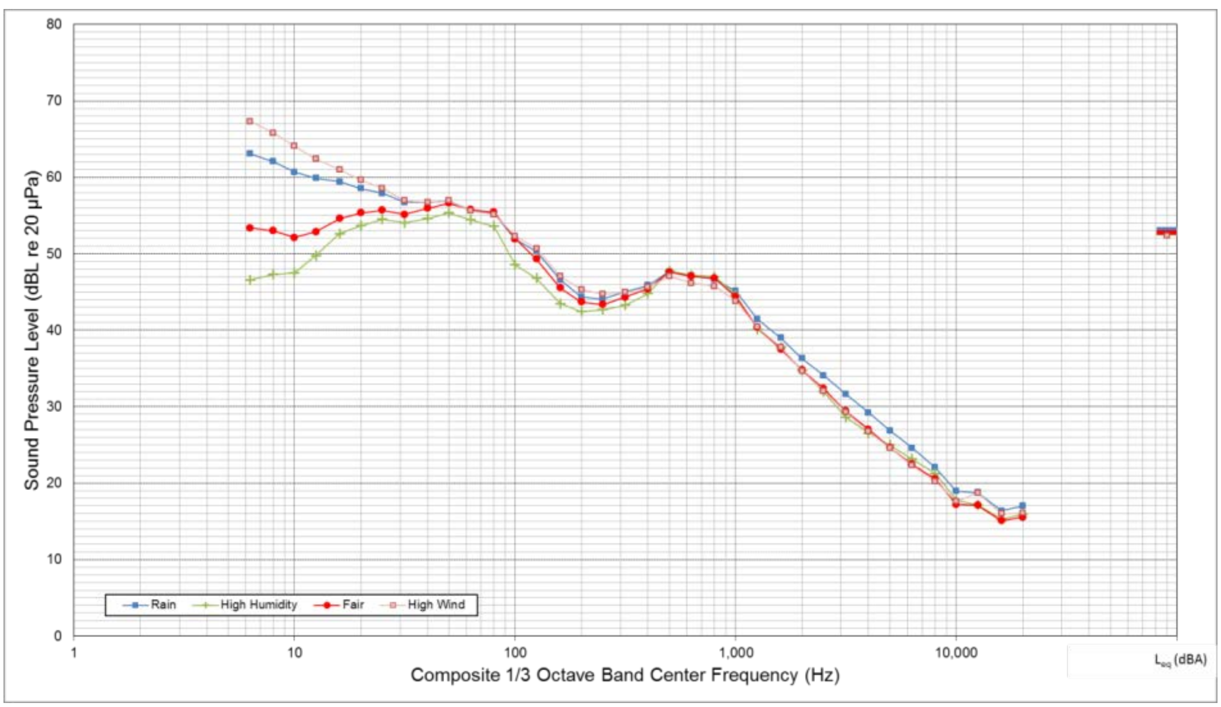
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-29. Photographs of Monitoring Position 20



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-30. Monitoring Position 20 Summary of Measured Sound Pressure Levels

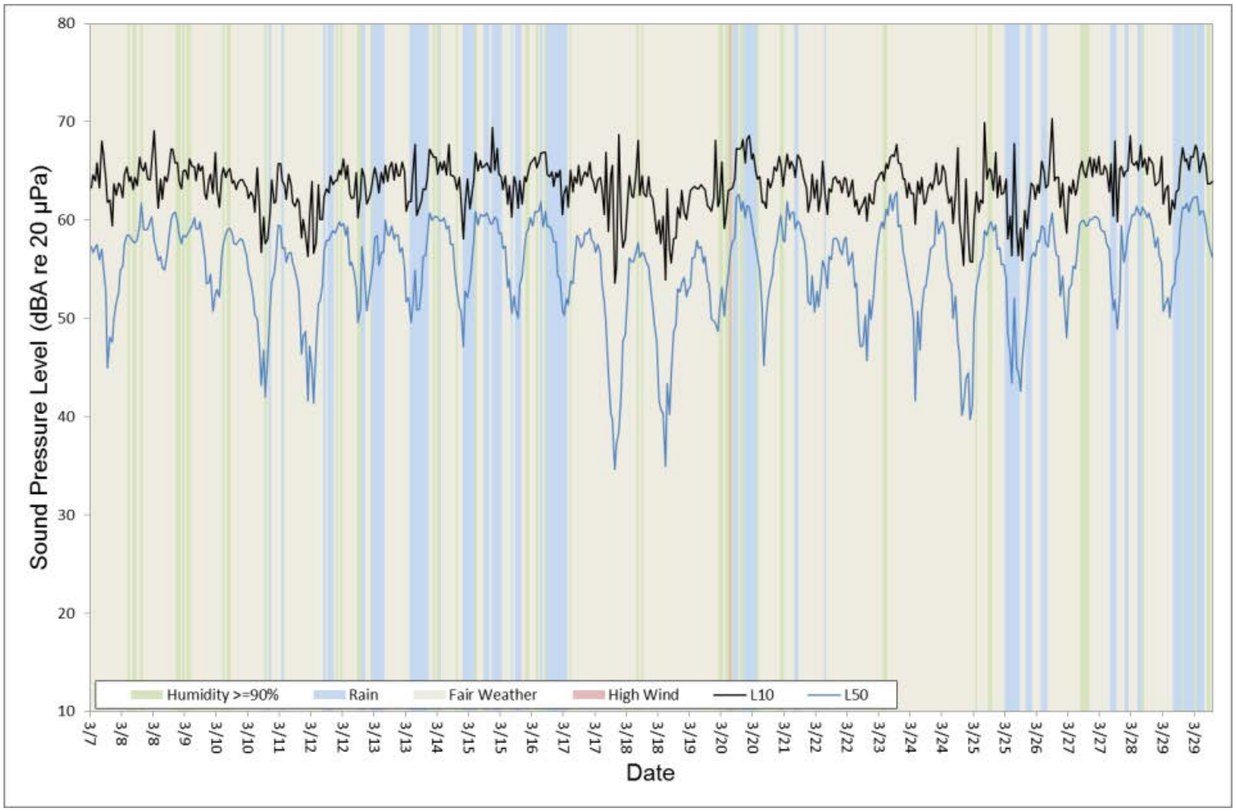
4.16 Monitoring Position 22 – Description and Results

MP-22 was located at a residence approximately 0.8 mile east of Weatherby, Oregon, along Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-22 are approximately 378 and 137 feet, respectively. The distance from MP-22 to the nearest existing transmission line, owned by IPC, is approximately 0.16 mile. Daytime observations included sounds from a train that was parked and idling approximately 300 feet away and then passed by the MP logged at approximately 80 dB and consistent highway traffic on I-84. There was also a wood pile situated near the meter with a wood splitter and evidence of chopping/splitting. Nighttime observations included sounds from highway traffic and running water in a nearby creek. Fifteen-minute traffic counts included 15 heavy trucks (10 eastbound and five westbound) and eight automobiles (seven eastbound and one westbound). Figure 4-31 includes photographs of the monitoring station relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-32 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

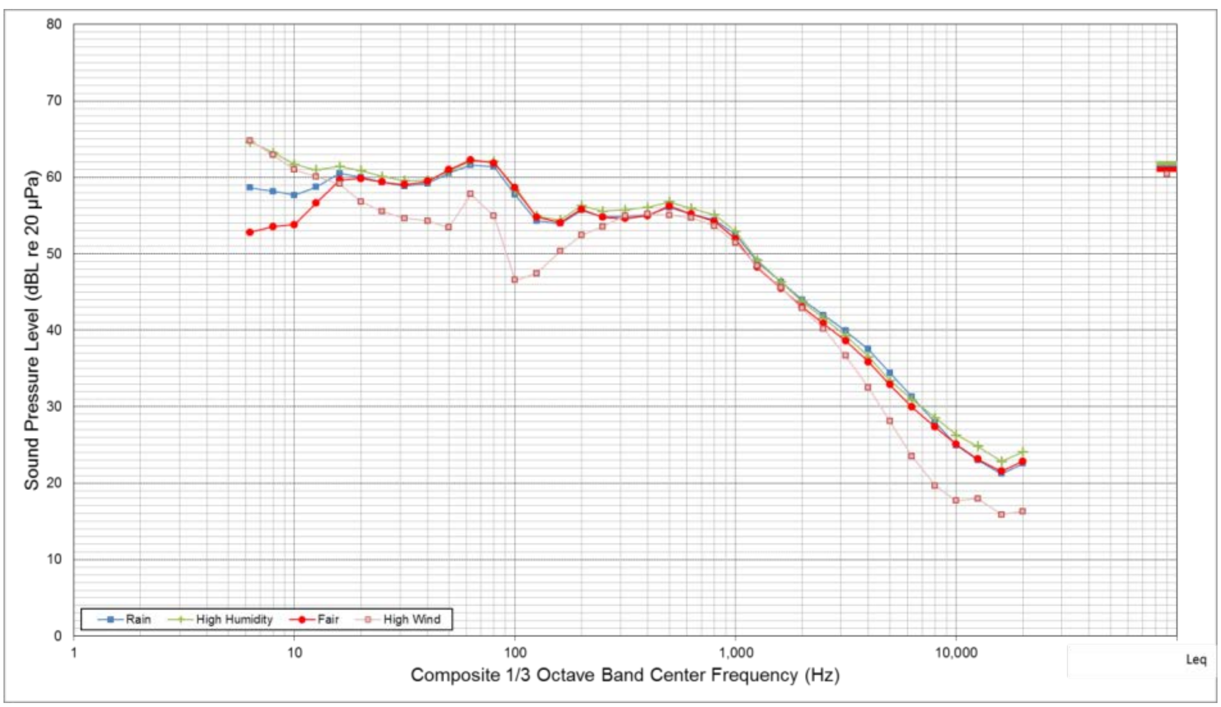
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-31. Photographs of Monitoring Position 22



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-32. Monitoring Position 22 Summary of Measured Sound Pressure Levels

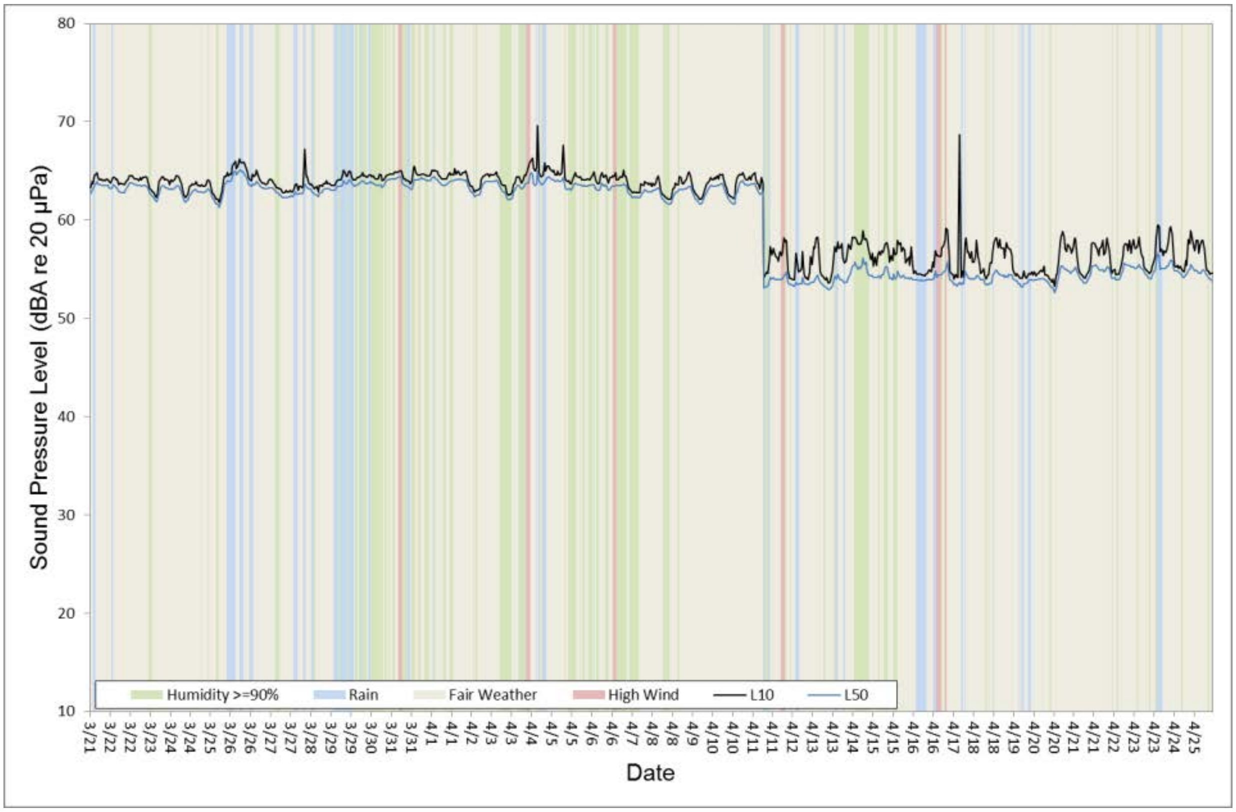
4.17 Monitoring Position 23 – Description and Results

MP-23 was located in an agricultural area approximately 1.0 mile southeast of Weatherby, Oregon, along Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-23 are approximately 993 feet and 0.27 mile, respectively. The distance from MP-23 to the nearest existing transmission line, owned by IPC, is approximately 340 feet. Daytime observations included sounds from the adjacent Creek (monitored in the high 50s to low 60s dB), a freight train and whistle, and highway traffic. Nighttime observations are assumed to be similar to those noted previously at MP-22 with higher sound levels from the nearby Sisley Creek due to closer proximity. Figure 4-33 includes photographs of the monitoring station relative to the primary residential structure and the viewpoint of the proposed Project. Figure 4-34 shows the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions. The time history plot shows a 2 to 3 dB drop in monitored sound levels on April 11, 2012, corresponding to a meter calibration check.

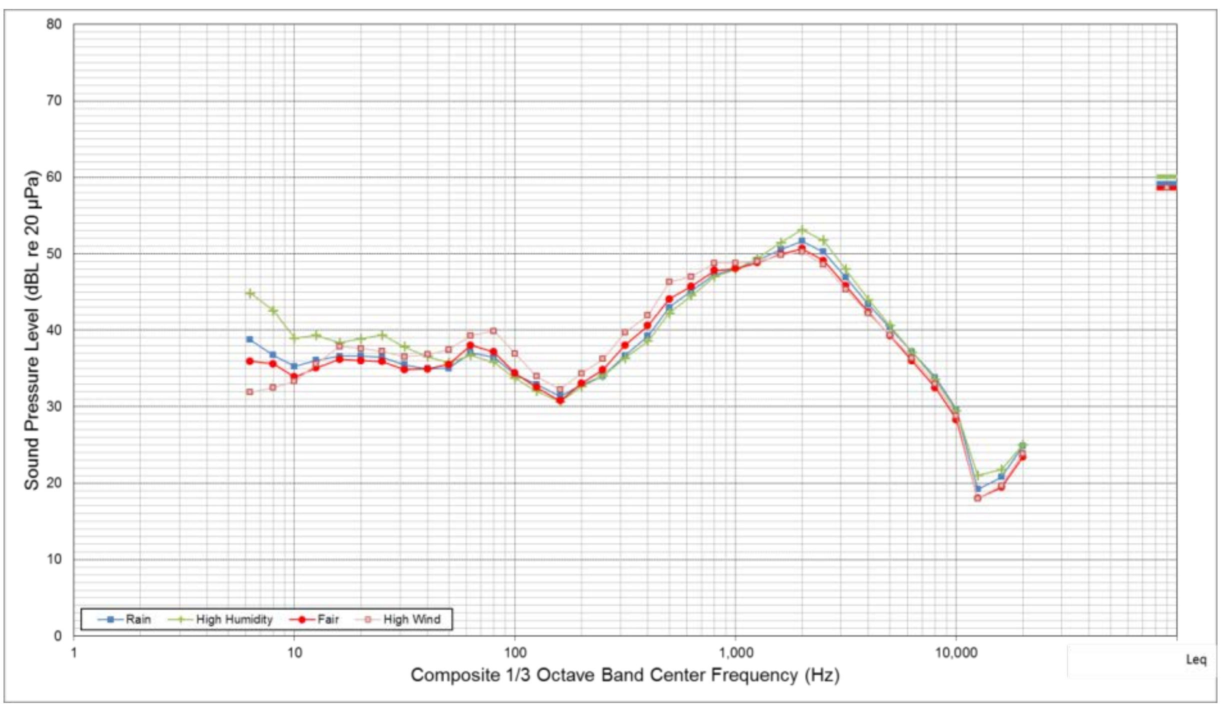
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-33. Photographs of Monitoring Position 23



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-34. Monitoring Position 23 Summary of Measured Sound Pressure Levels

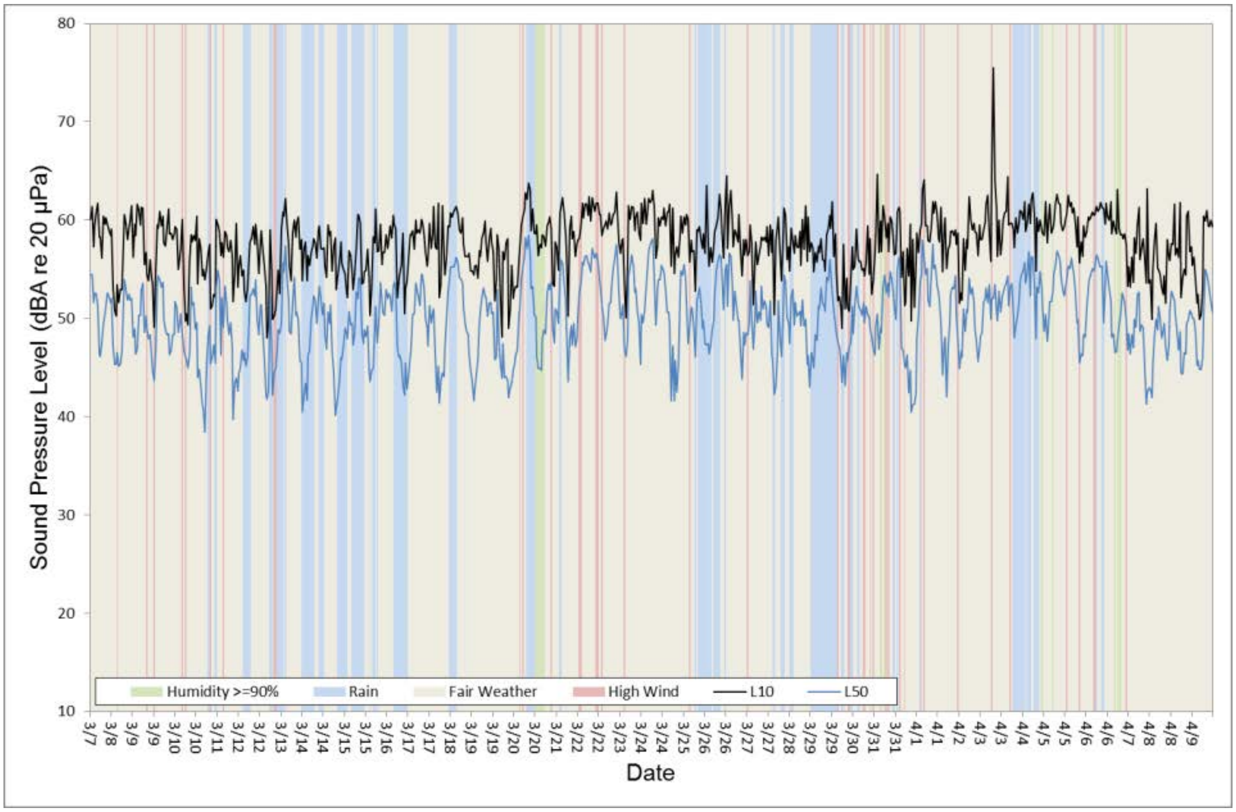
4.18 Monitoring Position 25 – Description and Results

MP-25 was located at a residence approximately 3 miles north of Lime, Oregon, along Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-25 are approximately 719 and 598 feet, respectively. The distance from MP-25 to the nearest existing transmission line, owned by IPC, is approximately 562 feet. Daytime observations included sounds from local roadway traffic, highway traffic on I-84, a train pass-by, faint wind chimes approximately 150 feet from the MP, dogs barking, the landowner talking and mowing grass, and wind. Nighttime observations included highway traffic, frogs, and insects. Fifteen-minute traffic counts included nine heavy trucks (three eastbound and six westbound) and nine automobiles (three heading east and six heading west) within 15 minutes. Figure 4-35 shows photographs of the monitoring station relative to the primary residential structure and the viewpoint of the proposed Project. Figure 4-36 shows the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

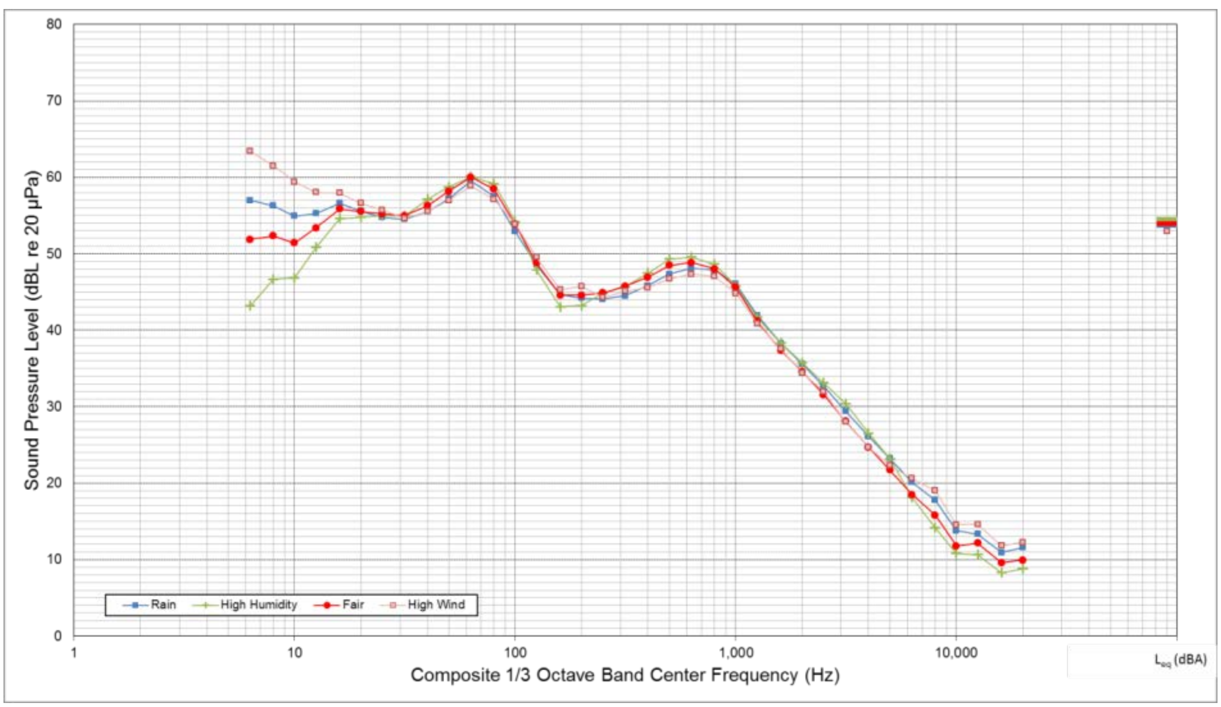
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-35. Photographs of Monitoring Position 25



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

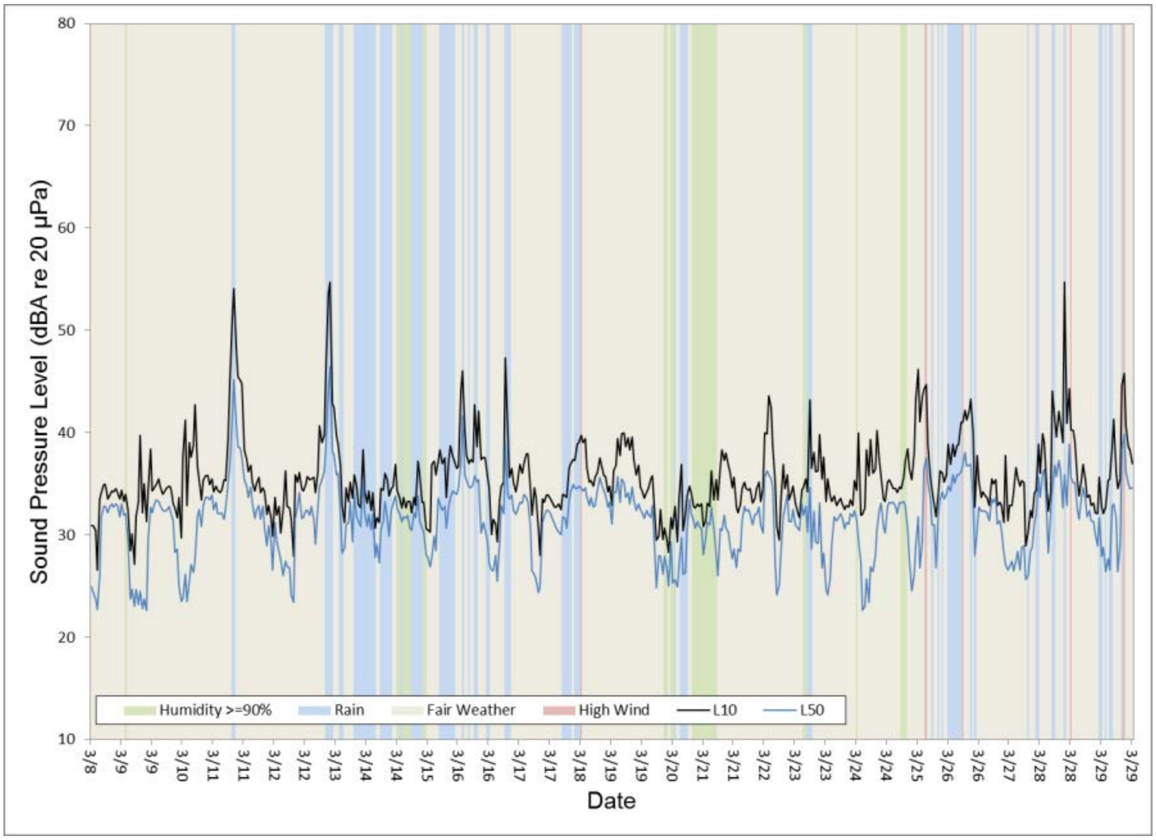
Figure 4-36. Monitoring Position 25 Summary of Measured Sound Pressure Levels

4.19 Monitoring Position 27 – Description and Results

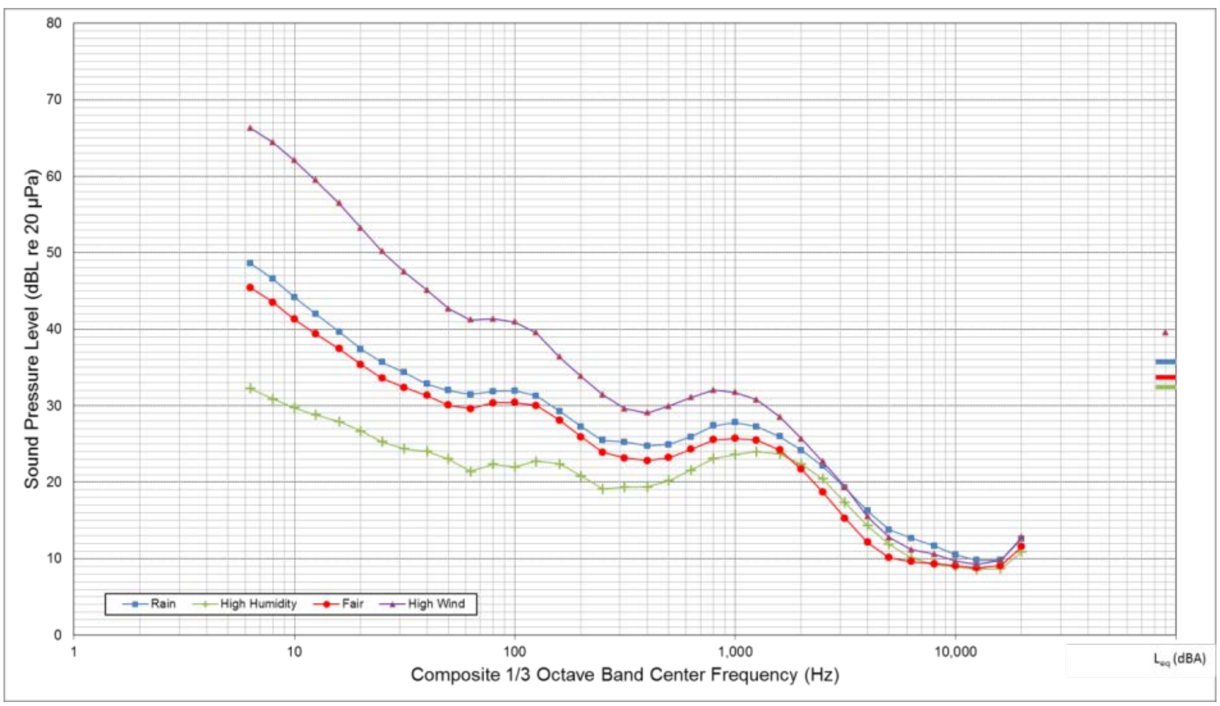
MP-27 was located on open space/BLM-managed lands near the Owyhee Reservoir adjacent to a residence approximately 9.4 miles southwest of the Adrian, Oregon, along Segment 5 (Malheur County). Access to the adjacent residence was restricted by the landowner so field engineers located the MP in a similar position that the residence is located relative to existing sound sources. Distances to the nearest major roadway (SR 201) and the Homedale Airport from MP-27 are approximately 7.3 and 10 miles, respectively. Distance to the local roadway (Owyhee Lake Road) was approximately 20 feet. The distance from MP-27 to the nearest existing transmission line, owned by PacifiCorp, was approximately 0.87 mile. Daytime observations included audible sources from a distance aircraft/jet flying over, the Owyhee River, and local roadway traffic from fishermen who were near the river access/parking area across the road from the MP. Other sources included sheep grazing across the river and distant gun shots, which seemed to be associated with target practice having observed 12 to 15 shots within 1 minute. Figure 4-37 includes a photograph of the MP relative to the Project. Figure 4-38 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

Photograph taken in the direction of the proposed Project

Figure 4-37. Photographs of Monitoring Position 27



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-38. Monitoring Position 27 Summary of Measured Sound Pressure Levels

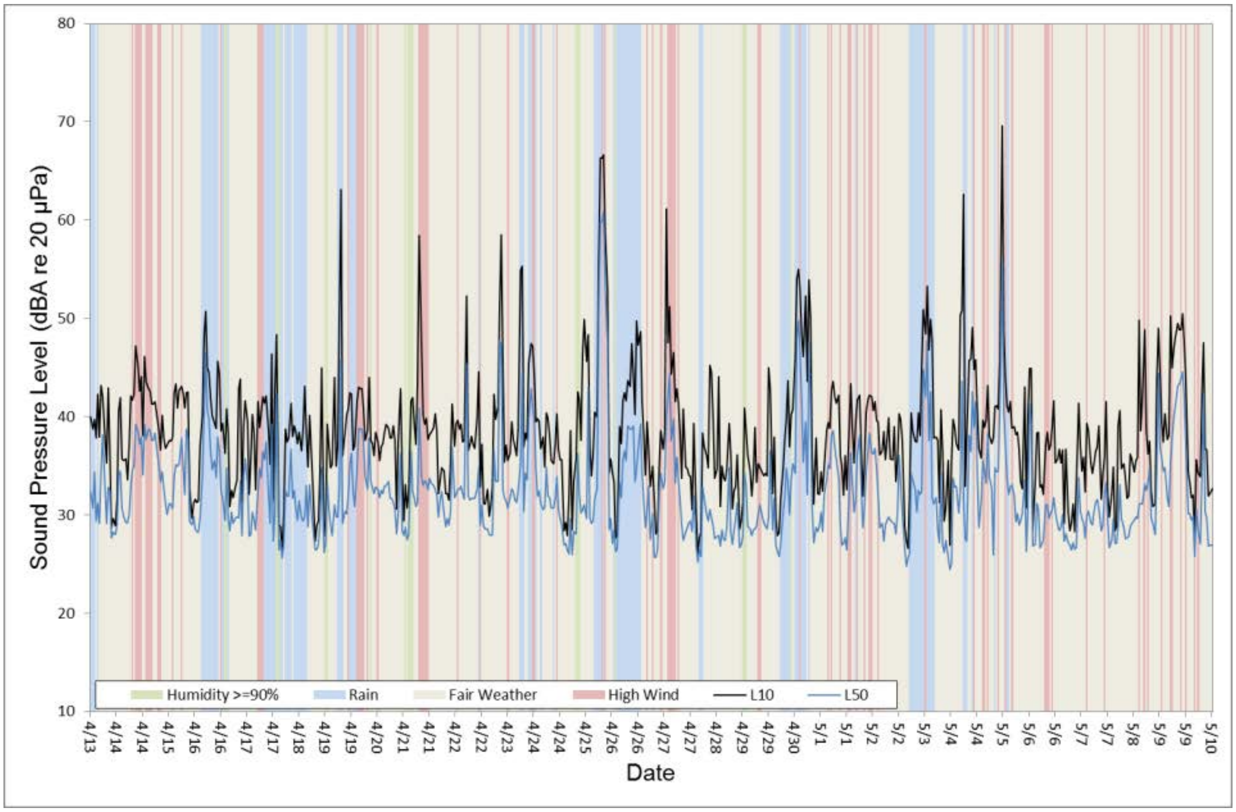
4.20 Monitoring Position 28 – Description and Results

MP-28 was located at a residence approximately 3.6 miles east of Pilot Rock, Oregon, along Segment 2 (Umatilla County). Distances to the nearest major roadway (US 395) and the Union Pacific Railroad from MP-28 are approximately 2.9 and 3.3 miles, respectively. The distance from MP-28 to the nearest existing transmission line, owned by PacifiCorp, is approximately 2.1 miles. Daytime observations noted generally quiet conditions with sounds from the wind interacting with vegetation and terrain, as well as sounds of birds. One helicopter and one fixed-wing overflights were observed during the survey. Nighttime observations included insects, winds interacting with vegetation, and one car on a gravel road approximately 1,000 feet away. Figure 4-39 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-40 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

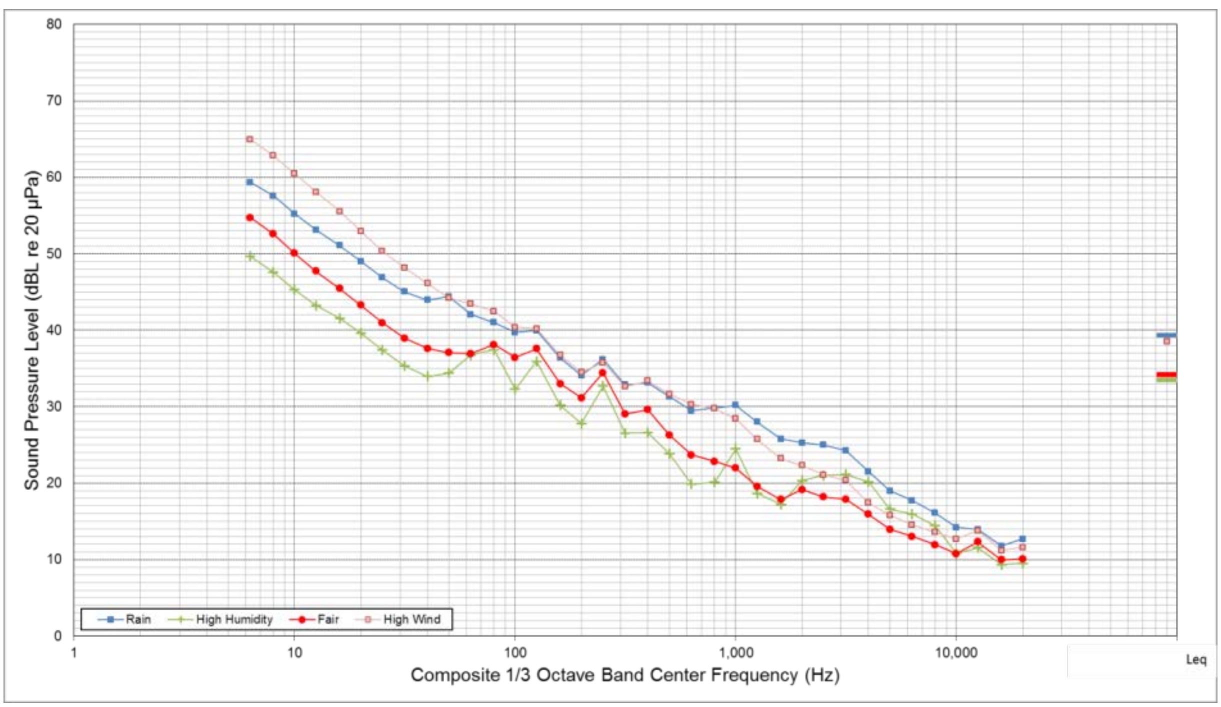
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-39. Photographs of Monitoring Position 28



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-40. Monitoring Position 28 Summary of Measured Sound Pressure Levels

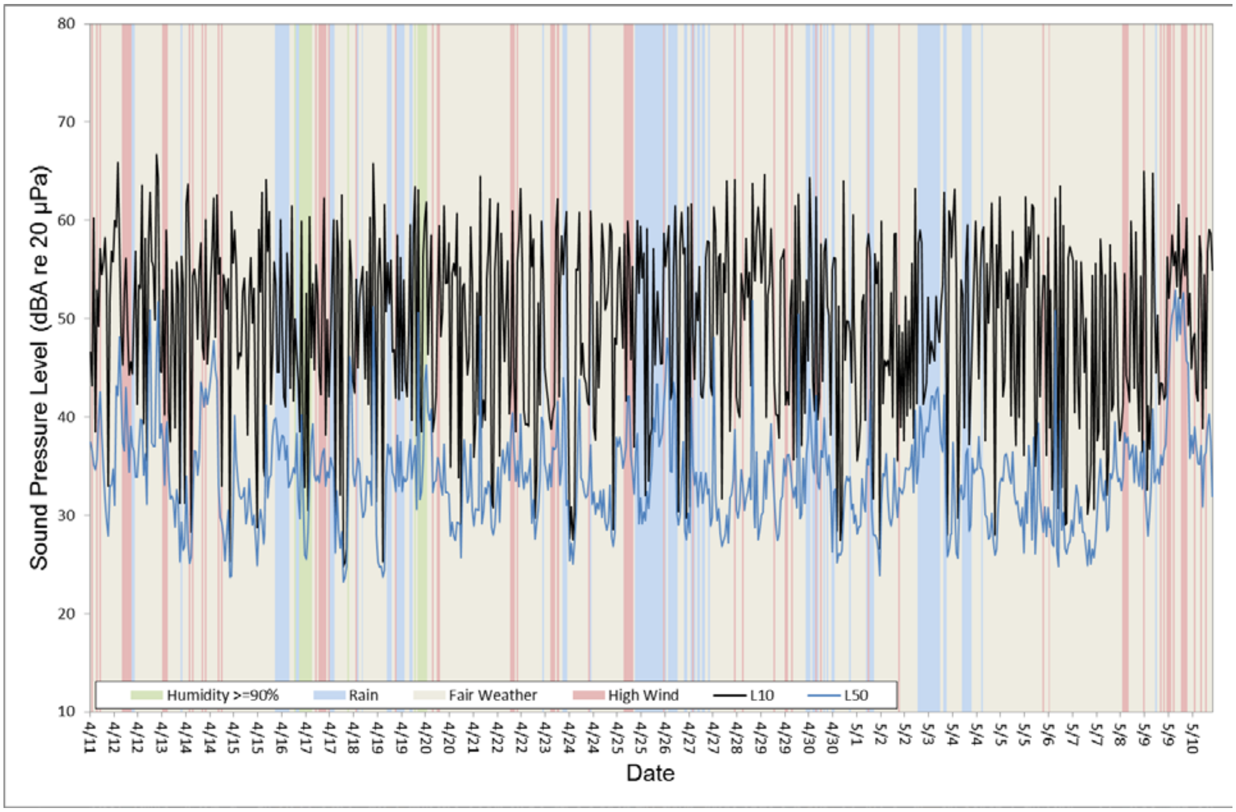
4.21 Monitoring Position 30 – Description and Results

MP-30 was located in a residential area approximately 2.8 miles northwest of the Durkee, Oregon, along Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-30 were approximately 0.9 mile and 493 feet, respectively. The distance from MP-30 to the nearest existing transmission line, owned by IPC, was approximately 0.56 mile. Daytime observations included sounds from birds, distant highway traffic, cows, and aircraft overflights. Nighttime observations included steady winds, running water in a nearby creek, birds, and distant traffic on I-84. Figure 4-41 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-42 shows the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

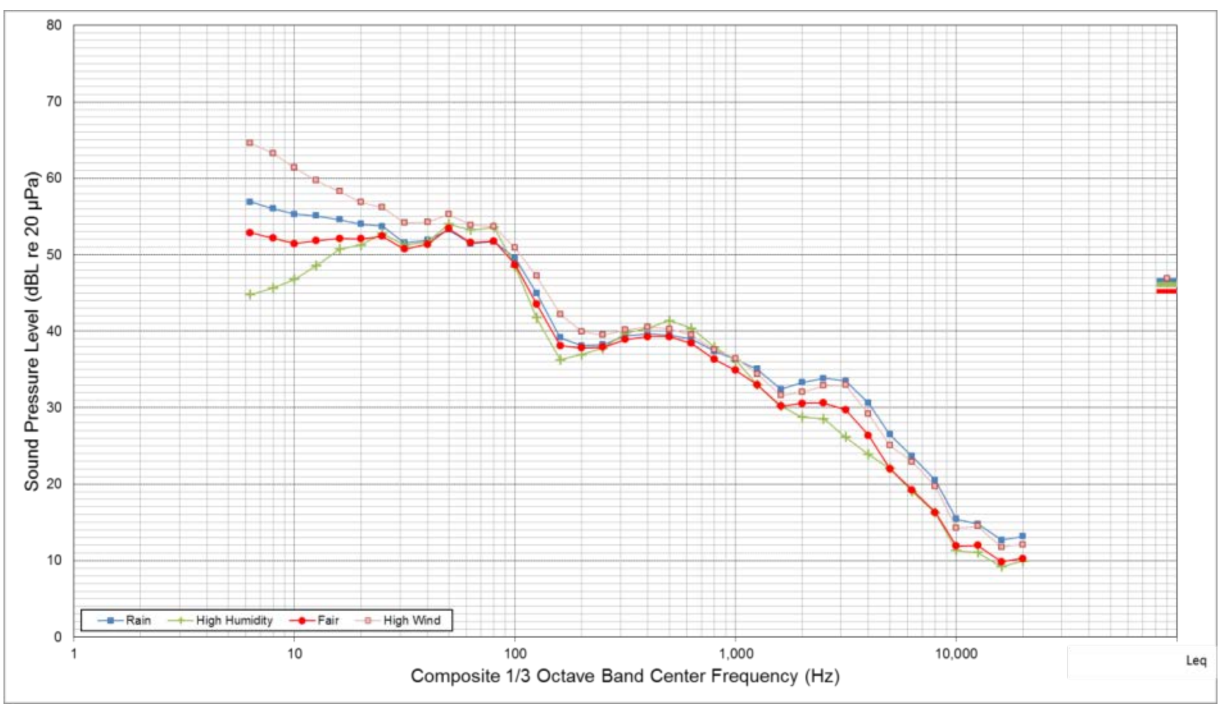
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the proposed Project

Figure 4-41. Photographs of Monitoring Position 30



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-42. Monitoring Position 30 Summary of Measured Sound Pressure Levels

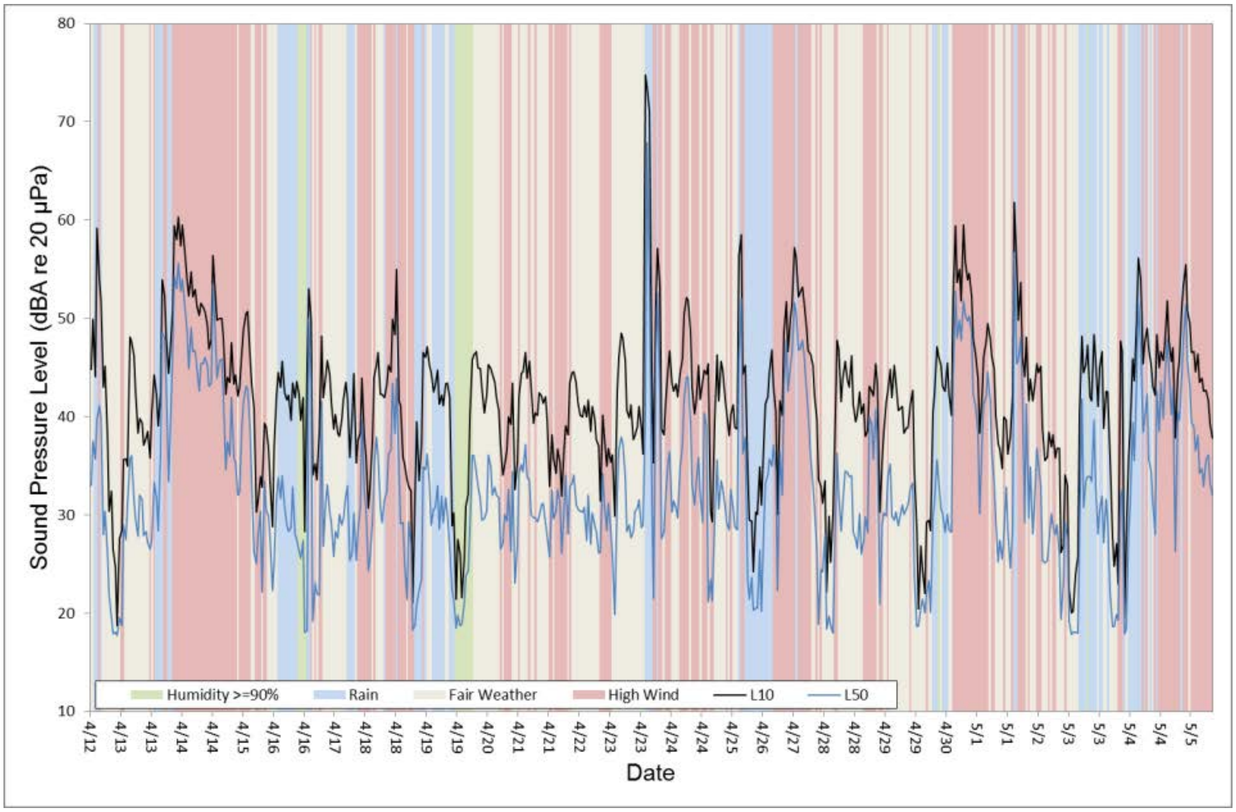
4.22 Monitoring Position 31 – Description and Results

MP-31 was located at a residence approximately 2 miles north of Brogan, Oregon, along Segment 5 (Malheur County). The distance to the nearest major roadway (US 26) was 975 feet. No railroads were nearby MP-31. The distance from MP-31 to the nearest existing transmission line, owned by IPC, was approximately 595 feet. Daytime observations included sounds from wind, birds, and light traffic on US 26. Additionally, the landowner noted approximately 200 cattle periodically graze over the property. Figure 4-43 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP to the Project. Figure 4-44 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

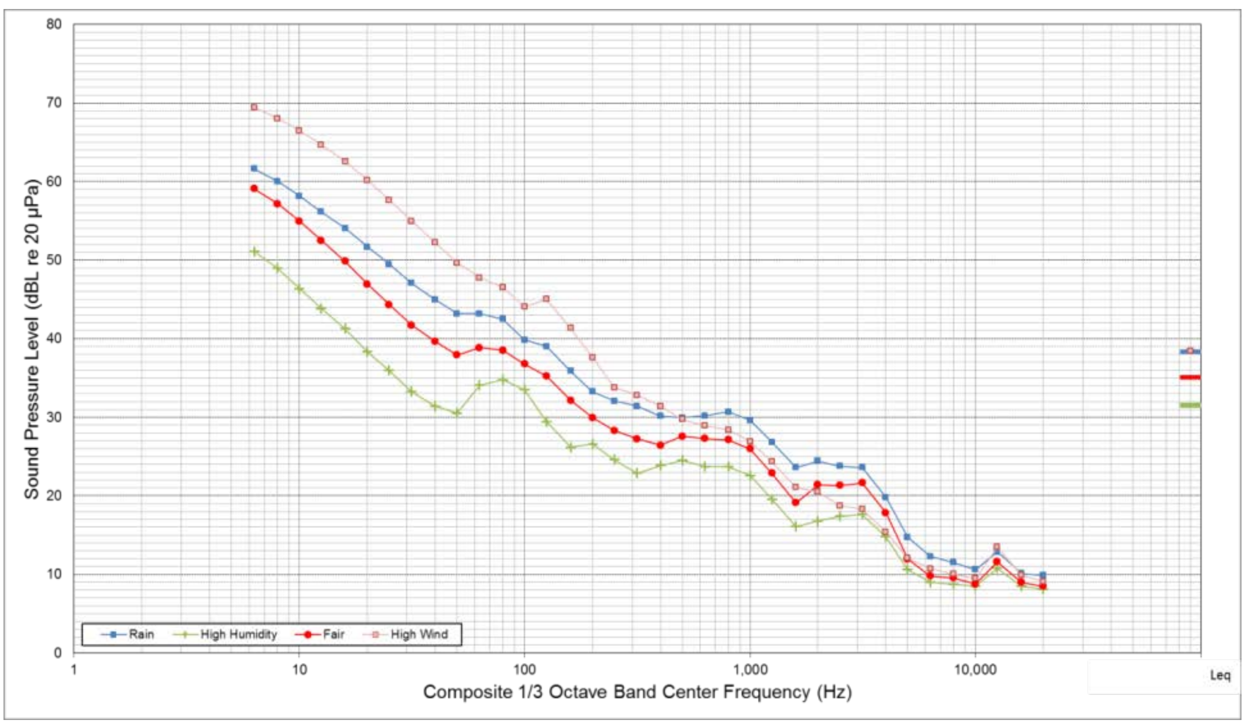
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the proposed Project

Figure 4-43. Photographs of Monitoring Position 31



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-44. Monitoring Position 31 Summary of Measured Sound Pressure Levels

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the Project Baseline Sound Survey indicate that background sound levels vary both spatially and temporally, which is partly a function of the large size of the analysis area and the varying existing sound sources within the analysis area. Principal contributors to the existing acoustic environment included motor vehicle traffic, railroad traffic, streams and rivers, mobile farming equipment and activities, farming irrigation equipment, ATVs, periodic aircraft flyovers, receptor yard sounds (i.e., people and pets), ranch animals (cows, horses, and sheep), and natural sounds such as birds, cows, horses, insects, and wind interaction with vegetation and/or terrain.

The Baseline Sound Survey data were analyzed in terms of periods when transmission line noise emissions are expected to be the highest (foul weather) and in terms of daytime (7:00 a.m. to 10:00 p.m.) and nighttime periods (10:00 p.m. to 7:00 a.m.) as defined in the OAR. Daytime and nighttime periods are typically distinguished in noise regulations because nighttime is generally associated with quieter hours of the day when people may have heightened sensitivity to noise. Additionally, a late night (12:00 a.m. to 5:00 a.m.) subset of the nighttime monitoring period was evaluated as this is a time period where sleep disturbance may be even more likely than during other nighttime hours.

The results of the baseline monitoring program were used in conjunction with acoustic modeling to establish a range of existing ambient sound levels within the analysis area and assist in determining compliance with OAR 340-035-0035(1)(b)(B)(i), which prescribes an incremental increase limit of 10 dBA over the ambient statistical noise levels of either the L_{10} or L_{50}. Consistent with the OAR, the mean L_{10} and L_{50} sound levels were used as estimates to represent the regularly reoccurring or "typical" exposure sound levels and to set baseline conditions. The mean L_{10}, L_{50} sound levels at each MP during daytime and nighttime periods under high humidity (90% relative humidity or greater) and precipitation meteorological conditions were calculated (see Table 5-1). These sound levels correspond to 1-hour interval data during daytime, nighttime, and late night periods measured over the duration of the survey. Table 5-1 also presents the total measurement duration (including starting and ending dates).

Sound levels reported in Table 5-1 are typically highest during the daytime hours. Results show that the L_{50} daytime mean sound levels range from a minimum of 32 dBA at MP-27 to a maximum of 60 dBA at MP-23. The range of the L_{50} nighttime mean sound levels is from 29 dBA at MP-31 to 62 dBA at MP-23. Ambient sound levels at MP-23 are most likely influenced by streams located nearby and insect noise during nighttime hours. MP-27 is located along a creek below the Owyhee Dam, and monitoring results show slightly elevated sound levels during late-night hours, which could be attributed to increased water flow in the Owyhee River and increased insect activity. In most instances, nighttime and late night L_{50} sound levels are fairly similar, typically only differing by 0 to 2 dBA. Across all Project transmission line route segments, the baseline sound levels vary from those characteristics of a quiet rural setting to those that may be more strongly influenced by existing sound sources in the Project area, such as roadways, railroads, and streams.

The results of the statistical analysis reported in Table 5-1 will be used to assess impacts from the Project via noise modeling. The baseline sound levels will be used for the purpose of assessing the feasibility of the Project to operate in compliance with OAR 340-035-0035(1)(b)(B)(i). Acoustic modeling will be conducted under similar referenced meteorological conditions and allowing for engineering safety factors, to allow some design margin for circumstances and account for variation of the Project-specific meteorological conditions when corona noise will most likely be present.

Table 5-1. Description of Monitoring Positions, Measurement Durations and Results (March 6, 2012 to May 10, 2012)

Monitoring Location	Time Period	L_{10} 1-hour dBA	L_{50} 1-hour dBA	Measurement Period	
				Date / Start Time	**Date / End Time**
MP-2 (SN 2575)	Daytime	45	39	3/6/12 12:00 p.m.	3/19/12 10:00 a.m.
	Nighttime	40	35		
	Late-Night	39	34		
MP-3 (SN 1711)	Daytime	44	36	3/9/12 3:00 p.m.	4/9/12 12:00 p.m.
	Nighttime	38	32		
	Late-Night	37	31		
MP-5 (SN 2663)	Daytime	49	41	3/6/12 2:00 p.m.	4/7/12 11:00 p.m.
	Nighttime	39	32		
	Late-Night	39	32		
MP-6 (SN 2665)	Daytime	45	38	3/6/12 4:00 p.m.	4/6/12 11:00 p.m.
	Nighttime	39	33		
	Late-Night	38	33		
MP-7 (SN 2442 / 2665)	Daytime	53	46	3/6/12 4:00 p.m.	4/24/12 10:00 a.m.
	Nighttime	47	40		
	Late-Night	45	40		
MP-8 (SN 2667)	Daytime	43	40	3/7/12 9:23 a.m.	4/8/12 11:00 p.m.
	Nighttime	42	41		
	Late-Night	43	41		
MP-9 (SN 2665)	Daytime	43	38	4/24/12 4:00 p.m.	5/10/12 12:00 p.m.
	Nighttime	40	36		
	Late-Night	41	37		
MP-11 (SN 1708)	Daytime	46	34	3/7/12 12:00 p.m.	4/6/12 11:00 p.m.
	Nighttime	46	31		
	Late-Night	46	31		
MP-13 (SN 2574 / 1710)	Daytime	64	58	3/7/12 1:00 p.m.	4/23/12 11:00 p.m.
	Nighttime	61	52		
	Late-Night	59	49		
MP-14 (SN 1671)	Daytime	47	41	3/7/12 5:00 p.m.	4/10/12 2:00 p.m.
	Nighttime	42	36		
	Late-Night	42	36		

Table 5-1. Description of Monitoring Positions, Measurement Durations and Results (March 6, 2012 to May 10, 2012) (continued)

Monitoring Location	Time Period	L_{10} 1-hour dBA	L_{50} 1-hour dBA	Measurement Period	
				Date / Start Time	Date / End Time
MP-15 (SN 2667 and 1710)	Daytime	43	36	4/10/12 2:00 p.m.	5/10/12 2:00 p.m.
	Nighttime	35	30		
	Late-Night	32	27		
MP-16 (SN 1710)	Daytime	55	47	3/7/12 5:00 p.m.	4/8/12 5:00 a.m.
	Nighttime	52	42		
	Late-Night	51	41		
MP-17 (SN 2661 and 2670)	Daytime	55	46	3/22/12 12:00 p.m.	4/25/12 11:00 a.m.
	Nighttime	55	43		
	Late-Night	55	42		
MP-19 (SN 1350 and 1711)	Daytime	55	50	3/21/12 6:00 p.m.	4/25/12 11:00 a.m.
	Nighttime	54	47		
	Late-Night	54	45		
MP-20 (SN 2668)	Daytime	54	47	3/7/12 1:00 p.m.	4/8/12 11:00p.m.
	Nighttime	51	42		
	Late-Night	50	41		
MP-22 (SN 2661)	Daytime	65	59	3/7/12 4:00 p.m.	3/29/12 11:00 p.m.
	Nighttime	62	52		
	Late-Night	62	51		
MP-23 (SN 2662 and 2668)	Daytime	61	60	3/21/12 5:00 p.m.	4/25/12 1:00p.m.
	Nighttime	63	62		
	Late-Night	64	63		
MP-25 (SN 2664)	Daytime	58	52	3/7/12 6:00 p.m.	4/9/12 11:00 p.m.
	Nighttime	57	47		
	Late-Night	57	46		
MP-27 (SN 1009)	Daytime	37	32	3/8/12 2:00 p.m.	3/29/12 11:00 p.m.
	Nighttime	35	32		
	Late-Night	35	33		
MP-28 (SN 2573 and 1009)	Daytime	43	36	4/13/12 2:00 p.m.	5/10/12 11:00 a.m.
	Nighttime	37	32		
	Late-Night	35	31		

Table 5-1. Description of Monitoring Positions, Measurement Durations and Results (March 6, 2012 to May 10, 2012) (continued)

Monitoring Location	Time Period	L_{10} 1-hour dBA	L_{50} 1-hour dBA	Measurement Period	
				Date / Start Time	Date / End Time
MP-30 (SN 1708 and 2661)	Daytime	51	37	4/11/12 12:00 p.m.	5/10/12 7:00 p.m.
	Nighttime	49	34		
	Late-Night	45	33		
MP-31 (SN 1671 2668)	Daytime	45	34	4/12/12 11:00 a.m.	5/5/12 11:00 p.m.
	Nighttime	37	29		
	Late-Night	33	25		

Notes:
dBA – A-weighted decibels
L_{10} – intrusive sound level
L_{50} – median sound level
MP – monitoring position
SN – serial number

APPENDIX A
MEASUREMENT EQUIPMENT AND NIST LABORATORY CALIBRATION CERTIFICATIONS

Certificate of Calibration and Conformance

This document certifies that the instrument referenced below meets published specifications per Procedure PRD-P263; ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Manufacturer:	Larson Davis	Temperature:	75.2	°F
Model Number:	831		24	°C
Serial Number:	1009	Rel. Humidity:	29	%
Customer:	Acoustical Consulting Services	Pressure:	1024	mbars
Description:	Sound Level Meter		1024	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 3-Oct-11 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2012	2011-138647

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Ed Devlin Signature:

THE MODAL SHOP INC. A PCB GROUP CO.

The Modal Shop, Inc.
3149 East Kemper Road
Cincinnati, OH 45241
Phone: (513) 351-9919
(800) 860-4867
www.modalshop.com

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-140442

Instrument Model 831, Serial Number 0001350, was calibrated on 07MAR2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Instrument found to be in calibration as received: YES
Date Calibrated: 07MAR2011
Calibration due: 07MAR2013

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61746	12 Months	13JUL2011	61746-070710

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade Relative Humidity: 26 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

"AS RECEIVED" data same as shipped data.
Tested with PRM831-010875

Signed: Ron Harris
Technician: Ron Harris

Provo Engineering and Manufacturing Center, 1681 West 820 North, Provo, Utah 84601
Toll Free: 888.258.3222 Telephone: 716.926.8243 Fax: 716.926.8215
ISO 9001-2000 Certified

Certificate of Calibration and Conformance

This document certifies that the instrument referenced below meets published specifications per Procedure PRD-P263; ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Manufacturer:	Larson Davis	Temperature:	75.2	°F
Model Number:	831		24	°C
Serial Number:	1671	Rel. Humidity:	29	%
Customer:	Acoustical Consulting Services	Pressure:	1024	mbars
Description:	Sound Level Meter		1024	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 3-Oct-11 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2012	2011-138647

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Ed Devlin Signature: Edward A. Devlin

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PRD-F242 revNR December 2, 2008 Page 1 of 1

Certificate of Calibration and Conformance

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Manufacturer:	Larson Davis	Temperature:	71.6	°F
Model Number:	831		22	°C
Serial Number:	1708	Rel. Humidity:	34	%
Customer:	Acoustical Consulting Services	Pressure:	1016	mbars
Description:	Sound Level Meter		1016	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 30-Sep-11 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2012	2011-138647

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

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Manufacturer:	Larson Davis	Temperature:	77	°F
Model Number:	831		25	°C
Serial Number:	1710	Rel. Humidity:	25	%
Customer:	Acoustical Consulting Services	Pressure:	1009	mbars
Description:	Sound Level Meter		1009	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 2-Feb.-2012 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2012	2011-138647

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

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Certificate of Calibration and Conformance

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Manufacturer:	Larson Davis	Temperature:	71.6	°F
Model Number:	831		22	°C
Serial Number:	1711	Rel. Humidity:	34	%
Customer:	Acoustical Consulting Services	Pressure:	1016	mbars
Description:	Sound Level Meter		1016	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 29-Sep-11 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2012	2011-138647

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Manufacturer:	Larson Davis	Temperature:	75.2	°F
Model Number:	831		24	°C
Serial Number:	2442	Rel. Humidity:	22	%
Customer:	Acoustical Consulting Services	Pressure:	1009	mbars
Description:	Sound Level Meter		1009	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 30-Jan-12 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/7/2012	2011-138647

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-145245

Instrument Model 831, Serial Number 0002573, was calibrated on 22JUN2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 22JUN2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-019134

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-145251

Instrument Model 831, Serial Number 0002574, was calibrated on 22JUN2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 22JUN2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-019135

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

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ISO 9001-2008 Certified

PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-145256

Instrument Model 831, Serial Number 0002575, was calibrated on 22JUN2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 22JUN2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

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Tested with PRM831-019136

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-149775

Instrument Model 831, Serial Number 0002661, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

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Tested with PRM831-019223

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

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PCB PIEZOTRONICS
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Certificate of Calibration and Conformance

Certificate Number 2011-149773

Instrument Model 831, Serial Number 0002662, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61746	12 Months	07JUL2012	61746-070711

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

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The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-019224

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-149776

Instrument Model 831, Serial Number 0002663, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61746	12 Months	07JUL2012	61746-070711

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

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Tested with PRM831-019225

Signed: Ron Harris
Technician: Ron Harris

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-149782

Instrument Model 831, Serial Number 0002664, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-019226

Signed: Ron Harris
Technician: Ron Harris

Page 1 of 1

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PCB PIEZOTRONICS
A PCB GROUP COMPANY

Certificate of Calibration and Conformance

Certificate Number 2011-149783

Instrument Model 831, Serial Number 0002665, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61746	12 Months	07JUL2012	61746-070711

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

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Relative Humidity: 36 %

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This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

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Certificate of Calibration and Conformance

Certificate Number 2011-149787

Instrument Model 831, Serial Number 0002667, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

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Certificate of Calibration and Conformance

Certificate Number 2011-149797

Instrument Model 831, Serial Number 0002668, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

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Signed: Ron Harris
Technician: Ron Harris

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Certificate of Calibration and Conformance

Certificate Number 2011-149799

Instrument Model 831, Serial Number 0002670, was calibrated on 04OCT2011. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 04OCT2011
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Stanford Research Systems	DS360	61889	12 Months	01FEB2012	61889-020111

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-019232

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Technician: Ron Harris

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APPENDIX B
TEST ENGINEERS LOG

Table B-1 summarizes observations made by test engineers at various times throughout the monitoring period.

Table B-1. Test Engineers Log

Monitoring Location	Time of Day	Observations
MP-2	10:00 a.m. & 12:00 p.m.	Swooshing from the nearby wind turbine generators (WTGs), high winds, heavy equipment with cranes setting up irrigation equipment, bee hives and dogs barking.
	11:00 p.m.	Sound associated with WTG operation and movement. Crickets and frogs were also audible.
MP-3	12:00 p.m. & 3:00 p.m.	Harvesting activity present in the fields approximately 1.0 mile from the MP. Semi-truck traffic on the roadways adjacent. An active staging area where trucks were loading/unloading. Aircraft overflights (one jet and a couple of propeller planes). Birds in the distance.
	11:30 p.m.	Pump sound at the road before the house logged at ~62 dBA. No audible sounds of pump at the MP, but irrigation/sprinkler were audible.
MP-5	2:00 p.m.	Two large dogs, heavy trucks on a nearby road, 2 planes flying over (observed at ~56 dB) and an ATV operated by the landowner, irrigators, dogs, and birds chirping.
MP-6	4:00 p.m.	Birds and the landowner noted 45 mph winds on Mar 18. Landowner also indicated that he starts using his tractor at 5 a.m. onward. Sounds from wind and horses.
	11:30 p.m.	Distant sound of horses.
MP-7	10:00 a.m. & 4:00 p.m.	Heavy winds, highway traffic, noisy birds in the trees nearby with sound levels in the high 40s to low 50s dB, one helicopter overflight, and farm equipment.
	11:00 p.m.	Traffic on US 395, running water in nearby creek, dogs barking, cows mooing (louder than the dog barks), and sound of light rain showers.
MP-8	9:30 a.m.	McKay Creek, birds, and the general area was sheltered from heavy winds that were readily present and observed an hour earlier at MP7.
MP-9	12:00 p.m. & 4:00 p.m.	Generally quiet with audible sounds from a nearby creek, birds, and wind interacting with vegetation and the terrain.
	11:30 p.m.	Sound from wind interacting with tops of trees but wind at ground level calm. Consistent sounds from frogs and insects. Observed noise levels of low 40s dBA.
MP-11	12:00 p.m.	Sound from the roadway traffic (snow plows and trucks keeping access roads and tracks clear) and train traffic on the Union Pacific Railroad. Approximately 8-10 heavy trucks (some with snow plows) passed the meter. Snowplows passing by the meter measured at approximately 80 dB on the meter. The acoustical environment was quiet when truck and railroad activity was not present.
	1:00 a.m.	No roadway or railroad traffic. Sounds of running water in nearby creek running, light snow/rain showers, and light winds.
MP-13	1:00 p.m.	Heavy winds, consistent highway traffic, and horses.
	2:00 a.m.	Highway traffic and light winds.

Table B-1. Test Engineers Log (continued)

Monitoring Location	Time of Day	Observations
MP-14	2:00 p.m. & 5:00 p.m.	Highway and driveway traffic adjacent to the property. The property owner noted that he has been firing his guns a lot and using his earth mover equipment. Large dog present and barking upon arrival, scattered farm equipment, loose metal shingles on home and barns blowing in the winds causing noise. Other audible sources included a school bus and antelope chirping.
	2:15 a.m.	Distant traffic on I-84, low wind, insects, and other unidentified wildlife.
MP-15	2:00 p.m.	Audible sources from trucks, birds, and intermittent aircraft.
	4:00 a.m.	Distant train horn and engine at 4:05 a.m. Windy conditions with wind howling over ground and structures. Distant traffic noise from vehicles on I-84.
MP-16	5:00 p.m.	The driveway of the residence is directly adjacent to the meter. There was a dog barking in a dog kennel situated at the end of the driveway approximately 50 feet from the meter. The landowner verified that the dog only barks when strangers are present. Further away from the MP is I-84 and highway traffic is audible. The landowner has a small child who has toys on the outside porch, which may be another source of daytime noise levels.
	1:00 a.m.	Highway traffic and 2 trains with rumbling wheels and blowing train horns observed logged at approximately 80 dB around 1 a.m.
MP-17	11:00 a.m. & 12:00 p.m.	Highway traffic, railroad traffic, and birds chirping.
	12:30 a.m.	Highway and a train. A worker train was located approximately 1.5 miles away slowly heading south towards the MP. Wind was also audible when highway and rail traffic was not present.
MP-19	11:00 a.m. & 6:00 p.m.	Highway traffic with heavy trucks using compression braking while descending downhill, a train pass-by, birds chirping, and steady winds. A tractor in the driveway appeared to be used regularly. Landowner has several dogs to assist with herding cattle. The dogs barked upon arrival. Additional sounds observed were from a helicopter flying nearby.
	12:00 a.m.	A train passing at approx. 12:15 a.m. operating its horn, compression braking by heavy trucks descending downhill and windy conditions.
MP-20	1:00 p.m.	Highway traffic, cows mooing, train traffic, loose metal shingles on the garage which was flapping and squeaking in the wind, birds chirping, and a chicken.
	11:30 p.m.	Highway traffic and wind.
MP-22	4:00 p.m.	Highway traffic on I-84, a train pass-by (logged at approx. 80 dB), the same train sat idling on the tracks nearby but not directly in front of the MP, and vehicles accessing the local roadways represent another source of noise. There was also a wood pile situated near the meter with a wood splitter.
	11:00 p.m.	Highway traffic with compression braking for heavy trucks and a nearby creek

Table B-1. Test Engineers Log (continued)

Monitoring Location	Time of Day	Observations
MP-23	1:00 p.m. & 5:00 p.m.	Deployment adjacent to Creek at similar set back distance representative of the home nearby. Observed a freight train, train horn, highway traffic, and running water in the creek. The creek flow monitored in the high 50s to low 60s dBA.
	11:00 p.m.	Same as MP-22 but with higher sound levels from the creek.
MP-25	6:00 p.m.	Highway traffic on I-84, a train pass-by, faint wind chimes, dogs, a mail truck, local roadway traffic, and steady winds.
	11:00 p.m.	Highway traffic, frogs, and insects.
MP-27	2:00 p.m.	Owyhee River, vehicle traffic accessing the river at the boat launch nearby, fisherman on the river, distant aircraft overflights, distant gun shots, and sheep grazing across the river from the MP. River flow varies at the MP depending on how much water is released from the nearby Owyhee Dam. The river flow was at a higher volume at retrieval and midway calibration than during deployment
MP-28	11:00 a.m. & 2:00 p.m.	Generally quiet with sounds from wind interacting with vegetation and terrain as well as birds in the area. Observed one helicopter and distant fixed-wing aircraft operating close enough to the MP to be audible. The helicopter flew closest to the MP with monitored sound levels at 60 dBA when at nearest location relative to the MP.
	12:30 a.m.	Wind interacting with vegetation and a car on the gravel road approximately 1,000 feet away. Low level insect sound.
MP-30	12:00 p.m. & 7:00 p.m.	Deployment – Audible sources from birds chirping, distant traffic, cows, and distant aircraft.
	4:45 a.m.	Wind, running water in nearby creek, birds, unidentified wildlife, and distant traffic on I-84. Hand measurement indicates low 40s dBA.
MP-31	11:00 a.m.	Deployment – Audible sources from wind, barely audible hum from low-voltage power line to residence, birds chirping, and light traffic on US 26. Although not present during deployment, midway calibration, and retrieval the landowner indicated that 200+ cattle periodically graze on his property.

ATTACHMENT X-3
SUPPLEMENTAL BASELINE SOUND SURVEY FOR THE TUB MOUNTAIN, BURNT RIVER, AND EAST OF BOMBING RANGE ROAD ALTERNATE CORRIDORS

Supplemental Baseline Sound Survey for the Tub Mountain, Burnt River, and East of Bombing Range Road Alternate Corridors

Prepared by
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Prepared for
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Boise, ID 83702

August 2013

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ABBREVIATIONS AND ACRONYMS

ANSI	American National Standards Institute
ASC	Application for Site Certificate
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CadnaA	Computer-Aided Noise Abatement
CAFE	Corona and Field Effects
dB	decibel
dBA	A-weighted decibel
Hz	hertz
IPC	Idaho Power Company
kV	kilovolt
L_{eq}	equivalent sound level
L_n	statistical sound level
L_{50}	sound level exceeded 50% of the time
L_{10}	intrusive sound level (sound level exceeded 10 percent of the time)
MET	meteorological tower
mm/hr	millimeter per hour
MP	monitoring position
NIST	National Institute of Standards and Technology
NSR	noise sensitive receptor
NWSTF	post 3.0, the route begins to parallel
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
ODOE	Oregon Department of Energy
pASC	preliminary Application for Site Certificate
Project	Boardman to Hemingway Transmission Line Project
RH	relative humidity
ROW	right-of-way
US	U.S. Highway
UTM	Universal Transverse Mercator
WRCC	Western Regional Climate Center

1.0 INTRODUCTION

1.1 Overview

This document supplements the information provided in Exhibit X of the preliminary Application for Site Certificate (pASC) submitted by Idaho Power Company (IPC) in February 2013 for the Boardman to Hemingway Transmission Line Project (Project). In Exhibit X of the pASC, IPC analyzed compliance with the Oregon Department of Environmental Quality (ODEQ) noise control standards in Oregon Administrative Rule (OAR) 340-035-0035. IPC prepared a Baseline Sound Survey Report as a supporting document for Exhibit X. The Baseline Sound Survey provided information about existing ambient noise levels at noise sensitive receptors (NSRs) located near the Project (within approximately 0.5 mile). The results of the Baseline Sound Survey were used to analyze compliance with the ODEQ noise control standards. Subsequent to submittal of the pASC, IPC identified the need to include additional alternate corridor segments as part of the Application for Site Certificate (ASC). This supplemental report was prepared to present the results of additional baseline sound survey work completed along alternate corridors being considered for the Project including the Tub Mountain, Burnt River, and East of Bombing Range Road alternate corridor segments. The East of Bombing Range Road Alternate is a revision to the Longhorn Alternate.

OAR Chapter 340, Division 35 prescribes noise regulations applicable throughout the state of Oregon. The noise regulations provide guidance for a new noise source if it will be located on a previously unused industrial or commercial site[1]. IPC presumes that the transmission line will constitute an industrial or commercial use located on predominantly unused industrial/commercial sites. Therefore, to demonstrate compliance with ODEQ noise control standards, the Project must not increase the existing ambient noise level at NSRs (i.e., residences) by more than 10 A-weighted decibels (dBA) in any one hour, or exceed the levels specified in OAR 340-035-0035. Compliance is determined at the appropriate measurement points as specified in OAR 340-035-0035(3)(b). In order to determine the existing ambient noise level at NSRs, a baseline sound survey was required, and additional data were collected along the alternate corridors being considered for the Project in a Supplemental Baseline Sound Survey.

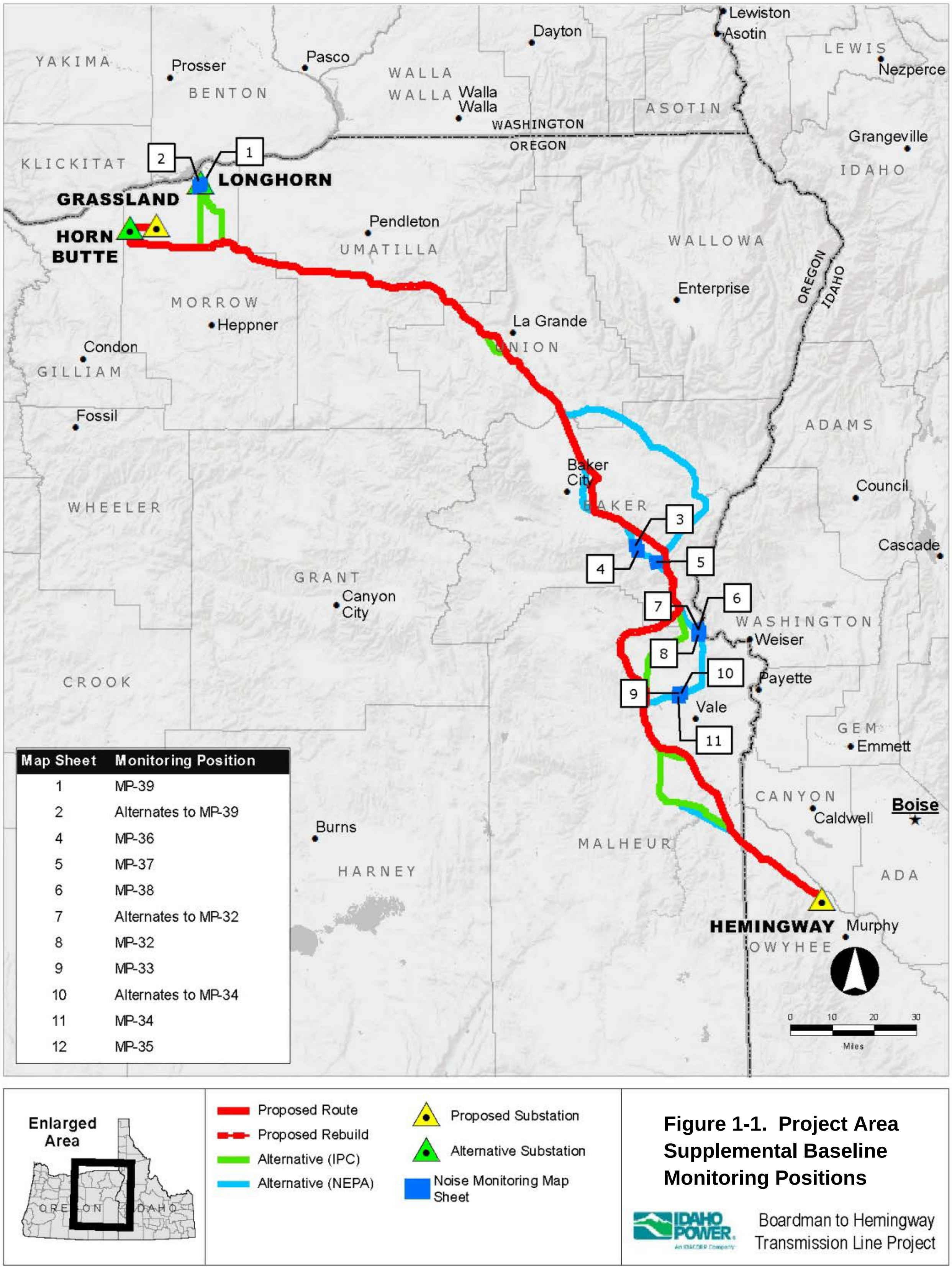
Per requirements of the Project Order, a draft Baseline Sound Monitoring Protocol was provided for Oregon Department of Energy (ODOE) review and approval prior to conducting the Baseline Sound Survey documented in Exhibit X of the pASC. The Protocol included a description of the sound survey methodology and assumptions, areas to be surveyed, and measurement parameters and was submitted to ODOE on April 6, 2012. IPC consulted with ODOE and received approval on the sound survey methodology, including the proposed monitoring positions (MPs). Following the same methodologies and procedures used in preparing the original Protocol, a Supplemental Baseline Sound Monitoring Protocol was developed for the Supplemental Baseline Sound Survey and was submitted to ODOE on June 4, 2013. The MPs included in the Supplemental Baseline Sound Survey are shown in Figure 1-1.

[1] There are no NSRs located on a previously used industrial or commercial site; therefore, guidance pertaining to previously used sites did not affect the Project acoustic analysis.

This report applies the same survey instrumentation, methodology, and data analysis as was utilized to develop the initial report and describes the results of the Supplemental Baseline Sound Survey.

1.2 Analysis Area

As provided in the Project Order, the analysis area for Exhibit X is the Site Boundary and 0.5 mile from the Site Boundary. In accordance with OAR 345-001-0010(55), the "Site Boundary" is "the perimeter of the site of a proposed energy facility, its related or supporting facilities, all temporary laydown and staging areas, and all corridors and micrositing corridors proposed by the applicant." The Site Boundary of the Project is further described in Exhibits B and C.



Map Sheet	Monitoring Position
1	MP-39
2	Alternates to MP-39
4	MP-36
5	MP-37
6	MP-38
7	Alternates to MP-32
8	MP-32
9	MP-33
10	Alternates to MP-34
11	MP-34
12	MP-35

Figure 1-1. Project Area Supplemental Baseline Monitoring Positions

2.0 PROJECT NOISE CRITERIA

OAR Chapter 340, Division 35 establishes noise limits for new noise sources located on a previously used or unused industrial or commercial site. Section 2.1 of the 2012 Baseline Sound Survey Report provides a description of the OAR 340-035-0035 requirements in more detail, and Section 2.2 provides more information on the Project Order (see Baseline Sound Survey Report, Attachment X-4 of Exhibit X). IPC submitted a Supplemental Baseline Sound Monitoring Protocol for the 2013 monitoring effort to ODOE, which is summarized in Section 2.1 of this document.

2.1 Baseline Sound Monitoring Protocol

For the 2012 Baseline Sound Survey, a Baseline Sound Monitoring Protocol was submitted for ODOE review and approval prior to conducting fieldwork. Similarly, for the Supplemental Baseline Sound Survey a Supplemental Baseline Sound Monitoring Protocol was developed which included the same methodology, assumptions, and measurement parameters needed to best respond to concerns of the applicable agencies and the public. This Supplemental Baseline Sound Monitoring Protocol provides information for new MPs relating to alternate corridors that will be analyzed in the ASC. The MPs are located along the proposed Tub Mountain, Burnt River, and East of Bombing Range Road alternates. The acoustic testing was completed to achieve the following:

- Document existing ambient baseline sound conditions at discrete noise sensitive properties, also known as NSRs, which comprise one or more noise sensitive properties located near (approximately 0.5 mile) the proposed right-of-way (ROW) for the alternates;
- Determine the ambient baseline sound conditions so that the expected increase in ambient baseline sound levels attributable to the proposed Project alternates can be calculated with the use of acoustic modeling analysis results; and
- Monitor weather data concurrent with noise monitoring to assist in the correlation of the recorded data to meteorological conditions coincident with the onset of corona noise.

To aid in the initial site selection, screening level noise modeling of corona noise for each Project alternate was completed at NSRs near the Project (i.e., within 0.5 mile from the Project transmission line site boundary). The modeling methodologies involved two separate analytical methods.

1. The first was the U.S. Department of Energy's Corona and Field Effects (CAFE) program, which was used to determine anticipated corona noise source levels.
2. The second modeling methodology was using the Datakustik Computer-Aided Noise Abatement Program (CadnaA) program, which conforms to the Organization for International Standardization standard 9613-2 (1996), *Attenuation of Sound During Propagation Outdoors*. CadnaA was used to model how sound travels outward from the transmission line to receivers in three dimensions.

Initial screening level modeling results of the proposed transmission line for the alternates were determined and assessed for future risk of non-compliance. If the potential for increasing baseline sound levels by 10 dBA or less could be reasonably assumed, compliance with the OAR ambient degradation test given in OAR 340-035-0035(1)(b)(B)(i) was inferred.

Supplemental baseline sound measurements were conducted at or near NSRs that showed a potential exceedance condition. From the supplemental baseline measurements, the regularly occurring median (L_{50}) sound levels were calculated using statistical means, and new compliance thresholds were therefore defined to assess conformance with the ambient antidegradation standard. At the request of ODOE, screening level modeling results were calculated to identify NSRs that showed a potential exceedance of 30 dBA, which was based on a threshold of 10 dBA over a conservative assumed ambient sound level of 20 dBA.

Due to the large number of potential NSRs identified within the analysis area, it was not feasible to conduct supplemental baseline monitoring at every individual NSR. Therefore, ambient measurements at a single MP were used to either represent one or a grouping of nearby NSRs with similar acoustic characteristics established by in-person field investigations. The approved supplemental baseline sound monitoring protocol identified eight additional MPs.

3.0 BASELINE SOUND LEVEL MEASUREMENTS

The purpose of the Supplemental Baseline Sound Survey was to establish the existing acoustic environment in the study area and to determine what masking of Project noise could be expected. A number of statistical sound levels were measured in consecutive 10-minute and 1-hour intervals such as the equivalent (L_{eq}), intrusive (L_{10}), and median (L_{50}) sound levels. OAR 340-035-0035(1)(b)(B)(i) requires the use of the L_{10} or L_{50} statistical levels for the purposes of assessing compliance with the ambient degradation test. The Supplemental Baseline Sound Survey involved the following:

- Measurement methodology was developed and reviewed by ODOE including instrument selection and setup.
- MPs for the supplemental sound survey were pre-selected as described in Section 2.1 and distributed to give a representative evaluation of baseline sound conditions along the Project alternates.
- IPC secured landowner permissions prior to the survey, and locations were screened during deployment to determine final MPs.
- Execution of the baseline sound survey consisting of continuous measurement and data-logging starting March 11, 2013.
- Roughly midway through the sound measurement program, the monitoring equipment was recalibrated, and data were downloaded and reviewed by an acoustic engineer.
- Noise data were analyzed by correlating daytime (7:00 a.m. to 10:00 p.m.) and nighttime periods (10:00 p.m. to 7:00 a.m.), late night periods (12:00 a.m. to 5:00 a.m.), precipitation events, high humidity, and wind speed with the corresponding monitored noise level.

The Supplemental Baseline Sound Survey provided relevant data to effectively document typical diurnal variation in sound levels over a range of meteorological conditions.

3.1 Instrumentation

All measurements were taken with a Larson Davis 831 real-time sound level analyzer equipped with a PCB model 377B02 ½-inch precision condenser microphone. This instrument has an operating range of 5 decibels (dB) to 140 dB, and an overall frequency range of 8 to 20,000 hertz (Hz) and meets or exceeds all requirements set forth in the American National Standards Institute (ANSI) standards for Type 1 sound level meters for quality and accuracy (precision). All instrumentation was laboratory calibrated within the previous 12-month period with calibration documentation provided in Appendix A, Measurement Equipment and National Institute of Standards and Technology (NIST) Laboratory Calibration Certifications. Table 3-1 provides a summary of the equipment used.

Table 3-1. Measurement Equipment Used

Description	Manufacturer	Type
Signal Analyzer	Larson Davis	831H/L
Weather Transmitter	Vaisala	WXT520
Microphone	PCB	377B02
Windscreen	ACO Pacific	7-inch
Calibrator	Larson Davis	CAL200

The monitoring stations are designed for service as a long-term environmental sound level data-logger measuring devices. Each sound level analyzer used was enclosed in a weatherproof case and equipped with a self-contained microphone. The microphone and windscreen were tripod-mounted at an approximate height of 1.5 to 1.7 meters (4.9 to 5.6 feet) above grade. When sound measurements are attempted in the presence of elevated wind speeds, extraneous noise can be self-generated across the microphone, often referred to as pseudonoise. Air blowing over a microphone diaphragm creates a pressure differential and turbulence. All sound level analyzer microphones were protected from wind-induced pseudonoise by a 180-millimeter- (7-inch-) diameter foam windscreen made of specially prepared open-pored polyurethane. By using this microphone protection, the pressure gradient and turbulence are effectively moved farther away from the microphone, minimizing self-generated wind-induced noise.

3.2 Field Measurement Methodology

A fixed outdoor MP was chosen at each location to be representative of the house and yard accommodations. MPs were placed in similar surroundings experiencing the same weather and acoustic conditions to where a resident was expected to spend the majority of time when outdoors. However, some property owners voiced opinions and preferences on the exact locations of the MP on their properties. To accommodate property owners, field engineers sited the MPs per the property owners' requests if that location maintained the intended goals of the monitoring program. All monitoring stations were anchored in a manner to avoid interference from any large vertical reflective surfaces and photographed from two vantage points as shown in each detailed MP description.

At each of the eight MPs, a sound level meter was set up, field calibrated, and programmed to data log continuously during daytime (7:00 a.m. to 10:00 p.m.), nighttime (10:00 p.m. to 7:00 a.m.), and late-night (12:00 a.m. to 5:00 a.m.) periods. The measurement period commenced March 11, 2013, and ended on June 12, 2013. Each MP collected data for at least 2 to 3 weeks as stated in the protocol submitted to ODOE, with some MPs collecting nearly a month of data to successfully capture meteorological conditions that would coincide with the onset of corona noise. Calibration was achieved with an ANSI Type 1 calibrator, which has accuracy traceable to the NIST. Calibration drift observed during pre-survey and post-survey calibration was well within acceptable tolerances.

Each sound analyzer was programmed to measure and log broadband A-weighted sound pressure levels in 10- and 1-minute time intervals as well as a number of statistical sound levels (L_n). The L_n provide the sound level exceeded for that percentage of time over the given measurement period. For example, the L_{10} level is often referred to as the intrusive noise level and is the sound level that is exceeded for 10 percent of the measurement period. The L_{eq}, L_{10}, and L_{50} median sound metrics were data-logged for the duration of the monitoring period to fully characterize the ambient acoustic environment. Data were collected for 1/1 and 1/3 octave band data spanning the frequency range of 8 Hz to 20 kilohertz. The locations of MPs were taken using a global positioning system unit, and photographs were taken to document surroundings. Following the completion of the measurement period, all monitored data were downloaded to a computer and backed up an external hard drive for further analysis.

Approximately midway through the sound measurement program, the monitoring equipment was recalibrated, and monitored data were downloaded and reviewed by an acoustic engineer. Midpoint calibrations were conducted to ensure the quality of the performance of the equipment and to identify any commonly occurring sound sources that might warrant in-person observation (Appendix B). Downloaded data were analyzed to identify any anomalous sound events or sound events that regularly occurred up to that point in the survey at a given MP. MPs that appeared to consistently have anomalous or regularly occurring sound events that did not take place during time periods that are typically associated with heightened periods of activity (e.g., increased traffic in the morning and evening) were selected for further field observations.

3.3 Meteorological Conditions

Measurement of existing sound levels is necessary to determine how much masking noise there might be at NSRs near the Project alternates. Elevated levels of background noise, or masking noise, could act to reduce or preclude the audibility of the transmission line corona noise while low levels of regularly occurring noise could permit operational noise to be more readily perceptible. Transmission line projects differ from conventional industrial projects in that the sound generated will slowly increase as the conductors become damp up to a certain maximum sound level. The highest audible noise levels occur in conditions of foul weather because of the potential for a large concentration of corona sources, such as water drops or snowflakes that collect on the conductor surface. Therefore, it is appropriate to compare the maximum corona sound level expected during meteorological conditions conducive to corona generation with the monitored sound levels that occurred during similar conditions. This means that background sound levels must be presented as a function of meteorological conditions.

Weather data were collected using Vaisala portable weather transmitters at 7 of the 8 MPs during the full measurement period. One MP was deployed without a Vaisala unit for two reasons: first, because it was located in close proximity and in a similar setting to that of two other MPs, which negated the need for a Vaisala unit; and, second, there were a limited number of Vaisala units available during the deployment. The Vaisala unit monitors wind speed and direction via its ultrasonic anemometer, and also measures barometric pressure, temperature and humidity, total rainfall, intensity, and duration of rainfall. The Vaisala unit is also able to distinguish between precipitation type such as rain, hail, and snow. Table 3-2 summarizes the percentage of time where high humidity (i.e., relative humidity [RH] is greater or equal to 90 percent) without precipitation occurred and where precipitation occurred at each MP. Percentage precipitation greater than 0 millimeters per hour (mm/hr) is presented as well as percentage of precipitation with a rain rate of 0.8 and 5 mm/hr. The rain rate of 0.8-5 mm/hr was reviewed because it excludes precipitation so heavy that the noise from the weather event is likely to increase ambient sound levels so much that corona noise will not be audible. The Bonneville Power Administration (BPA) has historically considered this rain rate to appropriately capture the foul weather conditions most likely to generate corona noise.

Table 3-2. Meteorological Station Summary by Monitoring Position

Station	Percentage of Time RH ≥ 90%	Percentage of Time Precipitation >0 mm/hr	Percentage of Time Precipitation 0.8 mm/hr – 5 mm/hr
MP-32	3	5	0
MP-33	2	7	0
MP-34	2	4	0
MP-35	0.1	7	0
MP-36	2	5	0
MP-37	3	6	0
MP-38	0	2	0
MP-39	1	4	0

The Western Regional Climate Center (WRCC) is one of six regional climate centers in the United States and provides meteorological monitoring data for the Pacific Northwest region. The regional climate center program is administered by the National Oceanic and Atmospheric Administration. Specific oversight is provided by the National Climatic Data Center of the National Environmental Satellite, Data and Information Service. Five years of meteorological data were reviewed at four of the WRCC's remote automated weather stations that are close to the Project site. Data from these stations (i.e., Umatilla, La Grande, Flagstaff Hill, and Owyhee Ridge) were used to determine whether the foul weather conditions may be considered as unusual and/or infrequent events. Table 3-3 shows the frequency of foul weather conditions for the overall Project area at each of the meteorological stations analyzed.

Table 3-3. WRCC Meteorological Data Frequency of Condition

Condition	Project Area	Flagstaff Hill	La Grande	Owyhee Ridge	Umatilla
Rainfall (0.8 mm/hr - 5 mm/hr[1])	1.30%	0.87%	2.66%	1.08%	0.60%
Rainfall (>= 5 mm/hr)	0.08%	0.05%	0.20%	0.04%	0.02%
Rainfall (> 1 mm/hr)[2]	1.38%	0.92%	2.86%	1.12%	0.62%
Relative Humidity > 90%[3]	14.32%	14.17%	18.24%	8.37%	16.49%
Low Corona Noise Conditions	85.21%	85.51%	80.88%	91.16%	83.28%

[1] In 2011, Bonneville Power Administration (BPA) applied its Audible Noise Policy[2] in the Big Eddy-Knight transmission line Environmental Impact Statement (EIS).[3] As provided in that EIS, audible noise levels, and in particular corona-generated audible noise, vary depending on weather. The Big Eddy-Knight EIS indicates that rainfall conditions of 0.8 to 5 millimeters per hour (mm/hr) are considered foul weather conditions.
[2] This condition is the model input of BPA Corona and Field Effects (CAFE) Program (US Department of Energy) and BPA (Bonneville Power Administration). Undated. "Corona and Field Effects Program Version 3.0 Computer Program".
[3] This condition was included per guidance provided by ODOE in the Project Order.

As demonstrated in Table 3-3, foul weather conditions in which maximum levels of corona noise are generated occur infrequently within the Project area.

[2] U.S. Department of Energy, Bonneville Power Administration. 2006. Audible Noise Policy. TBL Policy T2006-1. Bonneville Power Administration, Portland, OR.
[3] U.S. Department of Energy, Bonneville Power Administration. 2011. Big Eddy-Knight Transmission Project, Final Environmental Impact Statement. DOE/EIS-0421. July.

4.0 MEASUREMENT LOCATIONS AND OBSERVATIONS

Measurements were taken at representative locations roughly within 0.5 mile of the following Project alternate corridor segments:

- *Burnt River Alternate:* The Burnt River Mountain Alternate is 16.8 miles long, with 4.6 miles located on Bureau of Land Management (BLM)-managed land and 12.2 miles on privately owned land in Baker County. The Burnt River Canyon Alternative departs from the IPC Proposed Corridor at the Proposed Corridor milepost 171.5. This alternate heads southeast from the Proposed Corridor. At milepost 1.3, the route crosses over Interstate 84 (I-84) and the Union Pacific Railroad tracks. At milepost 6.8, the route crosses over the Burnt River at the mouth of the Burnt River Canyon approximately 2.5 miles east of the town of Durkee, Oregon. The route turns in a more easterly direction at milepost 8. At milepost 11.5, the route again turns to the southeast and begins to parallel an existing 138-kilovolt (kV) transmission line. At milepost 12.5, the route crosses over an active limestone quarry. At milepost 16.3, the route crosses over the Burnt River, the Union Pacific Railroad tracks, I-84, and an existing 69-kV transmission line. At milepost 16.8, the alternate rejoins the IPC Proposed Corridor at milepost 188.2. The Burnt River Canyon Alternate will use a single tower structure type consisting of 170-foot-tall self-supported steel lattice towers with a dulled galvanized steel finish. Typical span length between structures would be 1,000 to 1,400 feet. Sound levels were monitored at three MPs along the Burnt River Alternate (MP-36, MP-37, and MP-38).
- *Tub Mountain Alternate:* The Tub Mountain South Alternate is 34.7 miles long, with 25.6 miles located on BLM-managed land and 9.1 miles located on privately owned land. The Tub Mountain South Alternate would depart the IPC Proposed Corridor at milepost 198.3. This alternate travels in a southeast direction paralleling to the west of I-84 for 8 miles. At milepost 8, the route crosses Durbin Creek and then turns due south At milepost 17.3, the route crosses over an existing IPC 69-kV transmission line. At milepost 20, the route turns to the southwest. The route crosses into an area of irrigated agriculture centered along Willow Creek at milepost 23.5. At milepost 24.5, the route crosses over Willow Creek and at milepost 25 it crosses over U.S. Route 26 approximately 7 miles northwest of the town of Vale, Oregon. At milepost 26.5, the route leaves the area of irrigated agricultural land and turns in a more westerly direction. At milepost 32, the route is approximately 0.6 mile north of Bully Creek Reservoir. At milepost 34.5, the route rejoins the IPC Proposed Corridor at milepost 233. The Tub Mountain South Alternate will use a single tower structure type consisting of 170-foot-tall self-supported steel lattice towers with a dulled galvanized steel finish. Typical span length between structures would be 1,000 to 1,400 feet. Sound levels were monitored at four MPs (MP-32, MP-33, MP-34, and MP-35) along the Tub Mountain Alternate.
- *East of Bombing Range Road Alternate:* The East of Bombing Range Road Alternate is a 16.0-mile alignment located predominantly on private land in Morrow County. The alignment crosses land owned by the State of Oregon for approximately 2 miles. This alternate corridor exits the planned Longhorn Substation to the southwest, where it immediately crosses over the Union Pacific Railroad tracks. At milepost 0.5, the East of Bombing Range Road Alternate turns due south where at milepost 1.0 it crosses I-84. The route continues south, paralleling the east side of Bombing Range Road at a distance of approximately 125 feet. At milepost 1.5, the route begins to parallel an existing 69-kV transmission line located west of Bombing Range Road and a 138-kV

transmission line located to the east of Bombing Range Road. The East of Bombing Range Road Alternate and the existing lines would be separated by 125 feet. At milepost 3.0, the route begins to parallel the Boardman Naval Weapons System Training Facility (NWSTF) located to the west. At milepost 12, the alignment crosses over Bombing Range Road as the road turns to the east. At milepost 15, the route reaches the southern edge of the NWSTF. At this same point, the existing BPA 69-kV transmission line turns due west, paralleling the southern edge of the NWSTF. The route continues due south over pasture land and dry-land wheat fields until milepost 16, where it joins with the IPC Proposed Corridor at milepost 27.5. The East of Bombing Range Road Alternate will contain two structure types. From the Longhorn Substation to milepost 3.0, the line will use 170-foot-tall self-supported steel lattice towers with a dulled galvanized steel finish. Typical span length between structures would be 1,000 to 1,400 feet. At milepost 3.0, where the East of Bombing Range Road Alternate is adjacent to the NWSTF, structures will be 98-foot-tall self-supported tubular steel H-frame structures with a weathering steel finish. Typical span lengths between structures would be 500 to 700 feet. At milepost 15, the structure type will switch back to170-foot-tall steel lattice towers. Sound levels were monitored at one MP (MP-39) for this alternate.

Table 4-1 lists the Project alternate corridor segment, Universal Transverse Mercator (UTM) coordinates, population density per square mile of the census tract each MP is located within, and the serial numbers of the Larson Davis 831 sound level meters.

Table 4-1. Monitoring Position Location Summary

Monitoring Position	Project Alternate Corridor Segment	UTM Coordinates (NAD83 UTM Zone 11 m)		Population Density per Square Mile	Serial Number
		Easting (m)	Northing (m)		
MP-32	Tub Mountain	483155.1	4902774.0	1	2546 & 1736
MP-33	Tub Mountain	482564.7	4901562.3	1	1736 & 2546
MP-34	Tub Mountain	475458.9	4879467.8	31	3005 & 2199
MP-35	Tub Mountain	474307.2	4878072.9	31	2199 & 3005
MP-36	Burnt River	459395.2	4936382.4	4	2227 & 2199
MP-37	Burnt River	460362.5	4934361.7	4	3142 & 3005
MP-38	Burnt River	467235.9	4929893.9	4	2443
MP-39	East of Bombing Range Road	296750.2	5079098.5	26	2199 & 2443

These Supplemental Baseline Sound Survey measurement data incorporate all sounds at each MP, including contributions from roadway traffic, railroad activities, sounds of nature, existing industrial facilities, and other human-related activities. Monitoring stations equipped with weather data collection systems provided further information, including wind speed, temperature, relative humidity, and precipitation events. For those MPs that did not have a meteorological tower (MET) station installed, the closest MET station was used to assess local meteorological conditions.

Upon completion of the Supplemental Baseline Sound Survey, results were tabulated into relevant time periods of interest based on the received sound levels, diurnal variations, and meteorological conditions that may influence the resulting data set such as conditions when transmission line corona noise could be present. Time history plots were generated for each of the L_{eq}, L_{10}, and L_{50} sound pressure levels in 1-hour measurement intervals over the entire survey period. The sound level measurement data were also correlated to meteorological data including high humidity (i.e., greater than 90 percent) and precipitation events. The composite 1/3 octave band (16, 31.5, 63, 125, 250, 500, 1K, 2K, 4K, and 8K Hz) sound pressure levels were plotted under these meteorological conditions according to precipitation and high humidity to determine if the analysis area is predisposed to a discrete tonal condition. Subsections 4.1 to 4.8 present the following:

- A general description of the noise monitoring location;
- Identification of sounds audible during the field observations (and Attachment B);
- Anomalous or regularly occurring sound events identified over the course of the monitoring program;
- Nearby major infrastructure such as major roads, airports, railroads, and transmission lines; and
- Results of the data analyses including the time histories and spectral plots for each MP.

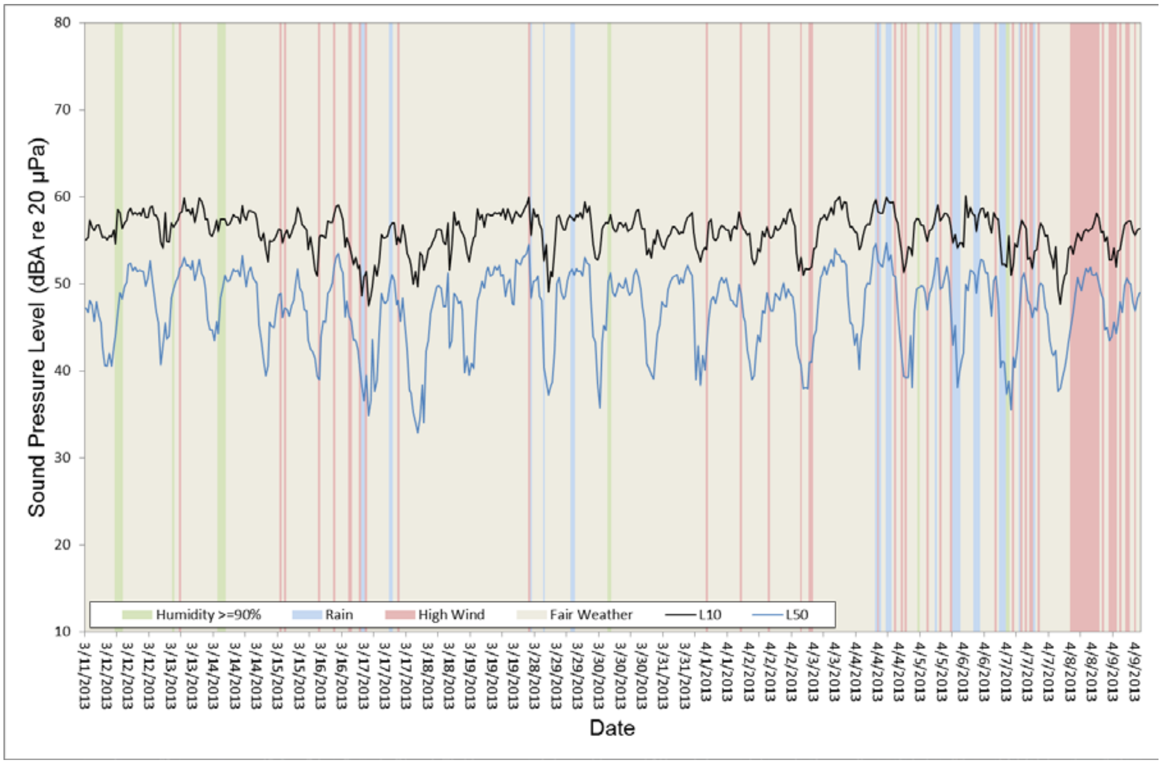
4.1 Monitoring Position 32 – Description and Results

MP-32 was located at a property with two residences that are approximately 5 miles south of Huntington, Oregon, along the Tub Mountain Alternate of Segment 5 (Malheur County). Distance to the nearest major roadway (I-84) from MP-32 is approximately 550 feet. The distances to the nearest existing transmission line and substation from MP-32 are both approximately 150 feet and over 40 miles. I-84 dominates the acoustic environment. At least one dog lives at the home and other daytime observations included low-voltage power lines nearby. Nighttime field observations included the sound of I-84, which was consistent and included multiple heavy trucks passing by. Figure 4-1 includes photographs of the MP relative to the residence and the viewpoint from the MP in the direction of the Project. Figure 4-2 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

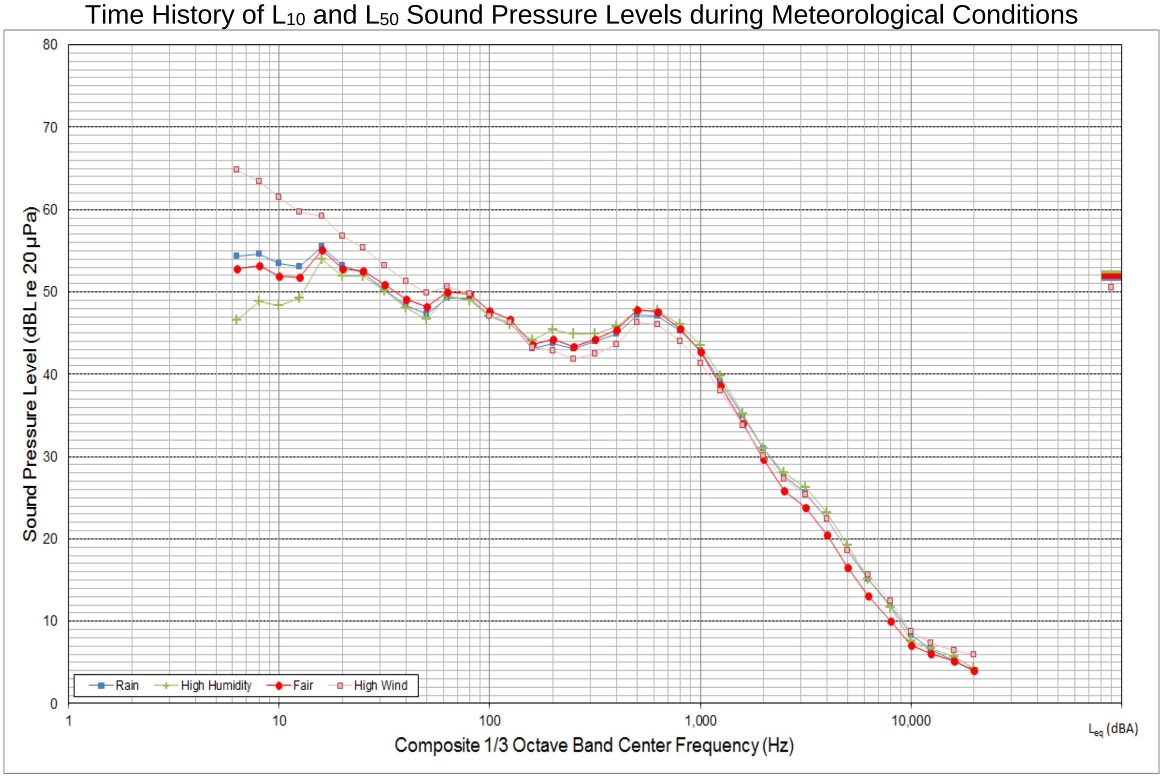
Photograph taken in the direction of one of the residential structures

Photograph taken in the direction of the Project

Figure 4-1. Photographs of Monitoring Position 32



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-2. Monitoring Position 32 Summary of Measured Sound Pressure Levels

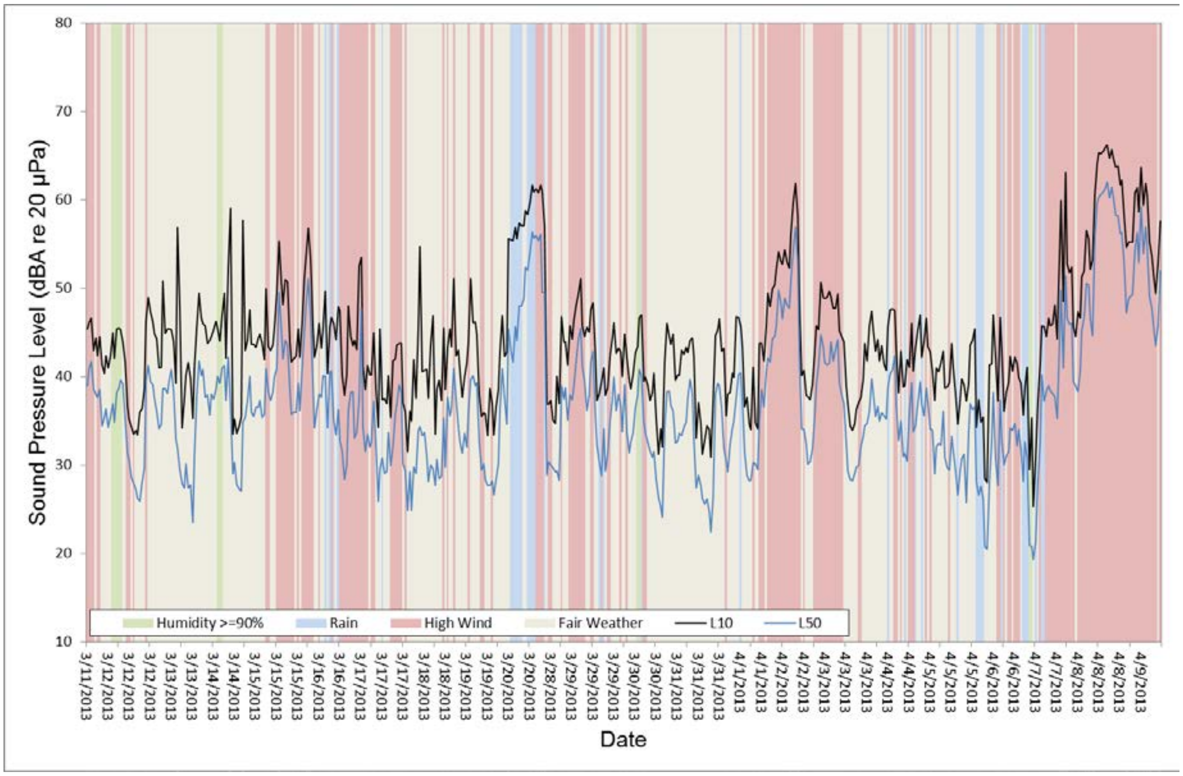
4.2 Monitoring Position 33 – Description and Results

MP-33 was located at a residence that is approximately 6 miles south of Huntington, Oregon along the Tub Mountain Alternate of Segment 5 (Malheur County). Distance to the nearest major roadway (I-84) from MP-33 is approximately 0.75 mile. The distances to the nearest existing transmission line and substation from MP-33 are both approximately 0.5 mile and over 40 miles. I-84 is consistently audible regardless of the time of day. At least one dog lives at the home and other daytime observations included the sound of horses and natural sounds such as birds. Nighttime field observations included the sound of I-84, which was lower level than at MP-32 due to the increased distance from the highway, but was still consistent and included multiple heavy trucks passing by. Figure 4-3 includes photographs of the MP relative to residence and the viewpoint from the MP in the direction of the Project. Figure 4-4 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

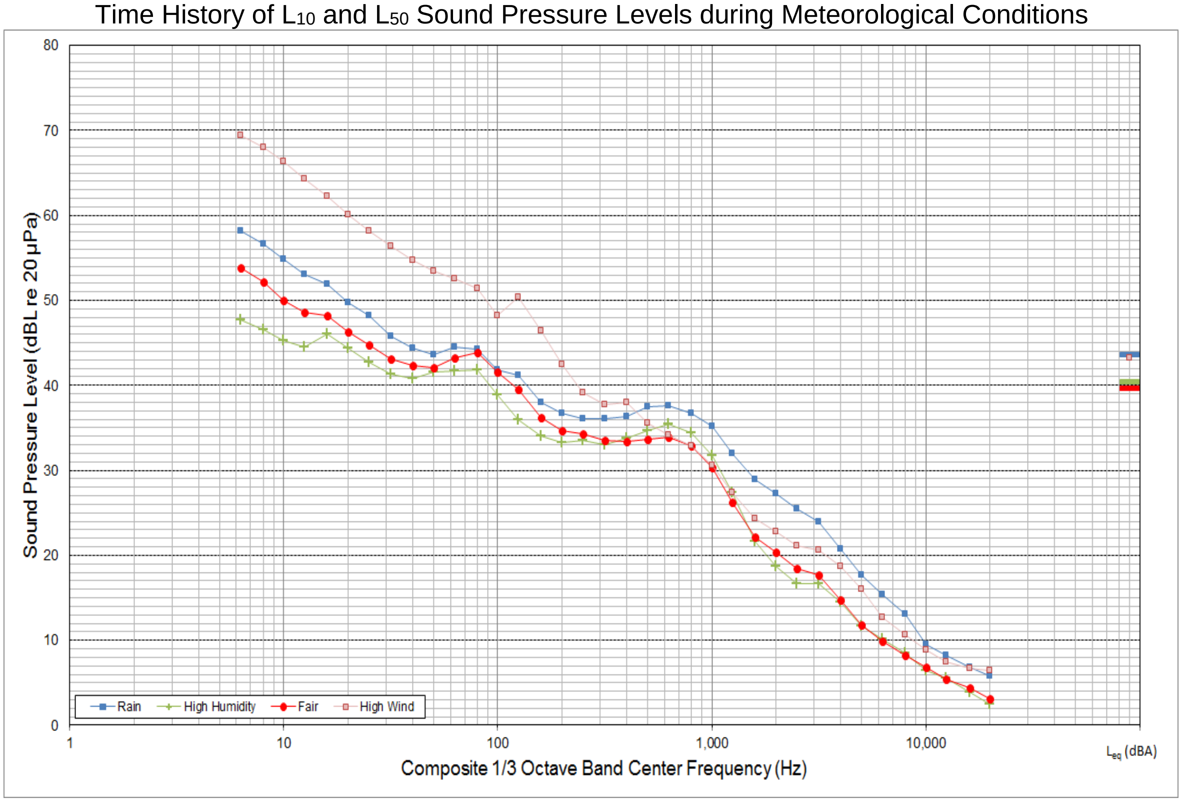
Photograph taken in the direction of one of the residential structures

Photograph taken in the direction of the Project

Figure 4-3. Photograph of Monitoring Position 33



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-4. Monitoring Position 33 Summary of Measured Sound Pressure Levels

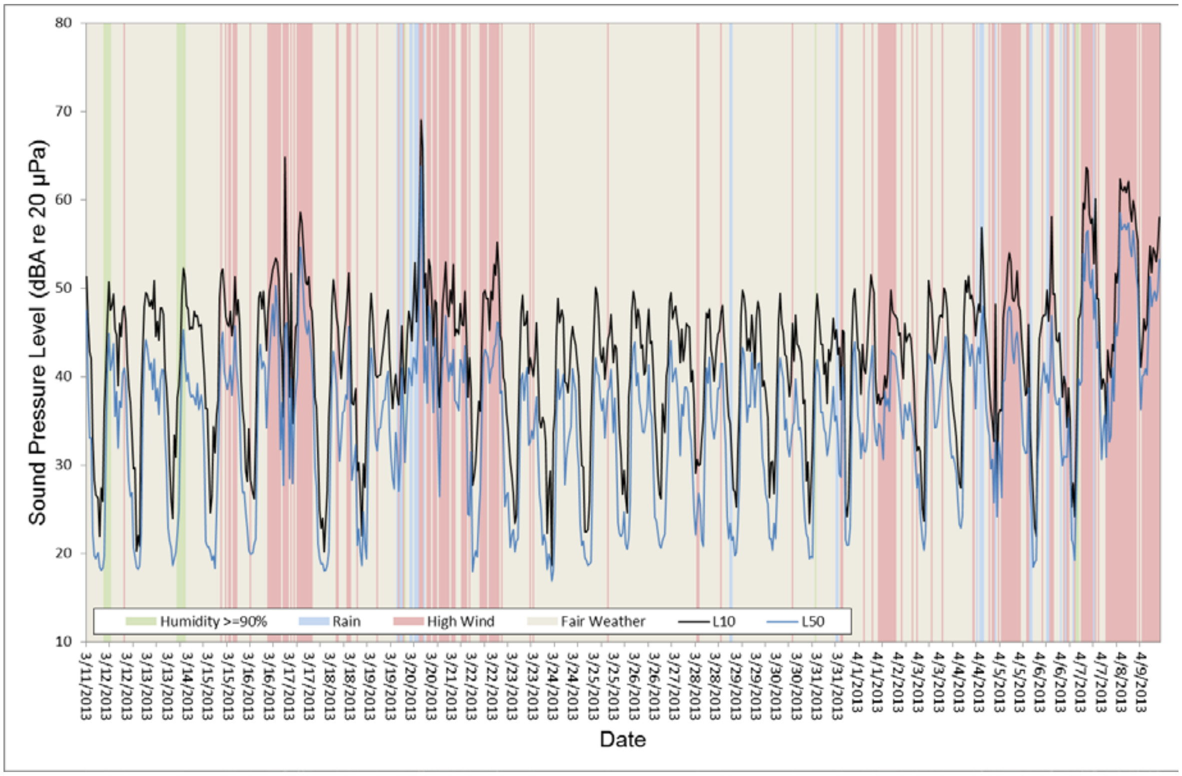
4.3 Monitoring Position 34 – Description and Results

MP-34 was located at a residence that is approximately 7 miles north of Vale, Oregon, along the Tub Mountain Alternate of Segment 5 (Malheur County). The distance to the nearest major roadway (U.S. Highway [US] 26) from MP-33 is approximately 0.5 mile. The distances to the nearest existing transmission line and substation from MP-34 are approximately 900 feet and 28 miles. Traffic on US 26 is audible when farming operations nearby are not active. Daytime observations included cows, sheep, and natural sounds such as birds. Nighttime field observations included the sound of US 26, cows, and sheep. Traffic on US 26 is somewhat infrequent during late-night hours. Figure 4-5 includes photographs of the MP relative to residence and the viewpoint from the MP in the direction of the Project. Figure 4-6 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

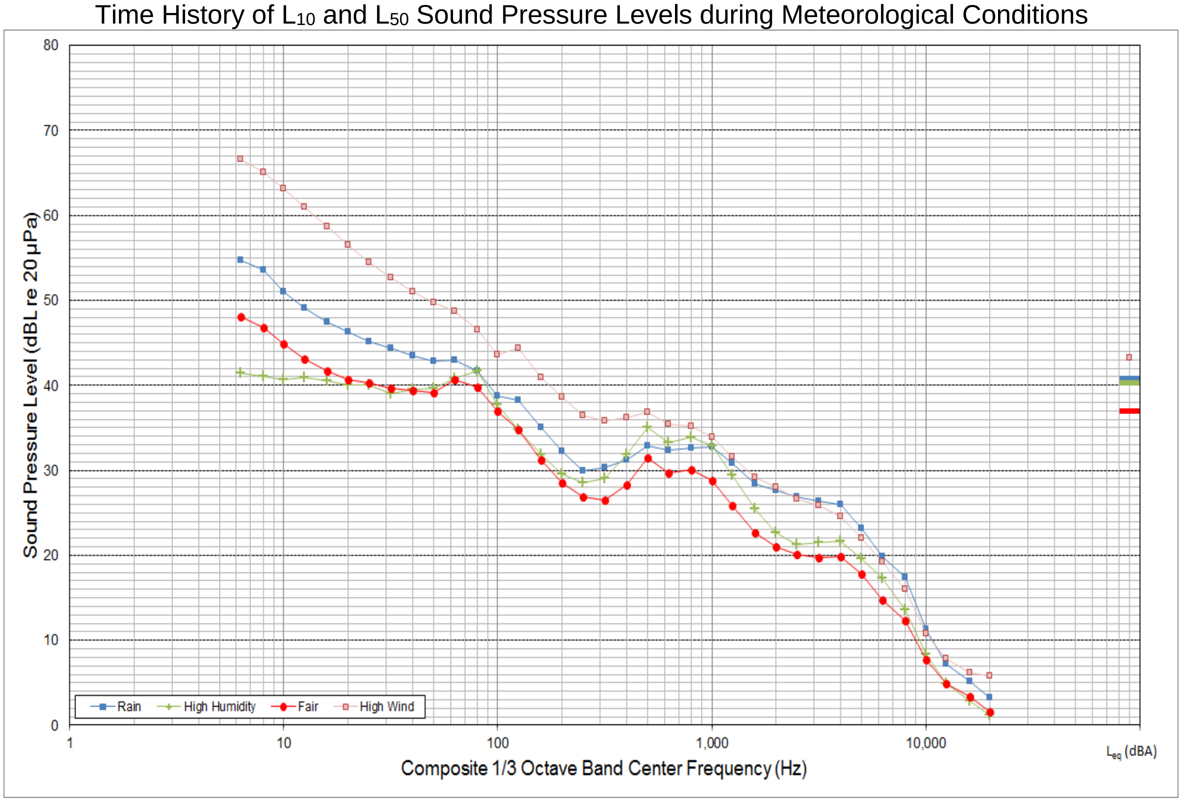
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-5. Photographs of Monitoring Position 34



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-6. Monitoring Position 34 Summary of Measured Sound Pressure Levels

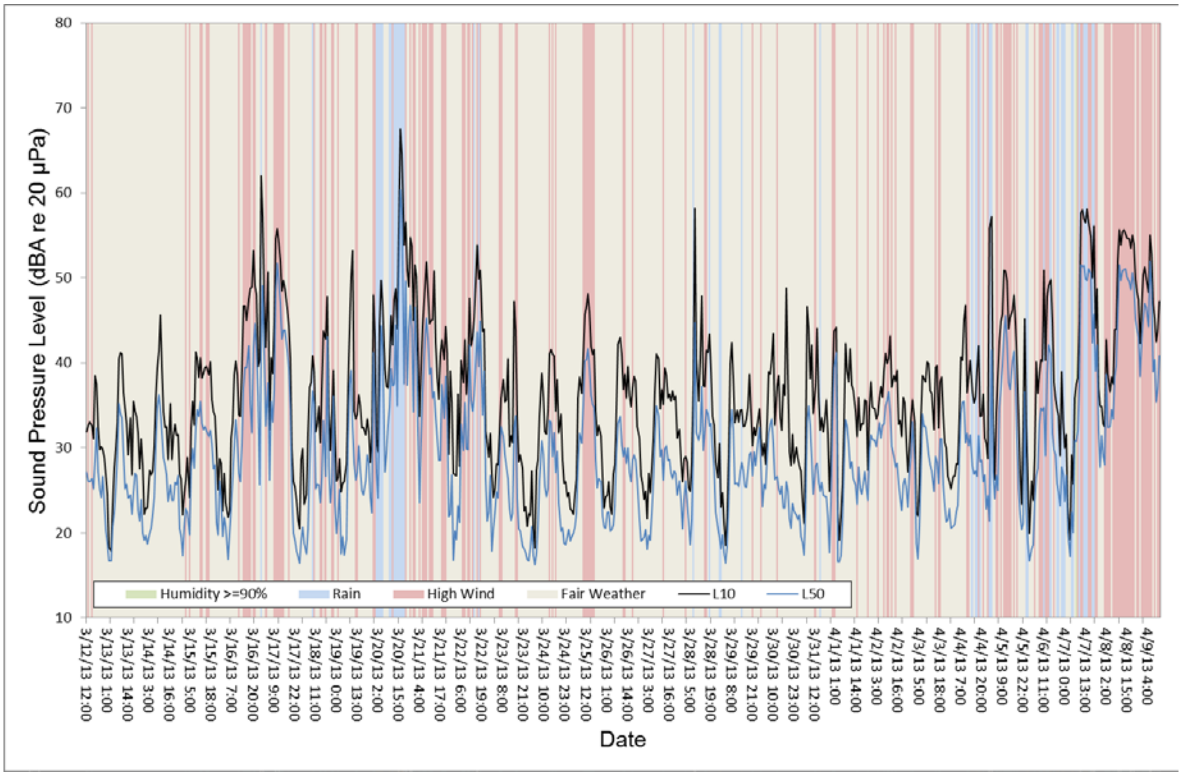
4.4 Monitoring Position 35 – Description and Results

MP-35 was located at a residence that is approximately 7 miles north of Vale, Oregon, along the Tub Mountain Alternate of Segment 5 (Malheur County). The distance to the nearest major roadway (US 26) from MP-35 is approximately 1.7 miles. The distances to the nearest existing transmission line and substation from MP-35 are approximately 1.5 miles and 29 miles. Traffic noise on US 26 is lower level compared to MP-34 and not recognizable over cows, sheep, and other agricultural activities nearby, when active. Generally higher sound levels are attributed to louder agricultural activities than at MP-34. At least one dog lives at the home, and other daytime observations included natural sounds such as birds. Nighttime field observations included the sound of traffic on US 26, which was lower level than at MP-35 due to the increased distance from the highway. Traffic levels are lower at night; therefore traffic noise is less frequent, but still audible between the sounds of sheep and cows. Figure 4-7 includes photographs of the MP relative to residence and the viewpoint from the MP in the direction of the Project. Figure 4-8 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

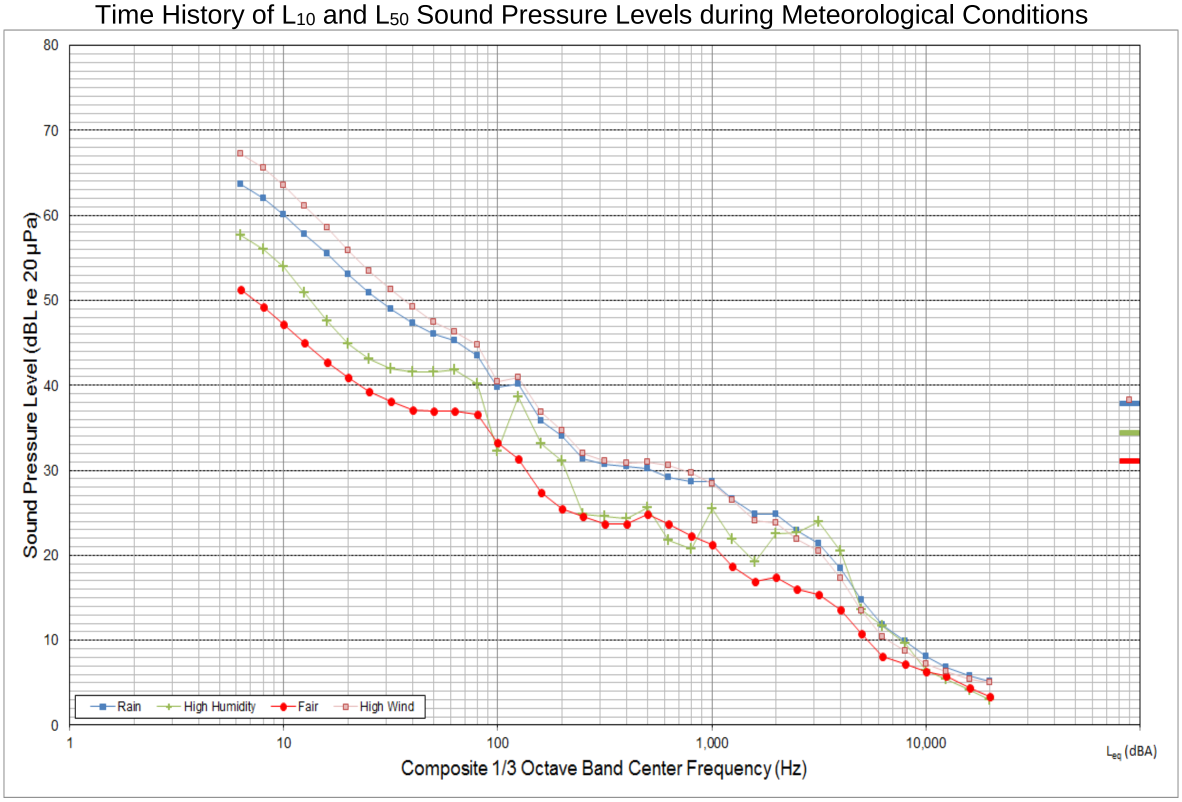
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-7. Photographs of Monitoring Position 35



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-8. Monitoring Position 35 Summary of Measured Sound Pressure Levels

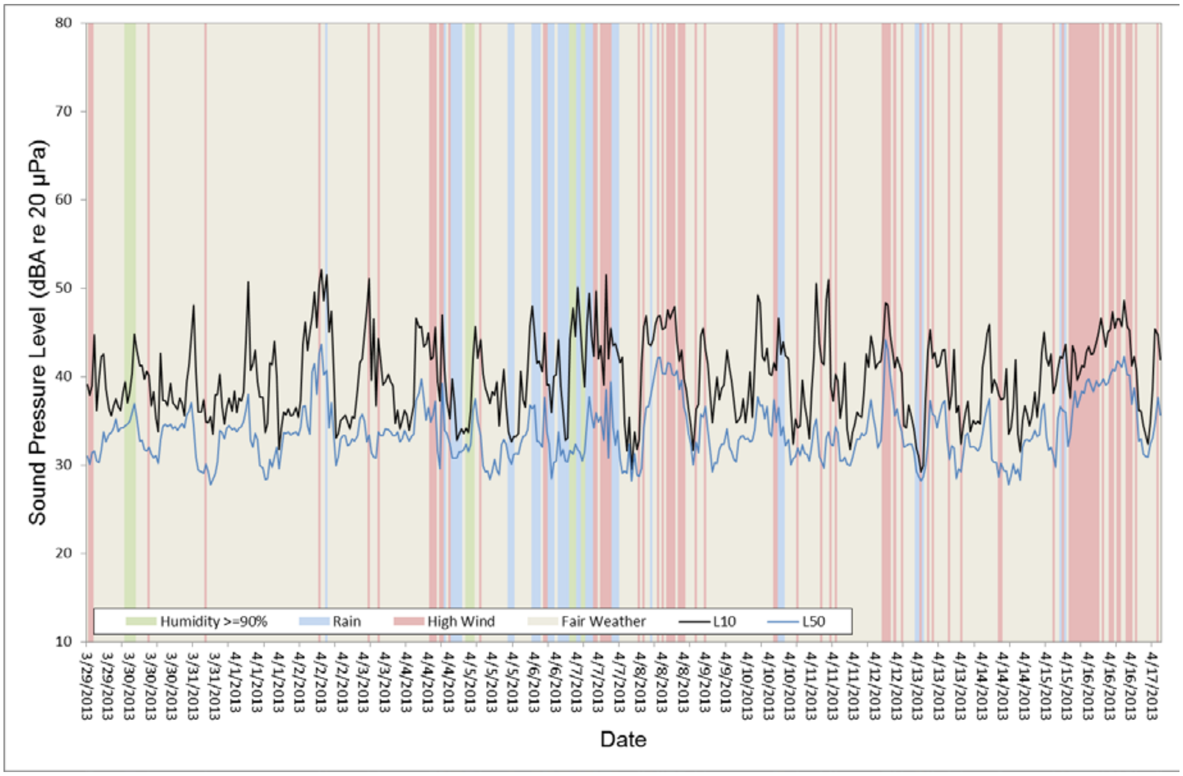
4.5 Monitoring Position 36 – Description and Results

MP-36 was located at a residence approximately 15 miles northwest of Lime, Oregon, and 20 miles southeast of Baker City, Oregon, along the Burnt River Alternate of Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-36 are approximately 2.1 miles and 2.3 miles, respectively. The distance to the nearest existing transmission line from MP-36 is approximately 930 feet. Audible daytime observations included cows, sheep, dogs, the trickle of water in a creek approximately 150 feet away, and birds. Audible nighttime observations included distant traffic on I-84, the nearby creek, cows, and wind. Figure 4-9 includes photographs of the MP relative to the primary residential structure and the viewpoint from the MP in the direction of the Project. Figure 4-10 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

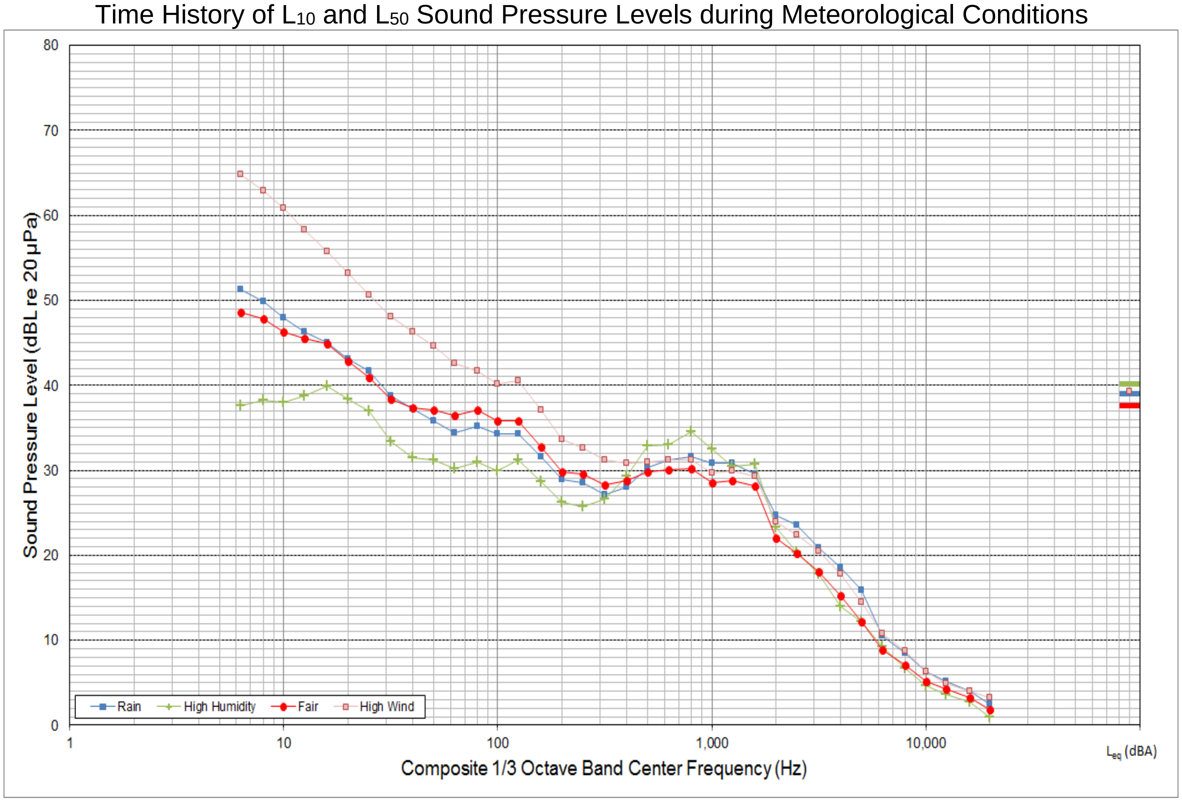
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-9. Photographs of Monitoring Position 36



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-10. Monitoring Position 36 Summary of Measured Sound Pressure Levels

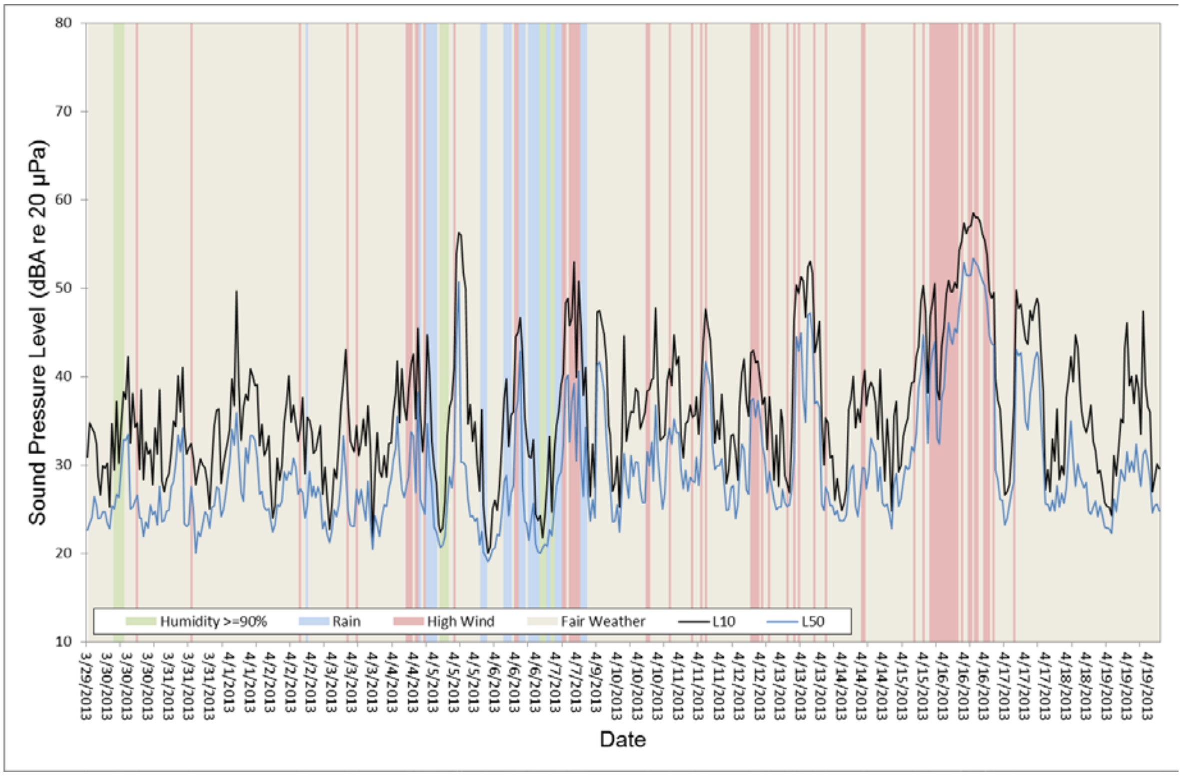
4.6 Monitoring Position 37 – Description and Results

MP-37 was located at a residence approximately 14 miles northwest of Lime, Oregon, and 22 miles southeast of Baker City along the Burnt River Alternate of Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-37 are approximately 2.3 and 2.6 miles, respectively. The nearest transmission line is approximately 0.7 mile away, and the nearest substation is 17 miles away. Observations noted faint sounds from I-84 and more easily heard sounds of trains when the railroad was active. Other sounds observed included horses at the property and natural sounds including birds. Figure 4-11 includes photographs of the MP relative to the primary residential structure and the viewpoint of the MP in the direction of the Project. Figure 4-12 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

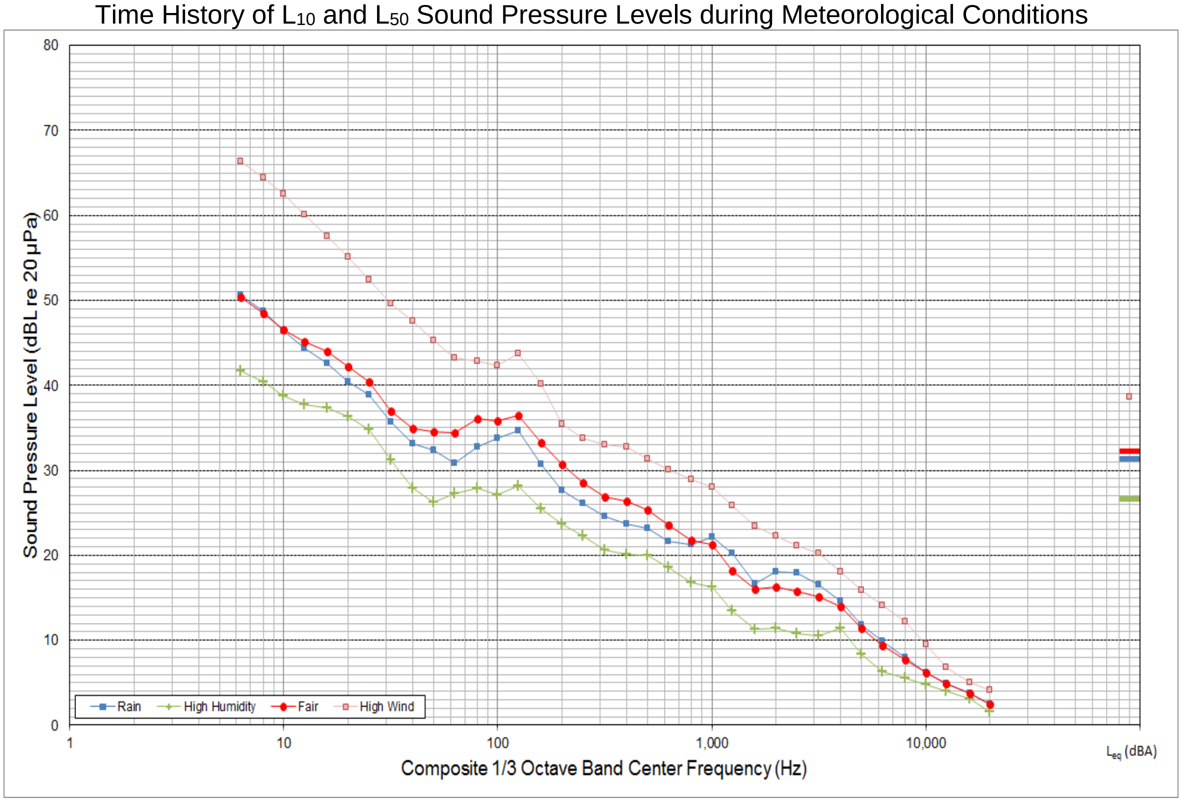
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-11. Photographs of Monitoring Position 37



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-12. Monitoring Position 37 Summary of Measured Sound Pressure Levels

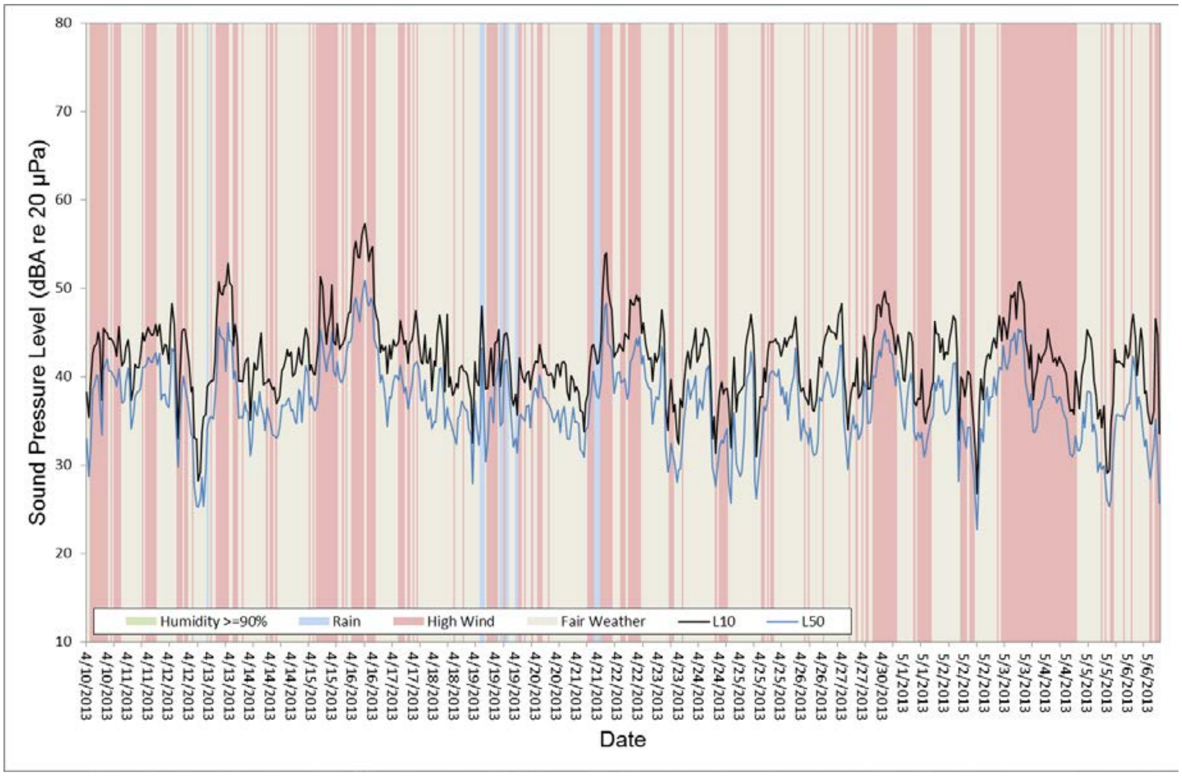
4.7 Monitoring Position 38 – Description and Results

MP-38 was located at a residence approximately 1.5 miles southwest of Nelson, Oregon, and 26 miles southeast of Baker City along the Burnt River Alternate of Segment 4 (Baker County). Distances to the nearest major roadway (I-84) and the Union Pacific Railroad from MP-38 are approximately 0.7 and 0.6 mile, respectively. The Ash Grove Cement Plant is located approximately 1.5 miles north of MP-38 and a rock quarry used for the cement plant is located 1.3 miles northwest. The hum of the cement plant processes was audible at the MP as well as the sound of heavy machinery at the rock quarry. I-84 and the railway are periodically audible as well. Figure 4-13 includes photographs of the MP relative to the residence (right portion of photo) and the viewpoint of the MP towards the Project. Figure 4-14 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions. High-humidity conditions did not occur during the monitoring period at this MP. Late-night observations at this MP were not possible due to landowner access restrictions; however, on multiple occasions field engineers noted the Ashe Grove Cement Plant operating or at least still generating sound at night.

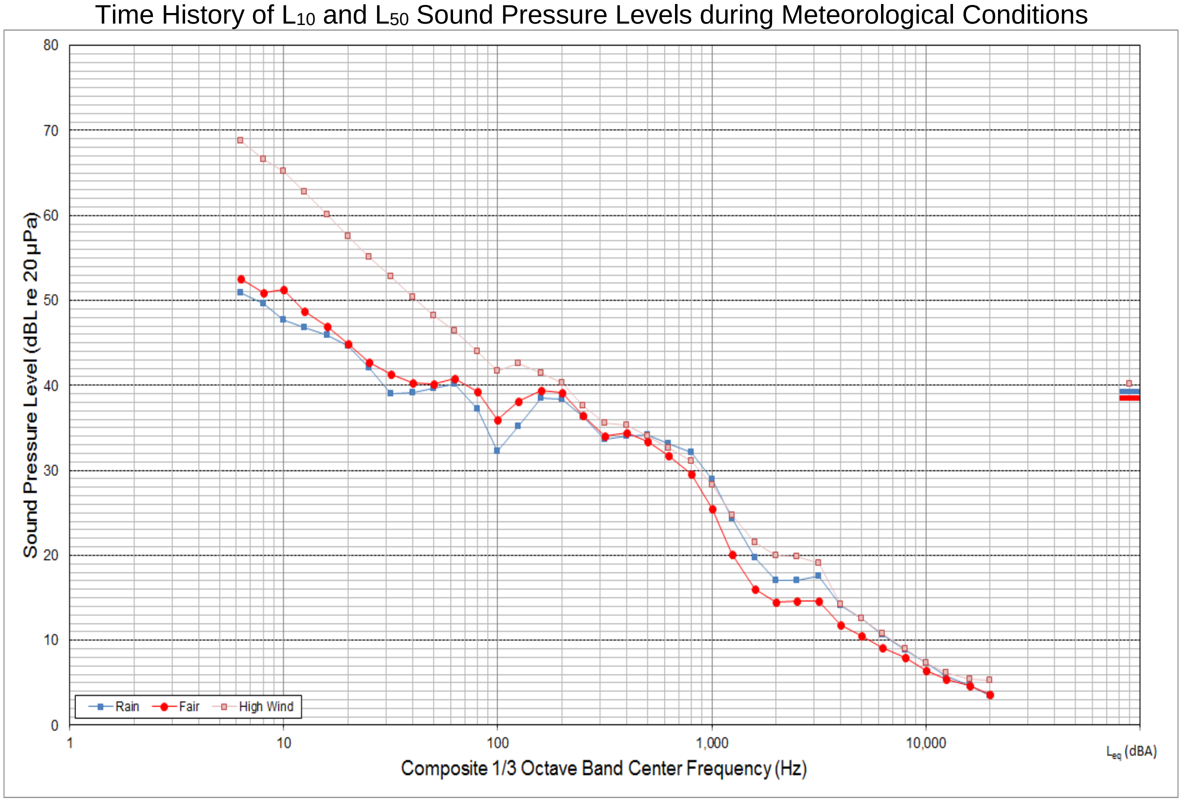
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-13. Photographs of Monitoring Position 38



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-14. Monitoring Position 38 Summary of Measured Sound Pressure Levels

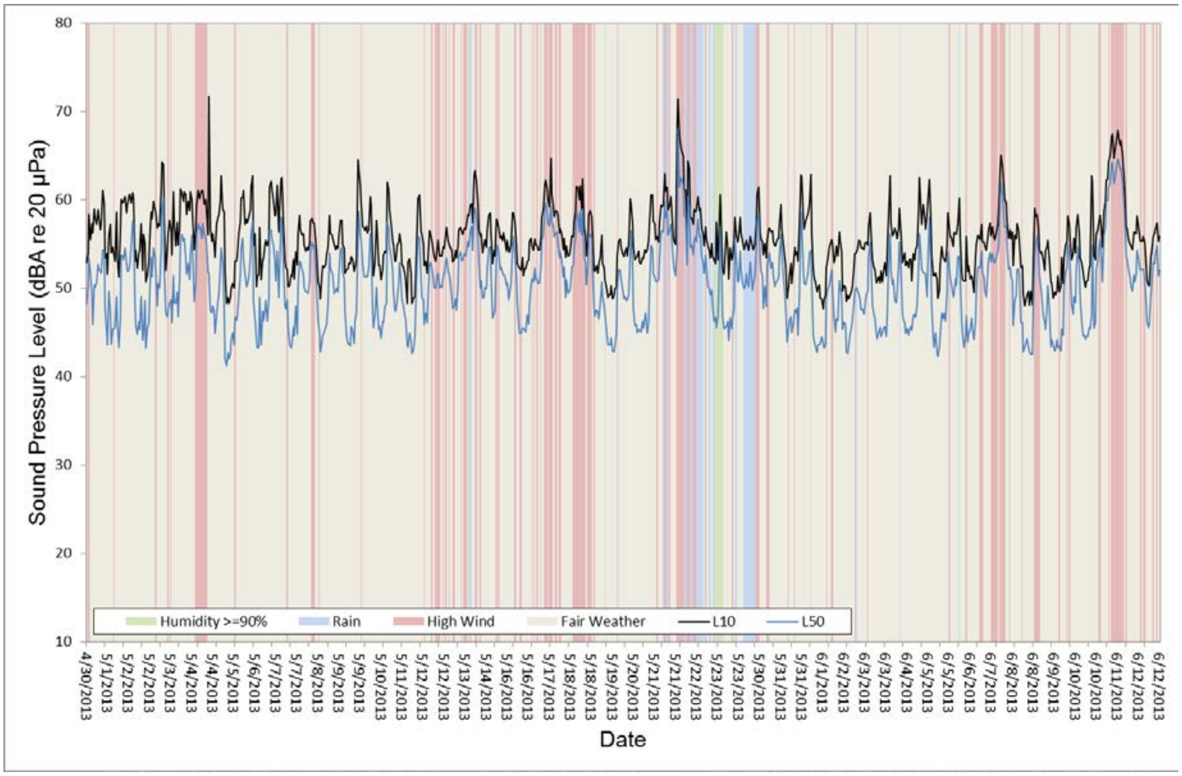
4.8 Monitoring Position 39 – Description and Results

MP-39 was located at a mobile home residence approximately 4 miles east of Boardman, Oregon, along the East of Bombing Range Road Alternate of Segment 1 (Morrow County). Distances to the nearest major roadways, US 730 and I-84, are 530 feet and 850 feet, respectively. There is an off-ramp from I-84 westbound for traffic to access US 730 that is at its closest point 690 feet from the MP. Additionally, the Union Pacific Railroad is located approximately 2,500 feet north of the MP. Figure 4-15 includes photographs of the MP relative to the mobile home and the viewpoint of the MP to the Project. Figure 4-16 includes the time history plot for the L_{10} and L_{50} sound pressure levels in 1-hour measurement intervals and the spectral plot of sound levels under meteorological conditions.

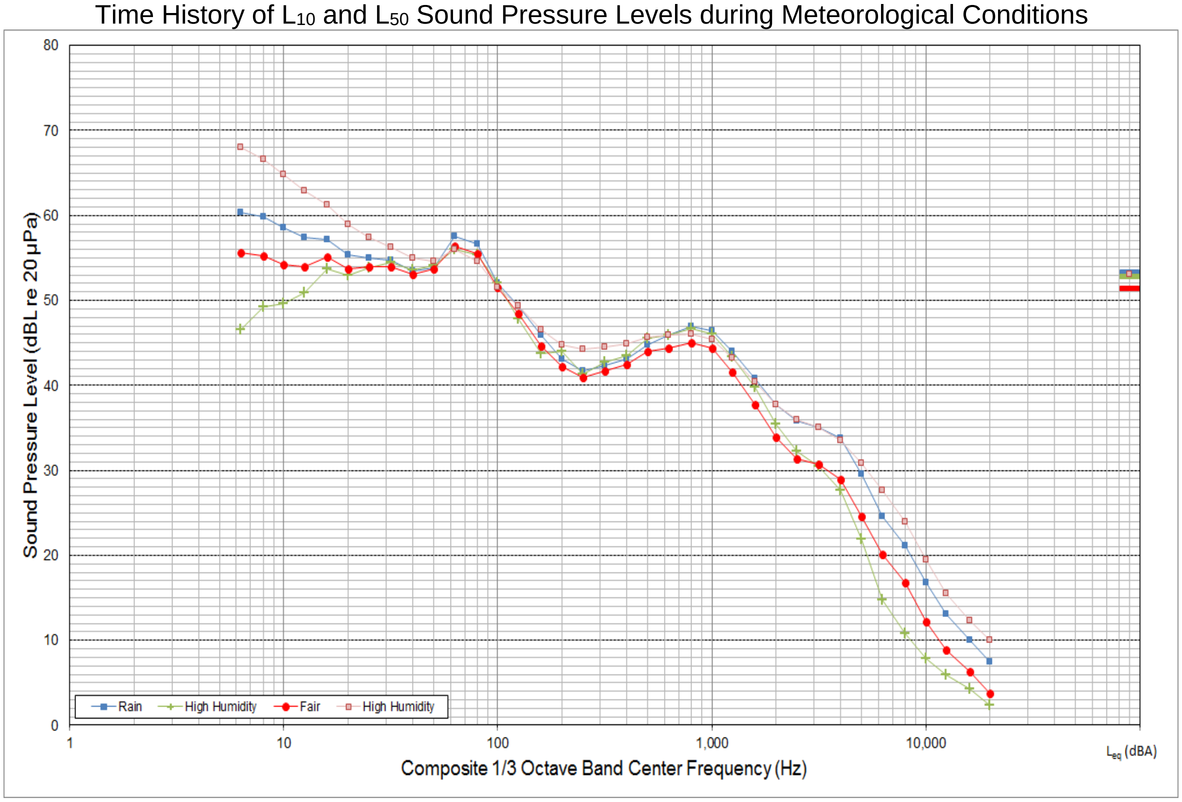
Photograph taken in the direction of the primary residential structure

Photograph taken in the direction of the Project

Figure 4-15. Photographs of Monitoring Position 39



Time History of L_{10} and L_{50} Sound Pressure Levels during Meteorological Conditions



Composite 1/3 Octave Band of Sound Pressure Levels during Meteorological Conditions

Figure 4-16. Monitoring Position 39 Summary of Measured Sound Pressure Levels

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the Project baseline sound survey indicate that background sound levels vary both spatially and temporally, which is a partly a function of the large size of the analysis area and varying existing sound sources within the analysis area. Principal contributors to the existing acoustic environment included motor vehicle traffic, railroad traffic, mobile farming equipment and activities, periodic aircraft flyovers, receptor yard sounds (i.e., people, children, and pets), ranch animals (cows, horses, and sheep), industrial sounds (e.g., cement plant and quarry), and natural sounds such as birds, insects, and wind interaction with vegetation and/or terrain.

The Supplemental Baseline Sound Survey data were analyzed in terms of periods when transmission line noise emissions are expected to be the highest (foul weather) and in terms of daytime (7:00 am to 10:00 pm) and nighttime periods (10:00 p.m. to 7:00 a.m.) as defined in the OAR. Daytime and nighttime periods are typically distinguished in noise regulations because nighttime is generally associated with quieter hours of the day when people may have heightened sensitivity to noise. Additionally, a late night (12:00 a.m. to 5:00 a.m.) subset of the nighttime monitoring period was evaluated as this is a time period where sleep disturbance may be even more likely than during other nighttime hours.

The results of the baseline monitoring program were used in conjunction with acoustic modeling to establish a range of existing ambient sound levels within the analysis area and assist in determining compliance with OAR 340-035-0035(1)(b)(B)(i), which prescribes an incremental increase limit of 10 dBA over the ambient statistical noise levels of either the L_{10} or L_{50}. Consistent with the OAR, the mean L_{10} and L_{50} sound levels were used as estimates to represent the regularly reoccurring or “typical” exposure sound levels and to set baseline conditions. The mean L_{10} and L_{50} sound levels at each MP during daytime and nighttime periods under high humidity (90 percent RH or greater) and precipitation meteorological conditions were calculated (see Table 5-1). These sound levels correspond to 1-hour interval data during daytime, nighttime, and late night periods measured over the duration of the survey. Table 5-1 also presents the total measurement duration (including starting and ending dates).

Sound levels reported in Table 5-1 are typically highest during the daytime hours. Results show that the L_{50} daytime mean sound levels range from a minimum of 28 dBA at MP-37 to a maximum of 53 dBA at MP-39. The range of the L_{50} nighttime mean sound levels is from 23 dBA at MP-37 to 52 dBA at MP-39 dBA. Late night L_{50} sound levels vary at the different MPs with higher levels occurring at MPs 32 and 39 and lower levels occurring at MPs 34 and 37. Across all Project transmission line route segments, the baseline sound levels vary from those characteristics of a quiet rural setting to those that may be more strongly influenced by existing sound sources in the Project area such as roadways, railroads, and industrial sources.

The results of the statistical analysis reported in Table 5-1 will be used to assess impacts from the Project via noise modeling. The baseline sound levels will be used for the purpose of assessing the feasibility of the Project to operate incompliance with OAR 340-035-0035(1)(b)(B)(i). Acoustic modeling will be conducted under similar referenced meteorological conditions and allowing for engineering safety factors, to allow some design margin for circumstances and account for variation of the Project specific meteorological conditions when corona noise will most likely be present.

Table 5-1. Description of Monitoring Positions, Measurement Durations, and Results (March 11 to June 12, 2013)

Monitoring Location	Time Period	L_{10} 1-hour dBA	L_{50} 1-hour dBA	Measurement Period	
				Date / Start Time	Date / End Time
MP-32 (SN 2546 & 1736)	Daytime	57	51	3/11/2013 3:00 PM	4/9/2013 3:00 PM
	Nighttime	54	41		
	Late-Night	53	41		
MP-33 (SN 1736 & 2546)	Daytime	47	40	3/11/2013 4:00 PM	4/9/2013 3:00 PM
	Nighttime	45	35		
	Late-Night	45	37		
MP-34 (SN 3005 & 2199)	Daytime	48	41	3/11/2013 6:00 PM	4/9/2013 11:00 AM
	Nighttime	38	28		
	Late-Night	32	25		
MP-35 (SN 2199 & 3005)	Daytime	46	38	3/12/2013 12:00 PM	4/9/2013 12:00 PM
	Nighttime	38	28		
	Late-Night	39	28		
MP-36 (SN 2227 & 2199)	Daytime	42	34	3/29/2013 11:00 AM	4/17/2013 8:00 AM
	Nighttime	38	32		
	Late-Night	38	31		
MP-37 (SN 3142 & 3005)	Daytime	37	28	3/29/2013 4:00 PM	4/19/2013 11:00 PM
	Nighttime	29	23		
	Late-Night	27	22		
MP-38 (SN 2443)	Daytime	42	38	4/10/2013 8:00 AM	5/6/2013 10:00 PM
	Nighttime	41	35		
	Late-Night	40	33		
MP-39 (SN 2199 & 2443)	Daytime	57	53	4/30/2013 4:00 PM	6/12/2013 11:00 PM
	Nighttime	57	52		
	Late-Night	56	50		

Notes:
dBA – A-weighted decibels
L_{10} – intrusive sound level
L_{50} – median sound level
MP – monitoring position
SN – serial number

APPENDIX A
MEASUREMENT EQUIPMENT AND NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST) LABORATORY CALIBRATION CERTIFICATIONS

Certificate of Calibration and Conformance

This document certifies that the instrument referenced below meets published specifications per Procedure PRD-P263; ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

Manufacturer:	Larson Davis	Temperature:	75.2	°F
Model Number:	831		25	°C
Serial Number:	2443	Rel. Humidity:	33	%
Customer:		Pressure:	987	mbars
Description:	Sound Level Meter			hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 28-Feb-13 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/16/2013	2012-154016

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: THR Signature:

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Cincinnati, OH 45241
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Certificate of Calibration and Conformance

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Manufacturer:	Larson Davis	Temperature:	75.2	°F
Model Number:	831		25	°C
Serial Number:	1736	Rel. Humidity:	25	%
Customer:		Pressure:	987	mbars
Description:	Sound Level Meter			hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 6-Mar-13 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/16/2013	2012-154016

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Ed Devlin Signature: [signature]

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Manufacturer:	Larson Davis	Temperature:	73.4	°F
Model Number:	831		24	°C
Serial Number:	2199	Rel. Humidity:	32	%
Customer:	TMS Rental	Pressure:	993	mbars
Description:	Sound Level Meter		993	hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 3-Jun-13 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/12/2014	2013-172614

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. Calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of The Modal Shop.

Technician: Tim Rarden Signature:

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Manufacturer:	Larson Davis	Temperature:	72.5	°F
Model Number:	831		24	°C
Serial Number:	2227	Rel. Humidity:	23	%
Customer:		Pressure:	1005	mbars
Description:	Sound Level Meter			hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 7-Mar-13 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/16/2013	2012-154016

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

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Manufacturer:	Larson Davis	Temperature:	75.2	°F
Model Number:	831		25	°C
Serial Number:	2546	Rel. Humidity:	33	%
Customer:		Pressure:	987	mbars
Description:	Sound Level Meter			hPa

Note: As Found / As Left: In Tolerance

Upon receipt for testing, this instrument was found to be:

Within the Stated tolerance of the manufacturer's specification

Calibration Date: 9-Oct-12 Calibration Due:

Calibration Standards Used:

Manufacturer	Model	Serial Number	Cal Due	Traceability No.
Larson Davis	LDSigGen/2239	0760/0109	4/16/2013	2012-157887

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at The Modal Shop and/or Larson Davis Corporate Headquarters. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

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PCB PIEZOTRONICS
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Certificate of Calibration and Conformance

Certificate Number 2012-164766

Instrument Model 831, Serial Number 0003005, was calibrated on 05OCT2012. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 0; S1.25-1991; IEC 61672-2002 Class 1; 60651-2001 Type 1; 60804-2000 Type 1; 61260-2001 Class 0; 61252-2002.

New Instrument
Date Calibrated: 05OCT2012
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO
Stanford Research Systems	DS360	61746	12 Months	06JUL2013	61740-070612

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade | Relative Humidity: 25 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

This calibration complies with the requirements of ISO 17025 and ANSI Z540. The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-025768

Signed:
Technician: Ron Harris

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PCB PIEZOTRONICS
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Certificate of Calibration and Conformance

Certificate Number 2013-168873

Instrument Model 831, Serial Number 0003142, was calibrated on 18JAN2013. The instrument meets factory specifications per Procedure D0001.8310, ANSI S1.4-1983 (R 2006) Type 1; S1.4A-1985 ; S1.43-1997 Type 1; S1.11-2004 Octave Band Class 1; S1.25-1991; IEC 61672 2002 Class 1 60651-2001 Type 1; 60804-2000 Type 1 61260-2001 Class 1; 61252-2002

New Instrument
Date Calibrated: 18JAN2013
Calibration due:

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL DUE	TRACEABILITY NO
Stanford Research Systems	DS360	61746	12 Months	03JUL2013	61746-070612

Reference Standards are traceable to the National Institute of Standards and Technology (NIST)

Calibration Environmental Conditions

Temperature: 23 ° Centigrade Relative Humidity 18 %

Affirmations

This Certificate attests that this instrument has been calibrated under the stated conditions with Measurement and Test Equipment (M&TE) Standards traceable to the U.S. National Institute of Standards and Technology (NIST). All of the Measurement Standards have been calibrated to their manufacturers' specified accuracy / uncertainty. Evidence of traceability and accuracy is on file at Provo Engineering & Manufacturing Center. An acceptable accuracy ratio between the Standard(s) and the item calibrated has been maintained. This instrument meets or exceeds the manufacturer's published specification unless noted.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written approval of the issuer.

Tested with PRM831-023868

Signed: Ron Harris
Technician: Ron Harris

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APPENDIX B
TEST ENGINEERS LOG

Table B-1 summarizes observations made by test engineers at various times throughout the monitoring period.

Table B-1. Test Engineers Log

Monitoring Location	Time of Day	Observations
MP-32	3/11/2013 2:40 PM	Highway traffic on I-84, low voltage transmission line noise, dog.
	3/28/2013 11:23 AM	Highway traffic on I-84, low voltage transmission line noise, dog.
	3/29/2013 1:00 AM	Highway traffic on I-84
	4/9/2013 4:00 PM	Highway traffic on I-84, low voltage transmission line noise, dog.
MP-33	3/11/2013 3:25 PM	Highway traffic on I-84, small dogs, wind.
	3/28/2013 11:45 AM	Highway traffic on I-84, small dogs, wind.
	3/29/2013 1:15 AM	Highway traffic on I-84
	4/9/2013 4:20 PM	Highway traffic on I-84, small dogs, wind.
MP-34	3/11/2013 5:35 PM	Roadway traffic on US26, cows, wind.
	3/28/2013 9:00 AM	Roadway traffic on US26, cows, wind.
	3/28/2013 11:30 PM	Intermittent roadway traffic on US26, cows, insects, wind.
	4/9/2013 11:20 AM	Roadway traffic on US26, cows, sheep, wind.
MP-35	3/12/2013 11:50 AM	Distant roadway on US26, sheep, cows, wind
	3/28/2013 8:00 AM	Distant roadway on US26, sheep, land owner on ATV, cows, wind.
	3/28/2013 11:00 PM	Distant roadway traffic on US26, sheep, insect, wind
	4/9/2013 11:00 AM	Distant roadway on US26, sheep, land owner on ATV, cows, wind.
MP-36	3/29/2013 11:00AM	Cows, light wind, low level birds, dogs barking upon approach
	4/9/2013 2:00 PM	Cows, light wind, low level bird sounds, dogs barking upon approach
	4/10/2013 4:00 AM	Cows, light wind, low level insect sounds
MP-37	3/29/2013 3:30 PM	Dog, some insects, minimal wind, horses
	4/9/2013	Dog, some insects, minimal wind, horses
	4/10/2013 4:00 AM	Some wind, low level highway noise on I-84 in distance
MP-38	4/10/2013 8:00 AM	Industrial noise from Ashe Grove Cement Plant and quarry, I-84
	4/30/2013 10:00 AM	Industrial noise from Ashe Grove Cement Plant and quarry, I-84
MP-39	4/30/2013 4:00PM	Highway traffic on I-84, farm equipment staging at nearby barn.
	5/15/2013 2:00 PM	Highway traffic on I-84 and US 730, dog bark
	5/15/2013 12:15 AM	Highway traffic on I-84 and US 730, railroad activity (distant)
	5/30/2013 12:00 PM	Highway traffic on I-84 and US 730, dog bark

ATV – all-terrain vehicle

ATTACHMENT X-4
TABULATED SUMMARY OF ACOUSTIC MODELING RESULTS BY RECEPTOR LOCATION

Attachment X-4. Tabulated Summary of Acoustic Modeling Results by Receptor Location

NSR Sequential Number	Receptor ID	Receptor Status	Distance from Receptor to the Transmission Line (ft)	Project Transmission Line Milepost	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Predicted Sound Level (dBA)		Foul Weather Increase over Late Night Baseline (dBA)
						Easting	Northing			Fair Weather	Foul Weather	
1	1008	Residence	1,673	1	Morrow	296,829	5,078,967	MP39	50	10	35	-
2	1009	Residence	1,148	1	Morrow	296,681	5,079,106	MP39	50	12	37	-
3	new	Residence	1,837	17.9	Morrow	295,456	5,052,088	MP05	27	10	35	+8
4	new	Residence	3,232	27.9	Morrow	311,219	5,050,286	MP05	27	8	33	+6
5	new	Residence	3,556	28.1	Morrow	311,442	5,050,316	MP05	27	8	33	+6
6	1176	Residence	2,657	33.2	Morrow	318,872	5,046,093	MP05	27	9	34	+7
7	New-1	Residence	2,884	49.7	Umatilla	335,681	5,030,287	MP06	25	9	34	+10
8	New-2	Residence	2,139	58.9	Umatilla	350,487	5,030,937	MP06	25	11	36	+11
9	New-3	Residence	1,834	59.6	Umatilla	351,608	5,029,688	MP06	25	11	36	+12
10	New-4	Residence	1,834	59.6	Umatilla	351,608	5,029,688	MP06	25	11	36	+12
11	New-5	Residence	1,398	59.7	Umatilla	351,805	5,030,667	MP06	25	13	38	+13
12	new	Residence	2,684	64	Umatilla	358,711	5,030,227	MP28	30	9	34	+6
13	new	Residence	2,221	64.2	Umatilla	358,940	5,030,005	MP28	30	10	35	+6
14	New-6	Residence	1,096	64.7	Umatilla	359,251	5,029,655	MP28	30	14	39	+9
15	new	Residence	2,428	64.8	Umatilla	360,178	5,029,105	MP28	30	10	35	+6
16	new	Residence	4,032	67.2	Umatilla	363,067	5,029,396	MP28	30	9	34	+5
17	new	Residence	2,569	75.7	Umatilla	374,908	5,035,471	MP08	41	10	35	-
18	123	Residence	919	78.5	Umatilla	377,967	5,038,280	MP09	35	16	41	+7
19	128	Residence	2,192	79.8	Umatilla	379,730	5,039,276	MP09	35	12	37	+4
20	118	Residence	1,483	82.9	Umatilla	384,896	5,038,241	MP09	35	14	39	+5
21	108	Residence	2,116	88.8	Union	390,861	5,032,259	MP11	32	13	38	+6
22	111	Residence	2,218	88.9	Union	390,956	5,032,288	MP11	32	12	37	+6
23	107	Residence	1,785	89	Union	391,084	5,032,153	MP11	32	14	39	+7
24	266	Residence	1,555	89	Union	391,099	5,032,083	MP11	32	14	39	+8
25	106	Residence	1,883	90.9	Union	393,171	5,029,402	MP11	32	13	38	+7
26	265	Cabin	1,260	91.6	Union	393,869	5,029,058	MP11	32	15	40	+8
29	257	School/Correctional Facility	1,867	99.1	Union	402,712	5,021,145	MP11	32	12	37	+6
36	blank	Residence	1,175	105	Union	411,360	5,018,085	MP11	32	15	40	+9
37	blank	Residence	2,733	105.3	Union	411,775	5,017,526	MP11	32	11	36	+5
38	blank	Residence	1,962	105.8	Union	413,069	5,018,465	MP11	32	12	37	+6

Attachment X-4. Tabulated Summary of Acoustic Modeling Results by Receptor Location

NSR Sequential Number	Receptor ID	Receptor Status	Distance from Receptor to the Transmission Line (ft)	Project Transmission Line Milepost	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Predicted Sound Level (dBA)		Foul Weather Increase over Late Night Baseline (dBA)
						Easting	Northing			Fair Weather	Foul Weather	
39	blank	Residence	1,339	105.8	Union	412,939	5,018,324	MP11	32	14	39	+7
40	blank	Residence	2,402	105.9	Union	413,382	5,018,048	MP11	32	11	36	+5
41	blank	Residence	1,650	106	Union	413,170	5,017,950	MP11	32	13	38	+7
42	blank	Residence	2,949	106.1	Union	411,871	5,017,363	MP11	32	11	36	+5
43	blank	Residence	1,978	106.1	Union	413,329	5,017,731	MP11	32	12	37	+6
44	blank	Residence	1,627	106.1	Union	413,205	5,017,785	MP11	32	13	38	+7
45	blank	Residence	2,024	106.2	Union	412,192	5,017,242	MP11	32	13	38	+6
46	blank	Residence	991	106.2	Union	413,066	5,017,539	MP11	32	15	40	+9
47	blank	Residence	1,345	106.3	Union	412,401	5,017,259	MP11	32	15	40	+8
48	blank	Residence	2,152	106.3	Union	412,204	5,017,039	MP11	32	12	37	+6
49	blank	Residence	1,247	106.3	Union	413,179	5,017,410	MP11	32	14	39	+8
50	blank	Residence	1,791	106.3	Union	413,355	5,017,402	MP11	32	12	37	+6
51	blank	Residence	3,130	106.4	Union	412,104	5,016,572	MP11	32	10	35	+5
52	blank	Residence	2,461	106.4	Union	412,287	5,016,666	MP11	32	12	37	+6
53	blank	Residence	1,759	106.4	Union	412,342	5,016,992	MP11	32	13	38	+7
54	blank	Residence	1,900	106.4	Union	412,352	5,016,874	MP11	32	13	38	+6
55	blank	Residence	3,041	106.6	Union	412,252	5,016,409	MP11	32	11	36	+5
56	blank	Residence	3,035	107.8	Union	413,460	5,014,689	MP11	32	11	36	+5
57	blank	Residence	1,939	110.3	Union	417,831	5,013,289	MP11	32	12	37	+6
58	blank	Residence	1,306	110.9	Union	418,035	5,012,267	MP11	32	14	39	+7
59	blank	Residence	1,581	111.7	Union	418,564	5,011,176	MP11	32	13	38	+6
60	blank	Residence	2,349	111.7	Union	418,791	5,011,237	MP11	32	11	36	+5
61	blank	Residence	2,858	111.9	Union	419,051	5,011,007	MP11	32	10	35	+4
62	blank	Residence	3,035	112.6	Union	419,517	5,009,994	MP11	32	9	34	+4
63	blank	Residence	958	112.6	Union	418,948	5,009,711	MP11	32	15	40	+9
64	blank	Residence	1,106	115.4	Union	420,229	5,005,549	MP13	48	15	40	-
65	blank	Residence	1,854	119.4	Union	423,413	4,999,692	MP13	48	12	37	-
66	91	Residence	2,106	120.5	Union	424,119	4,998,514	MP13	48	12	37	-
67	blank	Residence	997	123.7	Union	428,499	4,995,702	MP14	33	16	41	+8
68	85	Residence	2,083	124.1	Union	428,330	4,994,572	MP14	33	12	37	+5

Attachment X-4. Tabulated Summary of Acoustic Modeling Results by Receptor Location

NSR Sequential Number	Receptor ID	Receptor Status	Distance from Receptor to the Transmission Line (ft)	Project Transmission Line Milepost	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Predicted Sound Level (dBA)		Foul Weather Increase over Late Night Baseline (dBA)
						Easting	Northing			Fair Weather	Foul Weather	
69	83	Residence	1,467	142.6	Baker	439,860	4,968,035	MP15	27	14	39	+12
70	82	Residence	1,053	142.7	Baker	439,993	4,967,946	MP15	27	15	40	+14
71	-1	Residence	1,335	144.3	Baker	440,661	4,965,581	MP15	27	14	39	+13
72	80	Residence	3,320	144.3	Baker	440,057	4,965,541	MP15	27	10	35	+9
73	78	Residence	2,923	145.2	Baker	440,273	4,963,747	MP15	27	10	35	+9
74	1262	Residence	2,582	153.7	Baker	439,029	4,951,743	MP16	41	11	36	+1
75	523	Residence	1,591	153.8	Baker	439,265	4,951,957	MP16	41	13	38	+2
76	blank	Residence	2,323	154.1	Baker	439,590	4,951,522	MP16	41	12	37	+1
77	1266	Residence	2,707	154.4	Baker	439,982	4,951,168	MP16	41	11	36	+1
78	72	Residence	1,371	154.9	Baker	440,872	4,951,166	MP16	41	14	39	+2
79	71	Residence	860	155.2	Baker	441,403	4,951,092	MP16	41	17	42	+4
80	1269	Residence	3,058	155.6	Baker	441,686	4,950,225	MP16	41	11	36	+1
81	blank	Residence	2,431	156	Baker	442,416	4,950,110	MP16	41	12	37	+1
82	227	Residence	2,182	159.9	Baker	448,178	4,948,130	MP17	41	12	37	+1
83	68	Residence	2,205	162.3	Baker	452,311	4,947,967	MP09	35	12	37	+4
84	1714	Residence	2,881	166.2	Baker	455,371	4,943,302	MP17	41	10	35	+1
85	36	Residence	1,473	185.2	Baker	473,610	4,921,457	MP25	46	13	38	-
86	34	Residence	1,578	185.3	Baker	473,678	4,921,255	MP25	46	12	37	-
88	873	Residence	705	198.5	Malheur	482,540	4,903,638	MP32	41	19	44	+5
89	876	Residence	443	198.7	Malheur	482,856	4,903,318	MP32	41	21	46	+7
90	877	Residence	505	199.1	Malheur	483,155	4,902,774	MP32	41	21	46	+6
91	936	Residence	2,375	199.8	Malheur	482,565	4,901,562	MP33	34	10	35	+3
92	887	Residence	2,434	215.2	Malheur	478,340	4,879,805	MP35	24	10	35	+12
93	888	Residence	2,283	216	Malheur	477,194	4,879,669	MP34	24	10	35	+11
94	891	Residence	1,801	216.2	Malheur	476,768	4,879,627	MP34	24	12	37	+12
95	890	Residence	2,070	216.3	Malheur	476,735	4,879,525	MP34	24	11	36	+12
96	892	Residence	1,470	216.5	Malheur	476,299	4,879,547	MP34	24	13	38	+13
97	929	Residence	1,693	216.5	Malheur	475,893	4,880,423	MP34	24	12	37	+13
98	925	Residence	1,102	216.8	Malheur	475,509	4,880,072	MP35	24	14	39	+15
99	895	Residence	1,768	216.9	Malheur	475,678	4,879,196	MP35	24	12	37	+13

Attachment X-4. Tabulated Summary of Acoustic Modeling Results by Receptor Location

NSR Sequential Number	Receptor ID	Receptor Status	Distance from Receptor to the Transmission Line (ft)	Project Transmission Line Milepost	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Predicted Sound Level (dBA)		Foul Weather Increase over Late Night Baseline (dBA)
						Easting	Northing			Fair Weather	Foul Weather	
100	896	Residence	2,119	217	Malheur	475,620	4,879,057	MP35	24	11	36	+12
101	899	Residence	673	217	Malheur	475,459	4,879,468	MP34	24	17	42	+17
102	924	Residence	607	217.3	Malheur	474,932	4,879,676	MP35	24	17	42	+18
103	915	Residence	2,575	217.4	Malheur	474,051	4,879,545	MP35	24	10	35	+11
104	916	Residence	1,598	217.4	Malheur	474,382	4,879,621	MP35	24	12	37	+14
105	919	Residence	745	217.4	Malheur	474,630	4,879,540	MP35	24	16	41	+17
106	904	Residence	2,621	217.7	Malheur	475,377	4,878,437	MP35	24	10	35	+11
107	905	Residence	2,474	217.9	Malheur	474,640	4,878,052	MP35	24	10	35	+12
108	911	Residence	2,119	218.1	Malheur	474,307	4,878,073	MP35	24	11	36	+12
109	913	Residence	2,595	218.1	Malheur	473,894	4,879,450	MP35	24	10	35	+11
110	914	Residence	2,648	218.1	Malheur	473,920	4,879,474	MP35	24	10	35	+11
111	1415	Residence	2,746	253.5	Malheur	484,633	4,844,659	MP35	24	10	35	+11
112	1420	Residence	1,732	254.9	Malheur	486,262	4,843,852	MP35	24	12	37	+13
113	1422	Residence	3,087	263.7	Malheur	492,765	4,831,089	MP35	24	9	34	+11
Morgan Lake Alternative												
114	blank	Residence	3,031	1.9	Union	403,831	5,018,094	MP11	32	10	35	+4
115	blank	Residence	659	6.1	Union	410,100	5,016,605	MP11	32	18	43	+11
116	blank	Residence	2,989	6.7	Union	411,682	5,016,649	MP11	32	11	36	+5
117	98	Cabin	2,549	6.7	Union	410,416	5,015,531	MP11	32	12	37	+6
118	100	Residence	1,499	6.7	Union	410,654	5,015,745	MP11	32	14	39	+8
119	blank	Residence	935	6.8	Union	410,895	5,015,727	MP11	32	17	42	+10
120	blank	Residence	2,897	6.8	Union	411,725	5,016,555	MP11	32	11	36	+5
121	1237	Residence	1,079	6.9	Union	410,912	5,015,638	MP11	32	16	41	+9
122	blank	Residence	2,579	7.1	Union	412,010	5,016,071	MP11	32	12	37	+6
123	blank	Residence	2,618	7.1	Union	411,979	5,016,127	MP11	32	11	36	+5
124	blank	Residence	2,953	7.1	Union	412,025	5,016,230	MP11	32	11	36	+5
125	blank	Residence	1,378	7.4	Union	411,384	5,014,946	MP11	32	15	40	+8
126	blank	Residence	3,081	8.3	Union	413,366	5,014,719	MP11	32	11	36	+5
127	blank	Residence	2,077	9.1	Union	413,861	5,013,840	MP11	32	13	38	+6

Attachment X-4. Tabulated Summary of Acoustic Modeling Results by Receptor Location

NSR Sequential Number	Receptor ID	Receptor Status	Distance from Receptor to the Transmission Line (ft)	Project Transmission Line Milepost	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Predicted Sound Level (dBA)		Foul Weather Increase over Late Night Baseline (dBA)
						Easting	Northing			Fair Weather	Foul Weather	
128	blank	Residence	1,926	9.1	Union	413,858	5,013,792	MP11	32	13	38	+7
129	blank	Residence	1,936	9.1	Union	413,823	5,013,810	MP11	32	13	38	+7
130	blank	Residence	2,297	9.2	Union	413,986	5,013,859	MP11	32	12	37	+6
131	blank	Residence	3,071	11	Union	414,566	5,010,723	MP11	32	12	37	+6
132	blank	Residence	1,060	12.3	Union	416,014	5,008,955	MP11	32	17	42	+10

Notes:

Receptor IDs are provided for ease in cross-referencing older documentation. An incremental increase presented as (-) signifies that the future increase as a result of the Project is predicted to be less than 1 dBA when considered cumulatively with the baseline condition. The incremental increase is obtained by first logarithmically adding the Predicted Foul Weather Sound Level to the Late Night Baseline Sound Pressure Level. The Late Night Baseline Sound Pressure Level is then arithmetically subtracted from this total to quantify the incremental increase. Note that sound pressure levels cannot be added together linearly. For example, a baseline sound pressure level of 25 dBA plus a received sound pressure level of 33 dBA does not equal 58 dBA; rather, using logarithmic addition, the resultant sound pressure level would be 34 dBA. Sound levels in this table are reported in whole decibels.

dBA = A-weighted decibel

ft = feet

ID = identification

m = meter

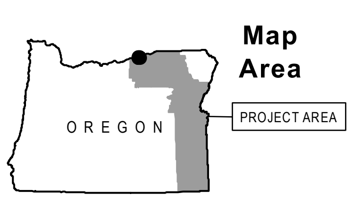
MP = milepost

NSR = noise sensitive receptor

UTM = universal transverse Mercator

ATTACHMENT X-5
AERIAL MAPS SHOWING NOISE SENSITIVE RECEPTORS PREDICTED TO EXCEED AMBIENT DEGRADATION STANDARD

0 1,000
Feet



Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Bureau of Reclamation
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

Boardman to Hemingway Transmission Line Project

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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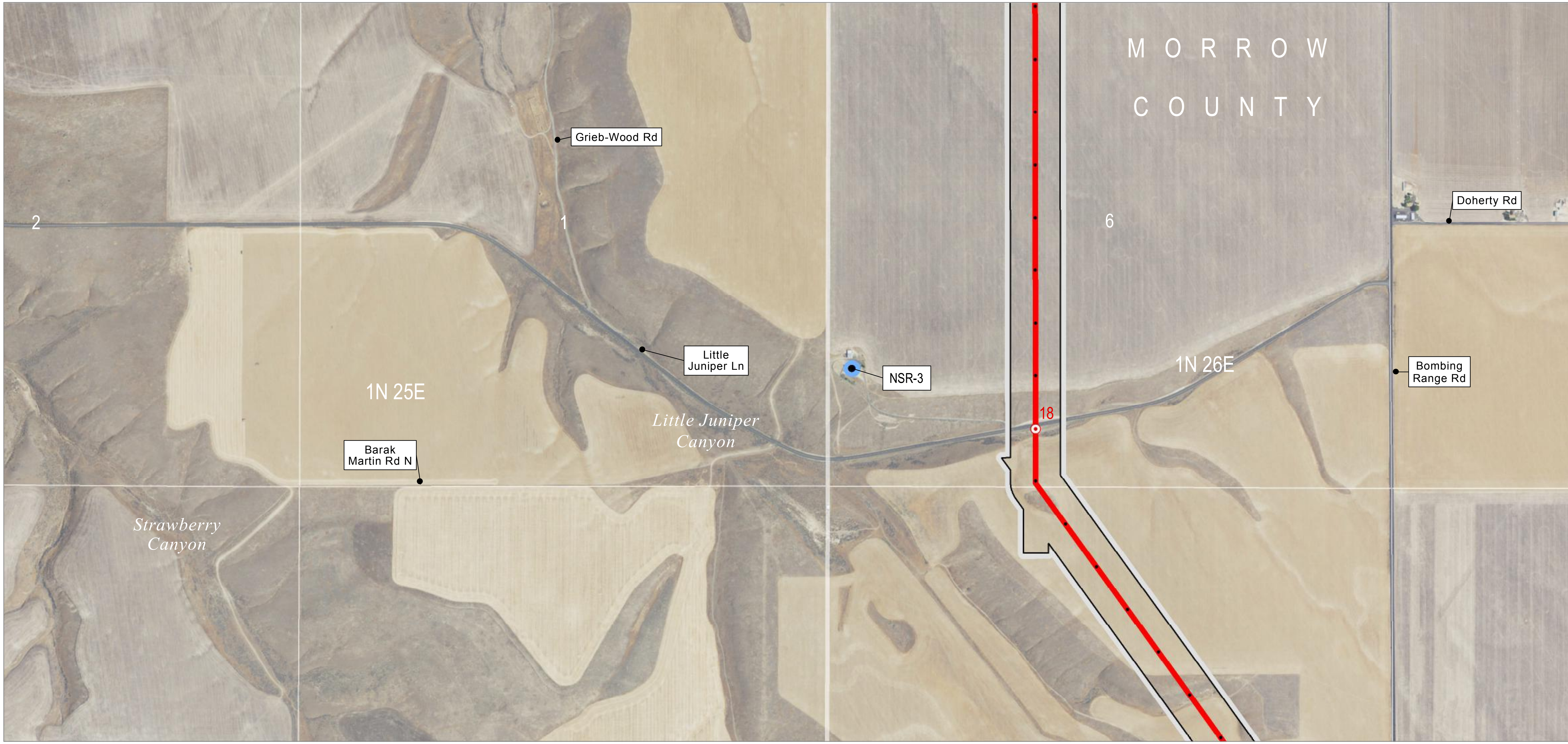
Attachment X-5

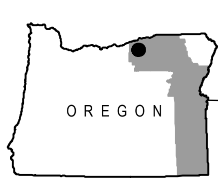
Noise Sensitive Receptors

Morrow County

Map 1



0 1,000
Feet



Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Boardman to Hemingway Transmission Line Project

Attachment X-5
Noise Sensitive Receptors
Morrow County
Map 2

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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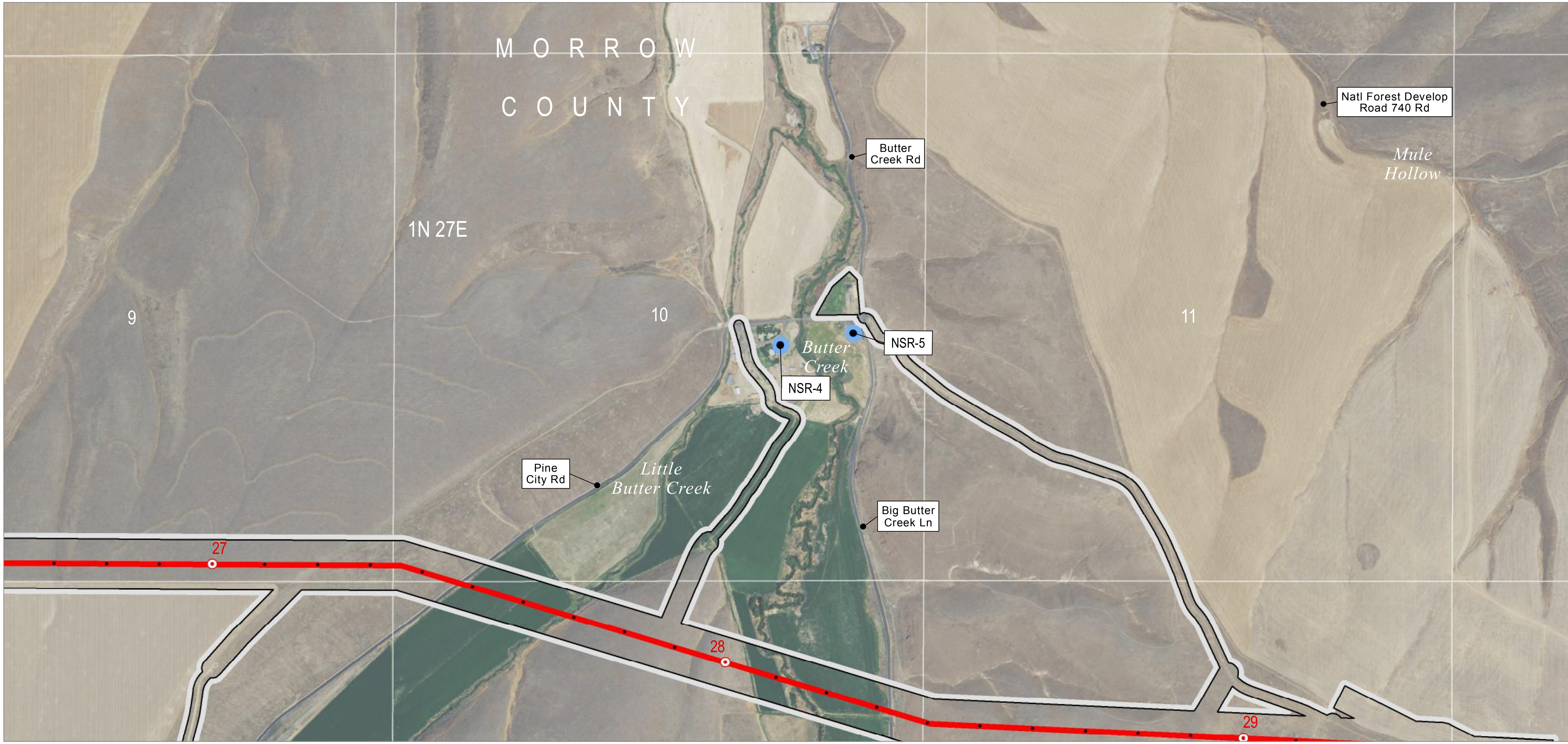

0 1,000
Feet

Map Area
OREGON
PROJECT AREA

Noise Sensitive Receptors
No Exceedance

Project Features
Site Boundary
Proposed Route
Mileposts
Mile
Tenth-mile

Land Status
Private

Boardman to Hemingway Transmission Line Project

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Attachment X-5

Noise Sensitive Receptors

Morrow County

Map 3

Map Area

OREGON

PROJECT AREA

0 1,000

Feet

Noise Sensitive Receptors

No Exceedance

Project Features

Site Boundary

Proposed Route

Mileposts

Mile

Tenth-mile

Land Status

Private

IDAHO POWER An IDACORP Company

Boardman to Hemingway Transmission Line Project

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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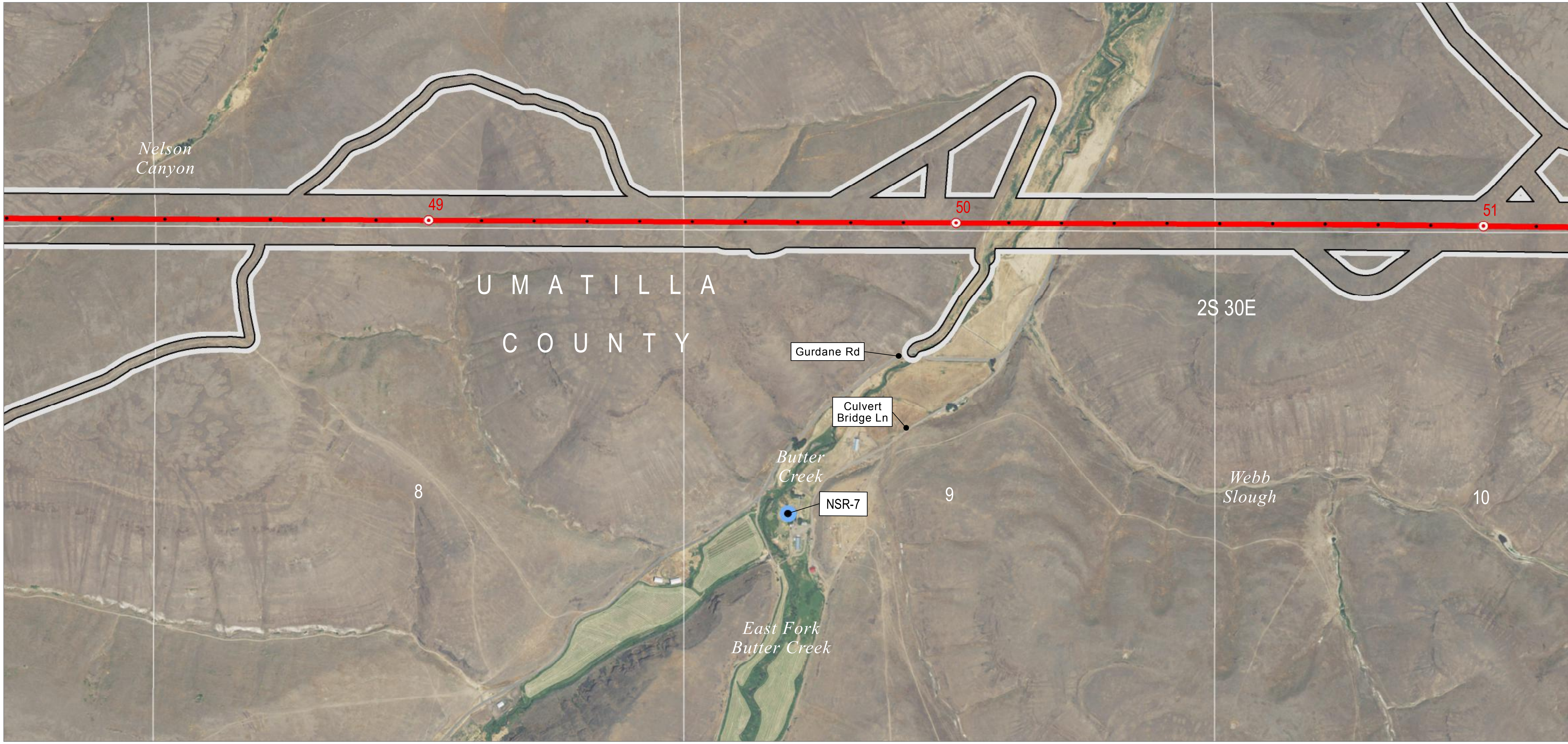
June 2017

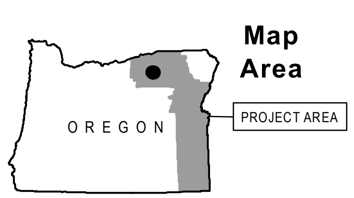
Attachment X-5

Noise Sensitive Receptors

Morrow County

Map 4





0 1,000

Feet

Noise Sensitive Receptors

No Exceedance

Project Features

Site Boundary

Proposed Route

Mileposts

Mile

Tenth-mile

Land Status

Private

IDAHO POWER An IDACORP Company

Boardman to Hemingway Transmission Line Project

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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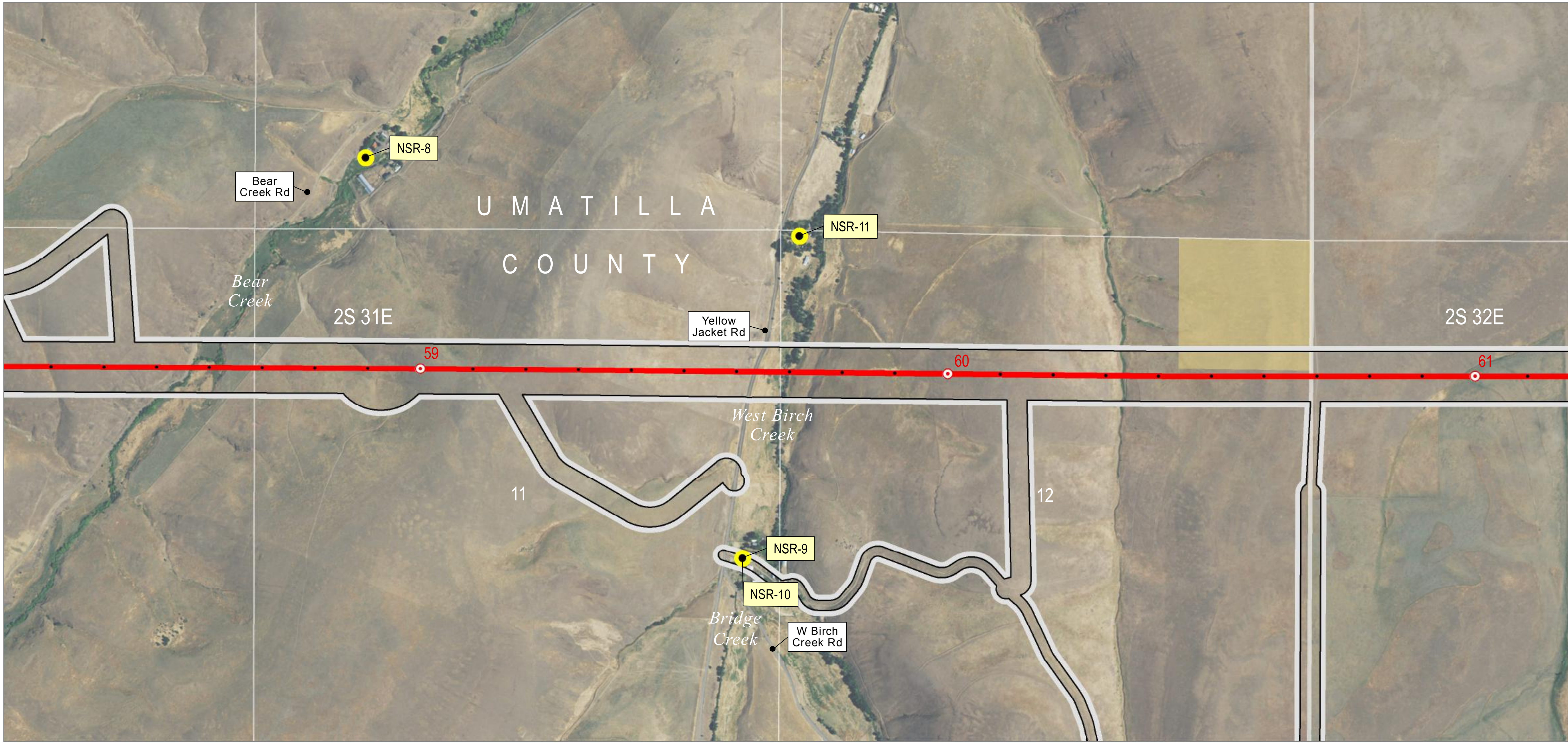
June 2017

Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 5



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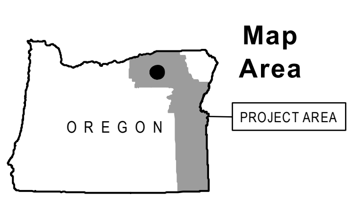
Feet



Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- Predicted Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

IDAHO POWER. An IDACORP Company

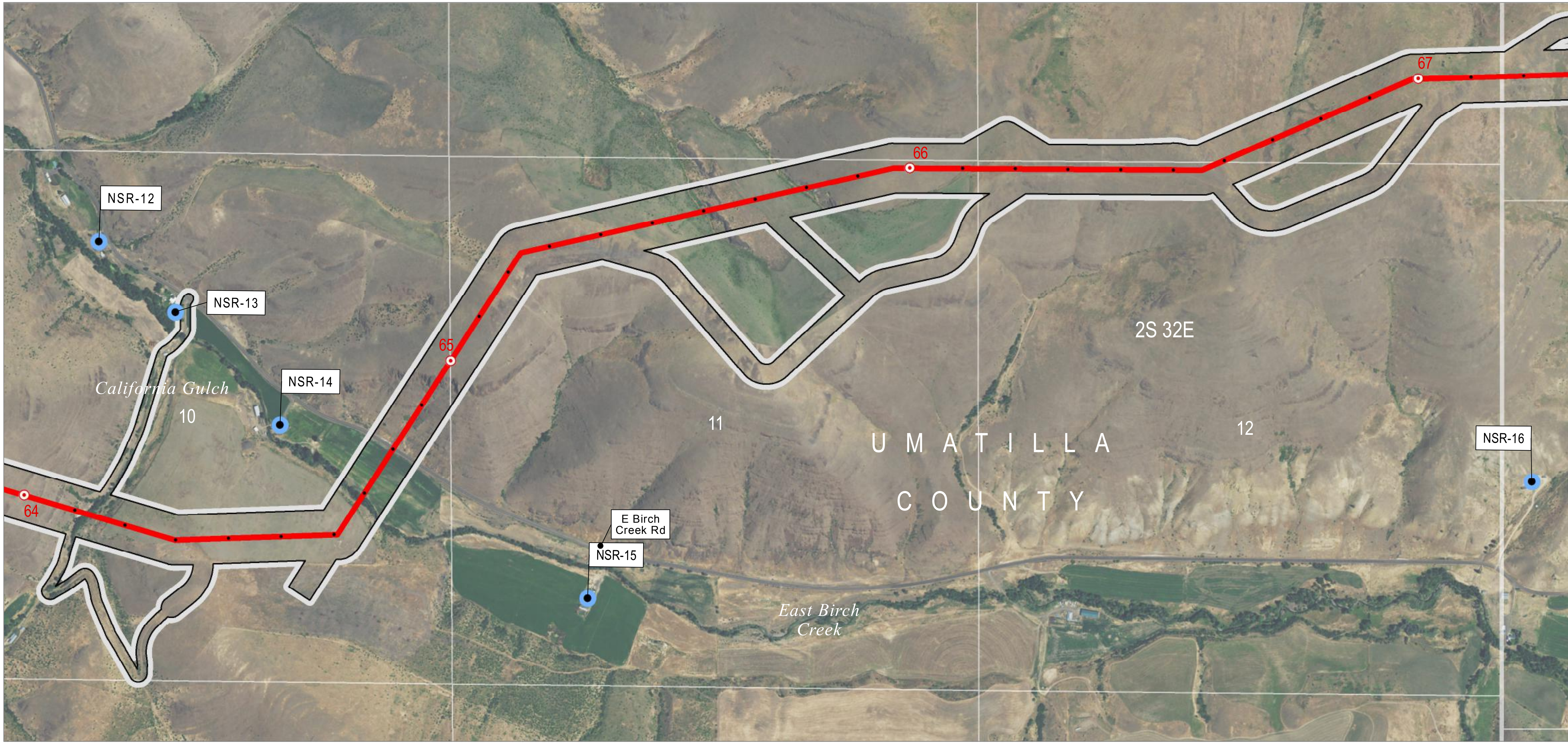
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 6



0 1,000
Feet

Map Area
OREGON
PROJECT AREA

Noise Sensitive Receptors
No Exceedance

Project Features
Site Boundary
Proposed Route
Mileposts
Mile
Tenth-mile

Land Status
Private

Boardman to Hemingway Transmission Line Project

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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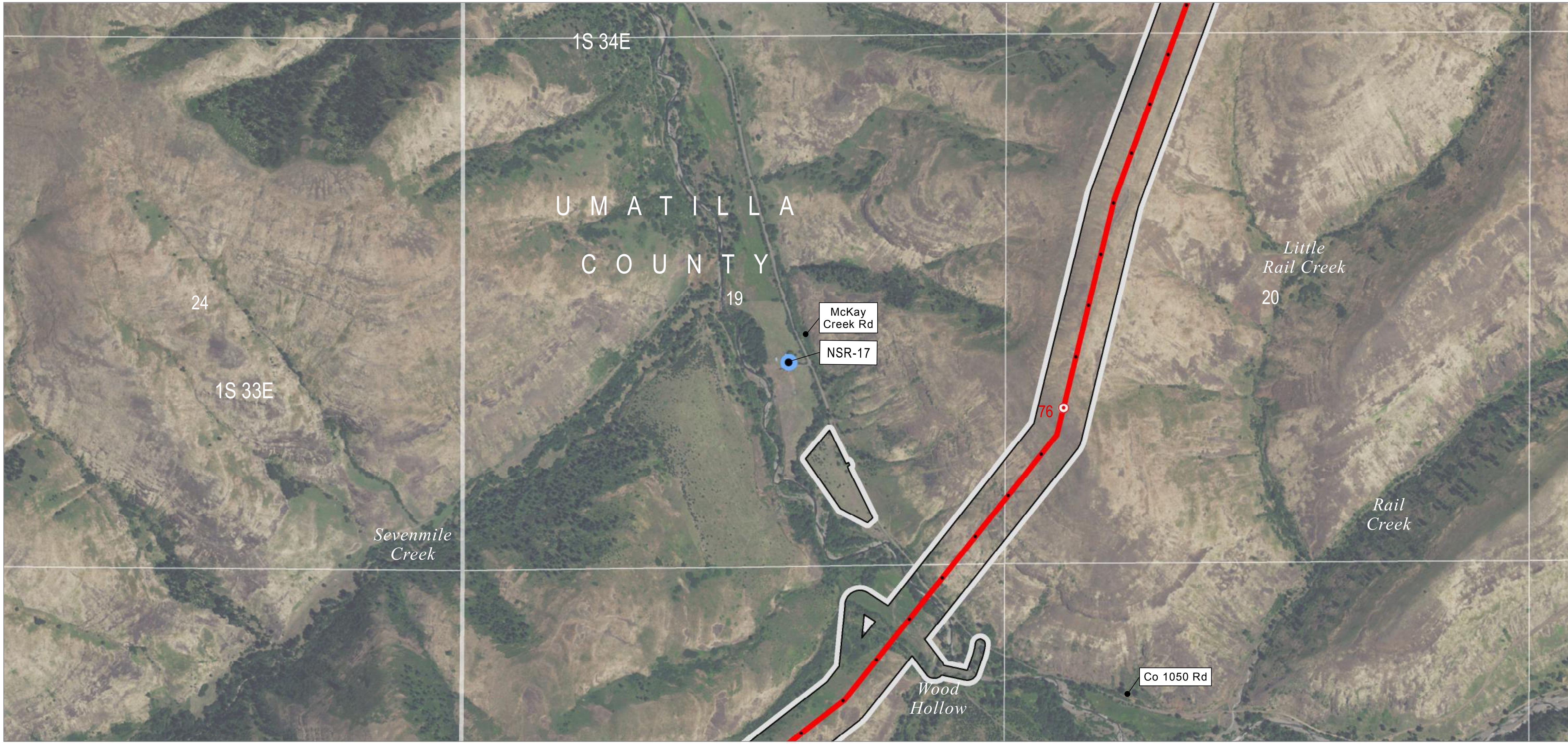
June 2017

Attachment X-5
Noise Sensitive Receptors
Umatilla County
Map 7



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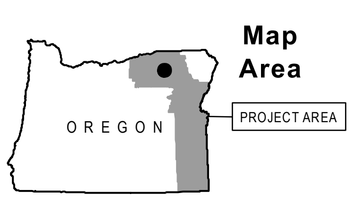
Feet



Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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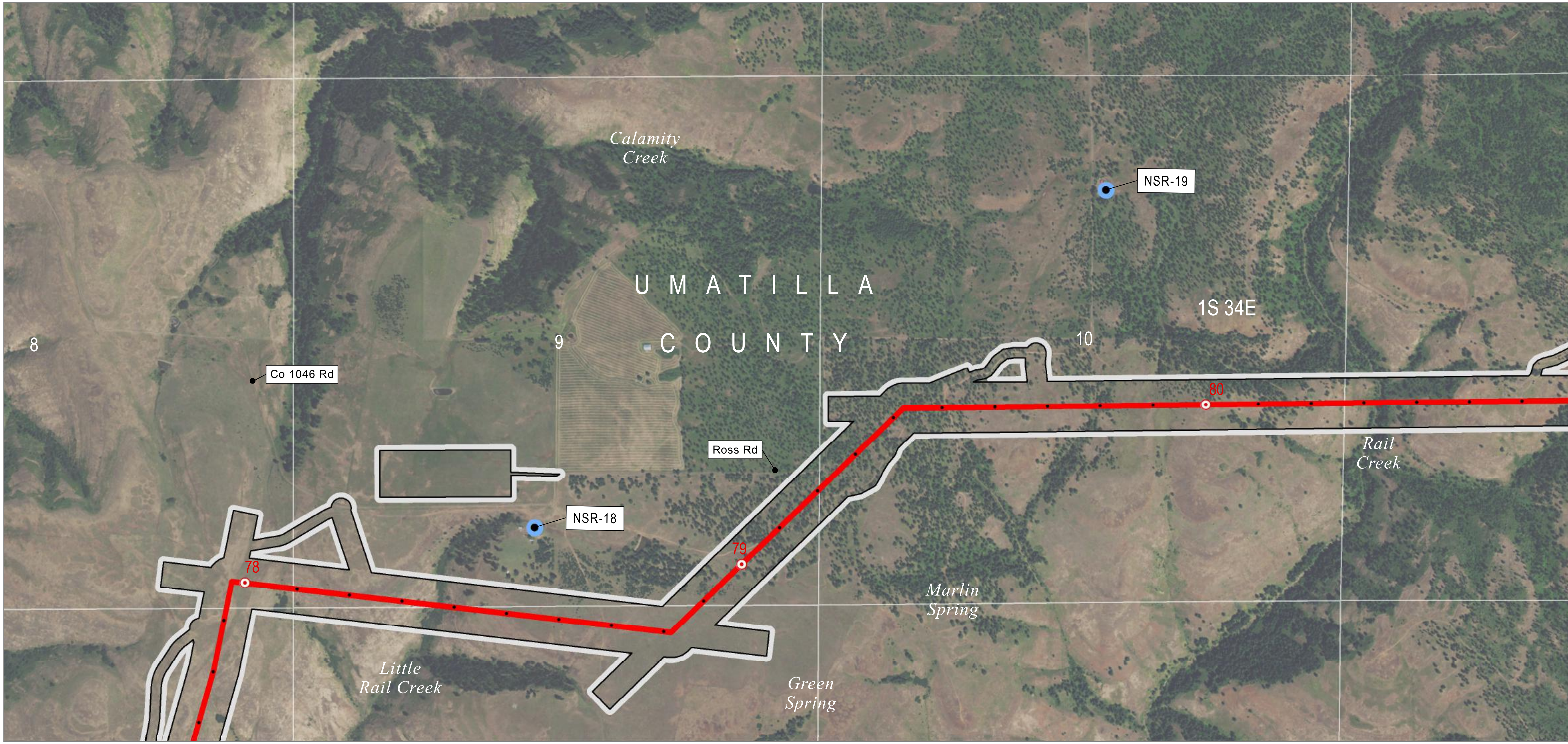
Boardman to Hemingway Transmission Line Project

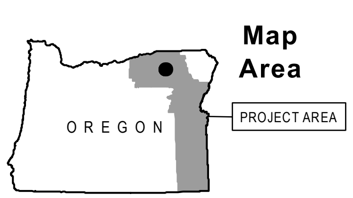
Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 8





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Feet

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

IDAHO POWER. An IDACORP Company

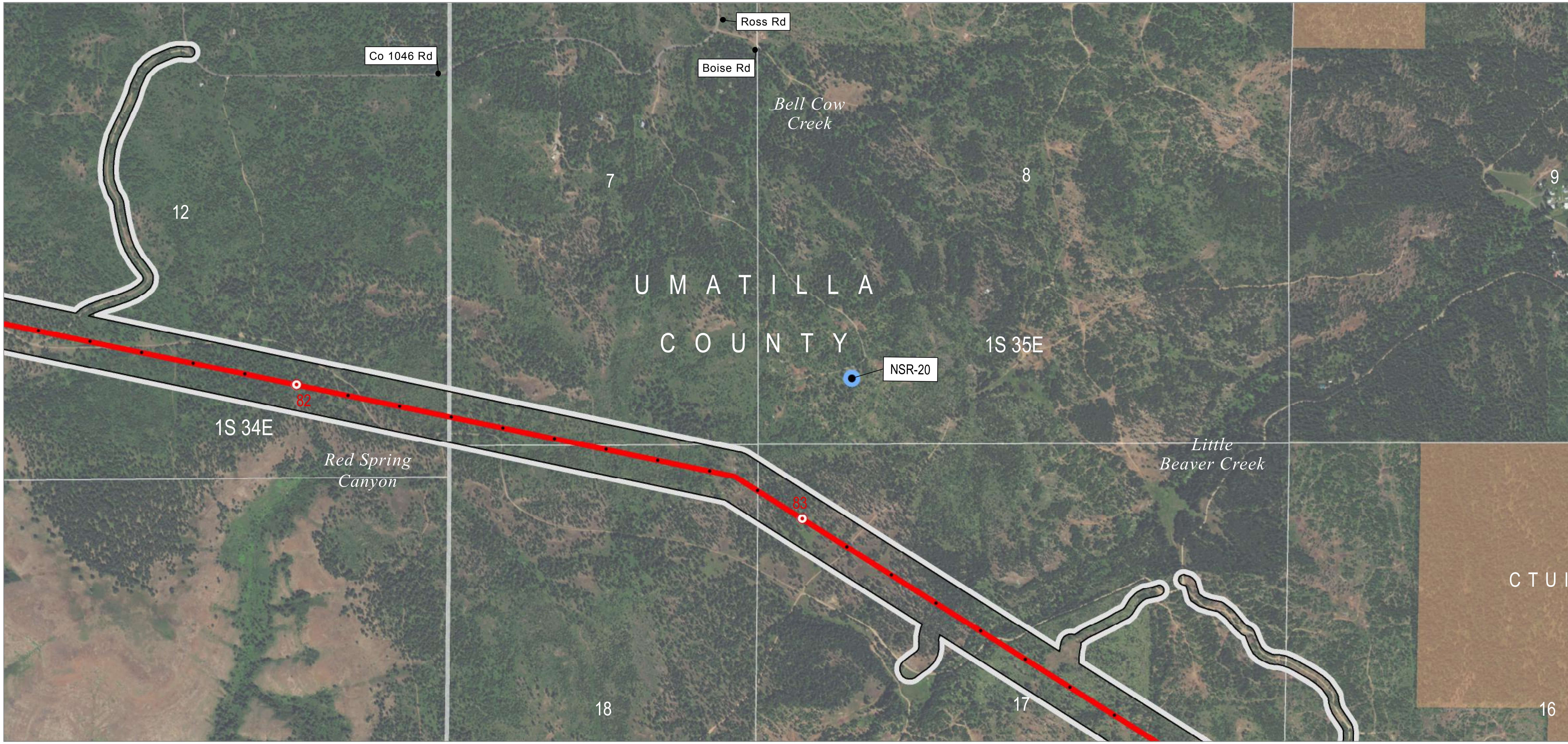
Boardman to Hemingway Transmission Line Project

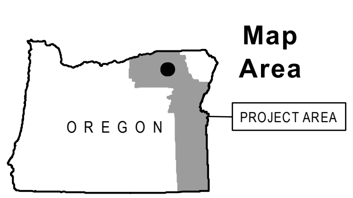
Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 9





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Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Indian Reservation
- Private

IDAHO POWER
An IDACORP Company

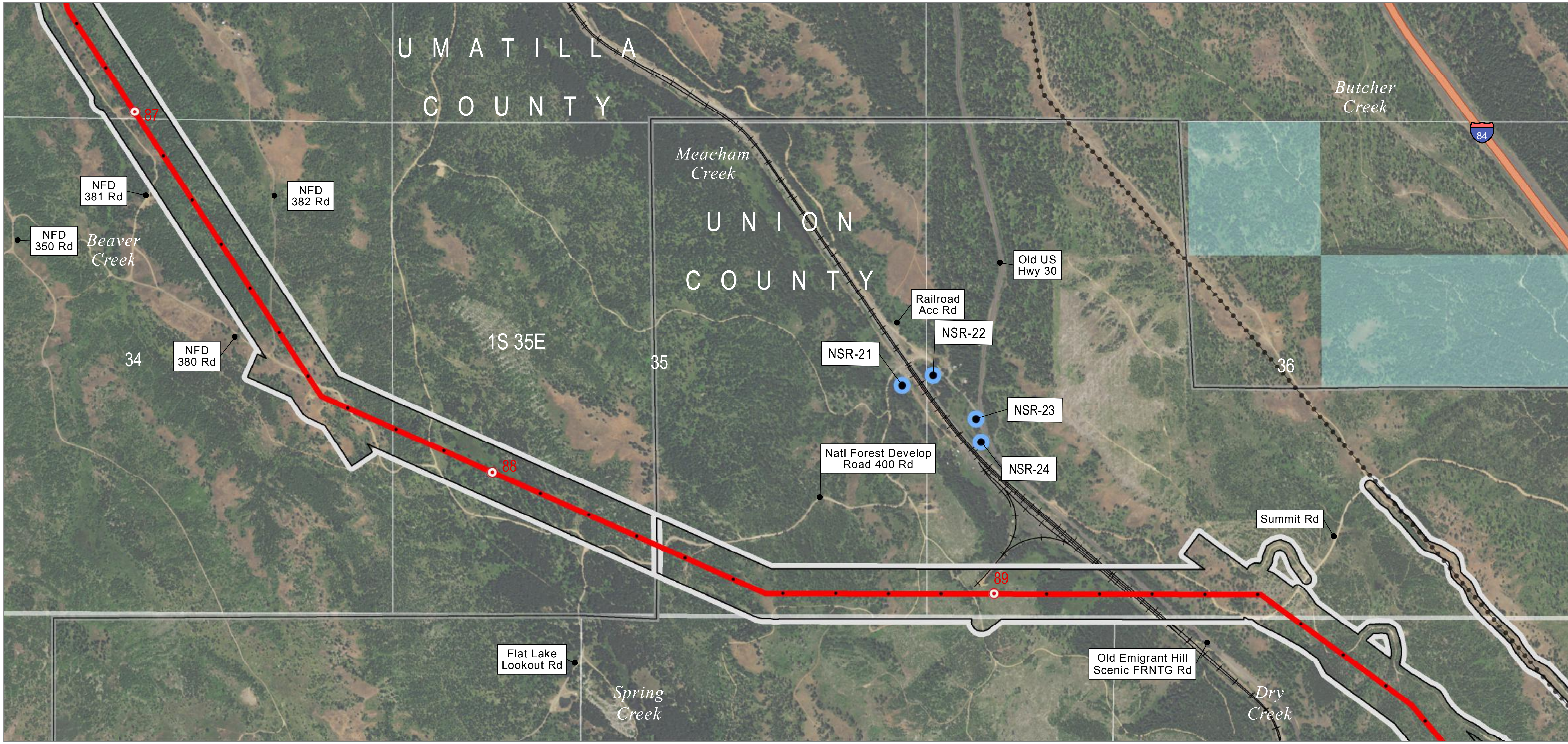
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 10



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Map Area

OREGON

PROJECT AREA

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private
- State or Local
- US Forest Service

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

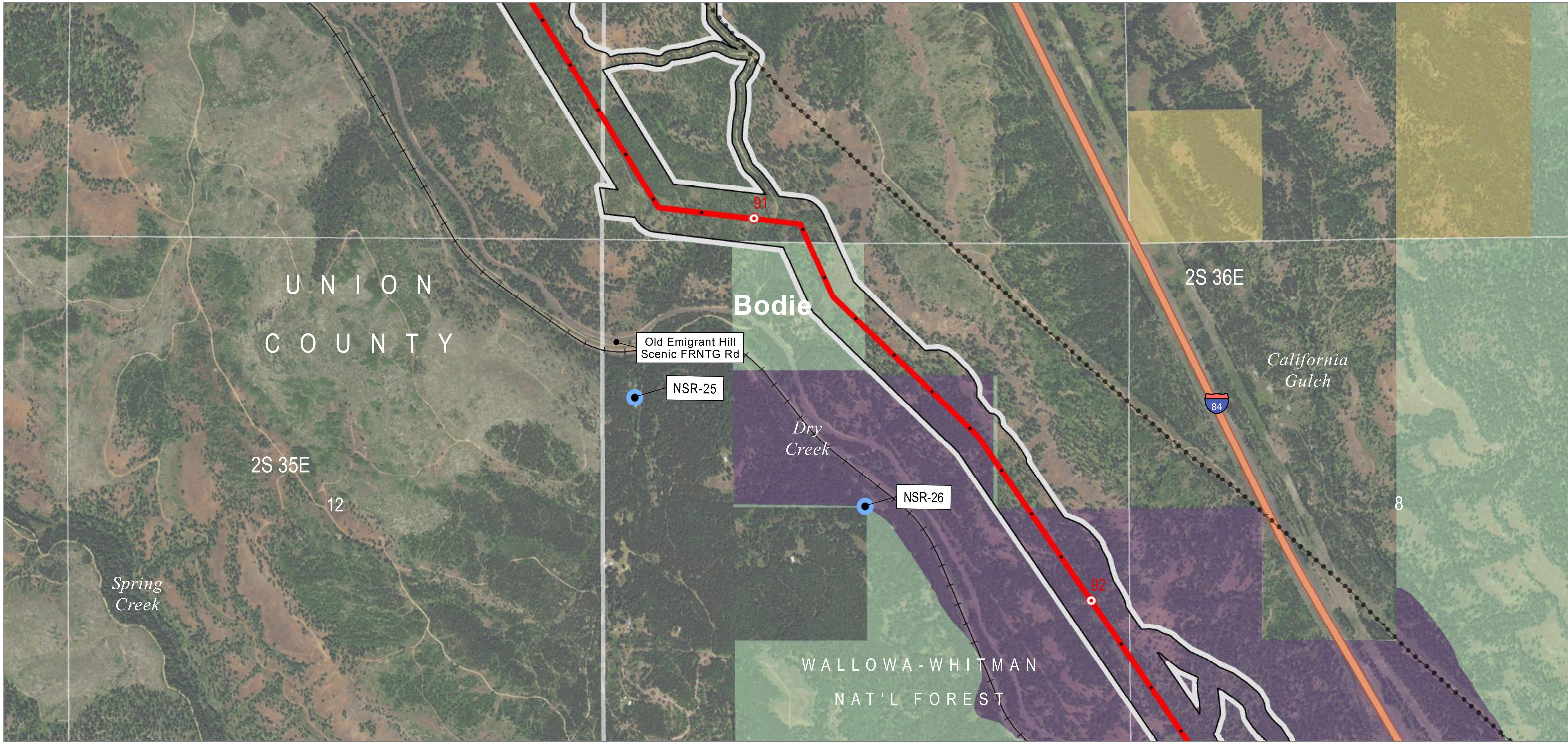
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 11



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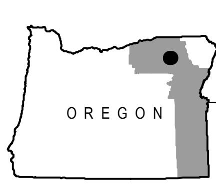

Map Area

PROJECT AREA

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private
- US Forest Service

Other Features
- Existing Transmission Lines
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 12

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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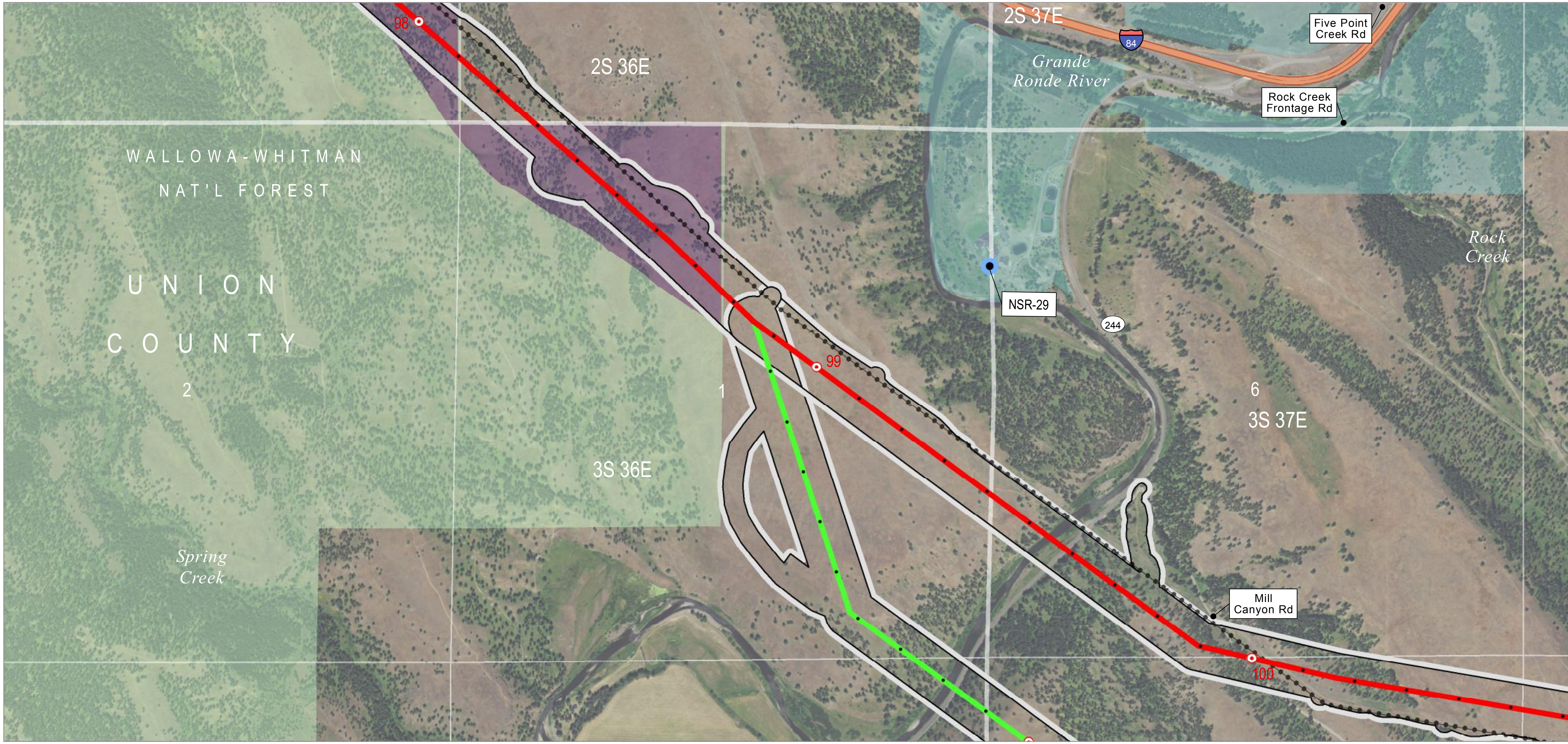

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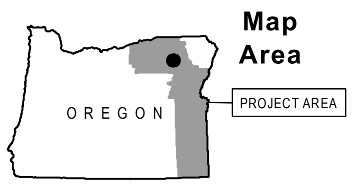

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Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route
- Morgan Lake Alternative

Mileposts
- Mile
- Tenth-mile

Land Status
- Private
- State or Local Wildlife or Parks and Recreation Area
- US Forest Service

Other Features
- Existing Transmission Lines
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

IDAHO POWER
An IDACORP Company

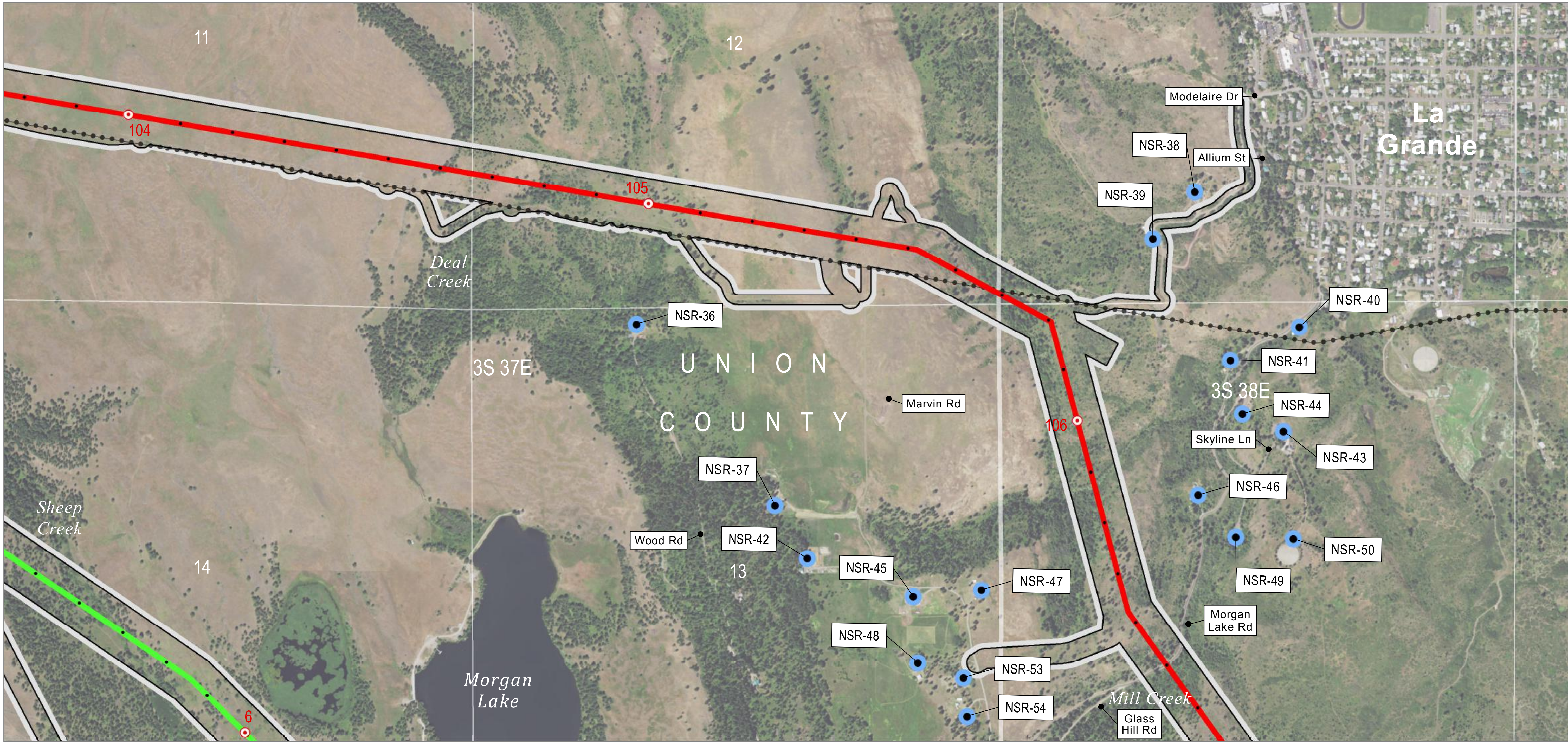
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Umatilla County

Map 13



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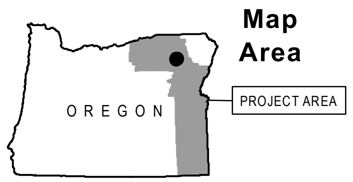

Map Area

Noise Sensitive Receptors

- No Exceedance

Project Features

- Site Boundary
- Proposed Route
- Morgan Lake Alternative

Mileposts

- Mile
- Tenth-mile

Land Status

- Private

Other Features

- Existing Transmission Lines

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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IDAHO POWER An IDACORP Company

Boardman to Hemingway Transmission Line Project

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Noise Sensitive Receptors

Umatilla County

Map 14

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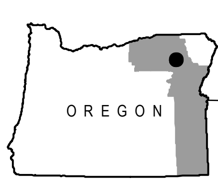
Feet



Map Area
PROJECT AREA

Noise Sensitive Receptors
- Predicted Exceedance
- No Exceedance

Project Features
- Site Boundary
- Proposed Route
- Morgan Lake Alternative

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Union County

Map 15

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

N
0 1,000
Feet

Map Area
OREGON
PROJECT AREA

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private
- State or Local Wildlife or Parks and Recreation Area

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

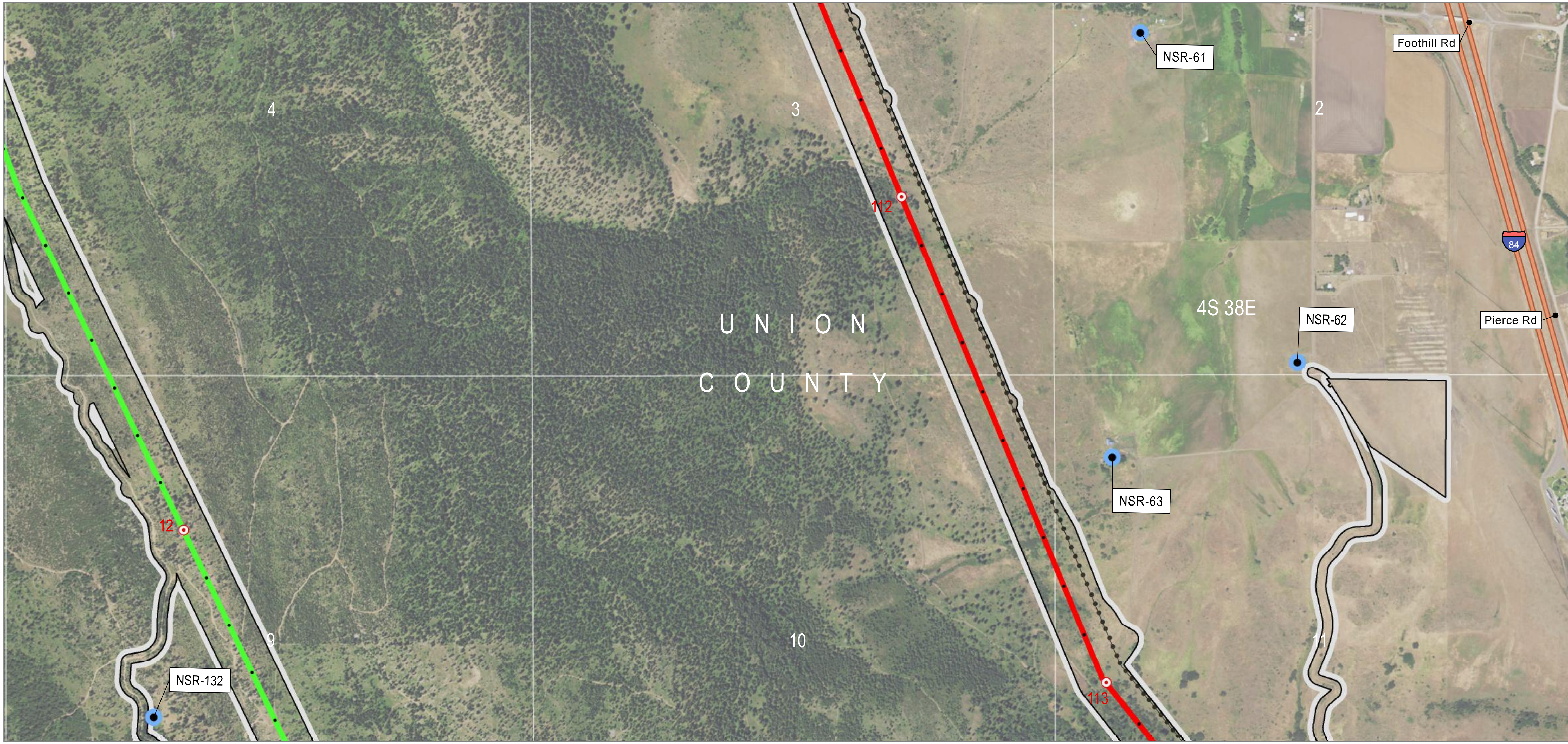
Boardman to Hemingway Transmission Line Project

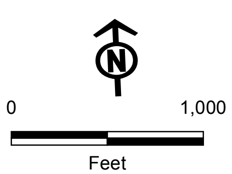
Attachment X-5

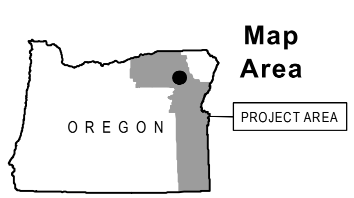
Noise Sensitive Receptors

Union County

Map 16







Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route
- Morgan Lake Alternative

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Other Features
- Existing Transmission Lines

Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Union County

Map 17

0 1,000
Feet

Map Area
OREGON
PROJECT AREA

Noise Sensitive Receptors
No Exceedance

Project Features
Site Boundary
Proposed Route
Morgan Lake Alternative

Mileposts
Mile
Tenth-mile

Land Status
Private
US Forest Service

Other Features
Existing Transmission Lines

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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IDAHO POWER An IDACORP Company

Boardman to Hemingway Transmission Line Project

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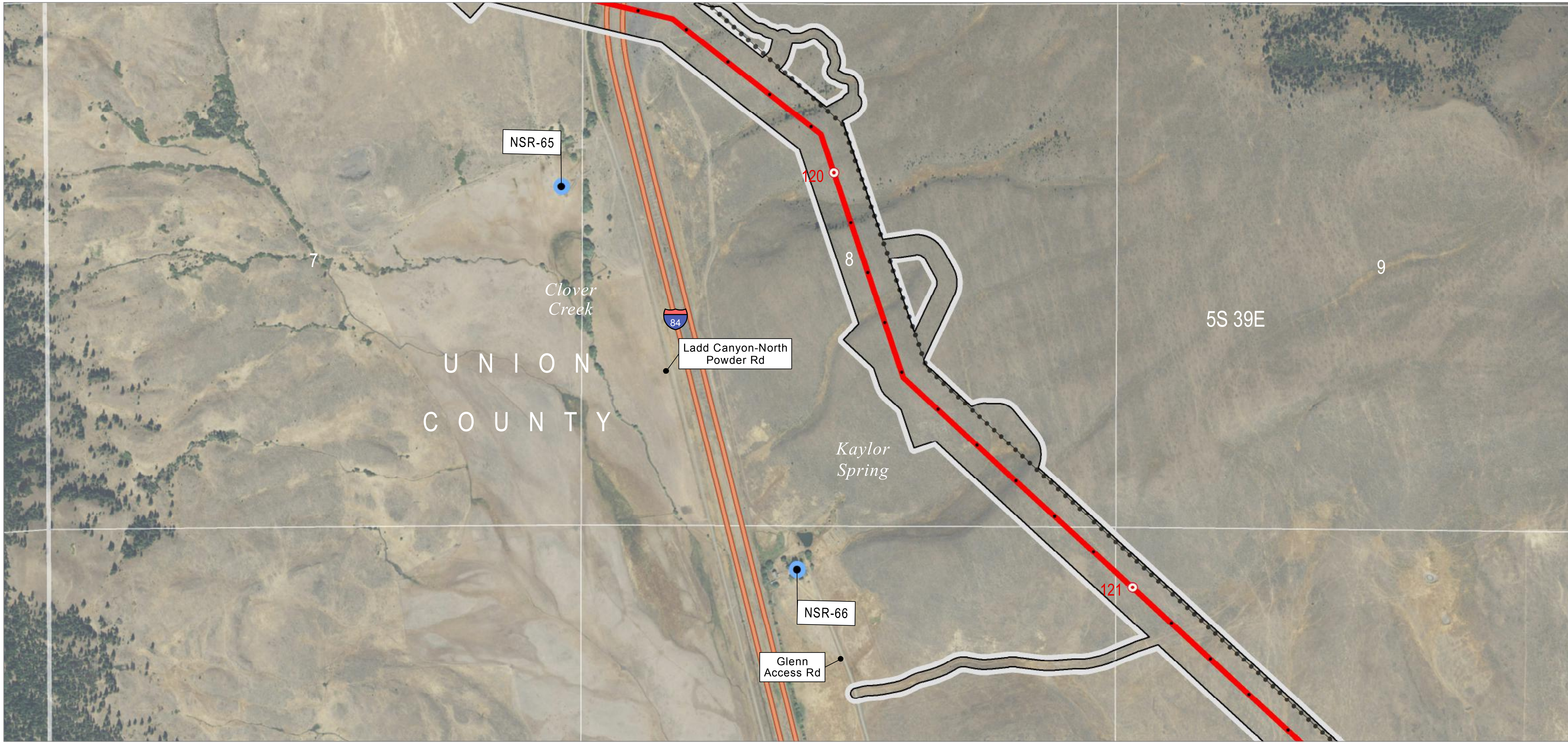
Noise Sensitive Receptors

Union County

Map 18



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Map Area
OREGON
PROJECT AREA

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Union County

Map 19

0 1,000
Feet

Map Area
OREGON
PROJECT AREA

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

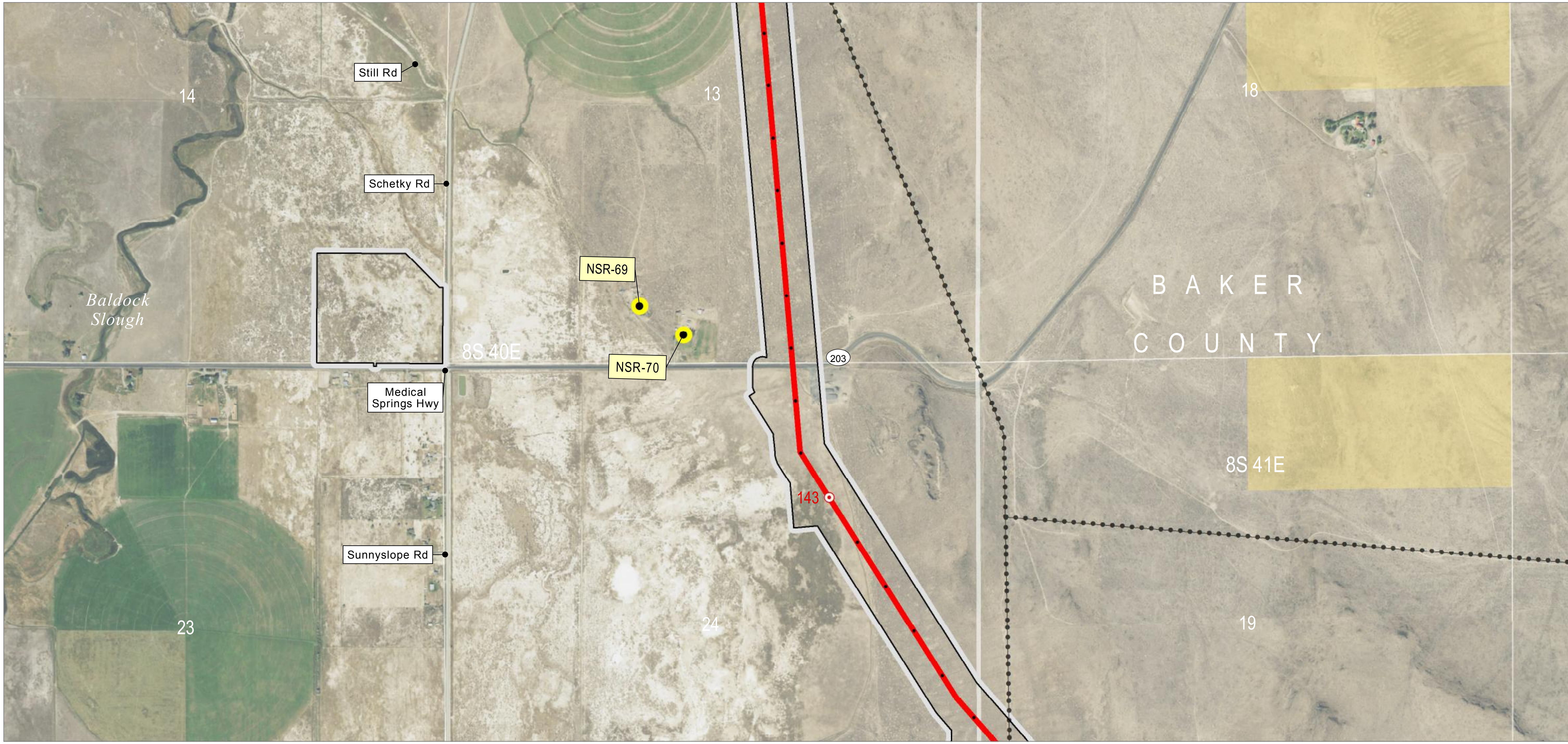
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Union County

Map 20



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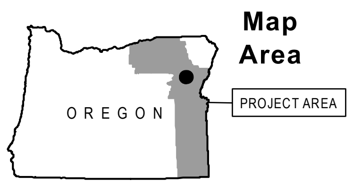

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June 2017

Noise Sensitive Receptors
- Predicted Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

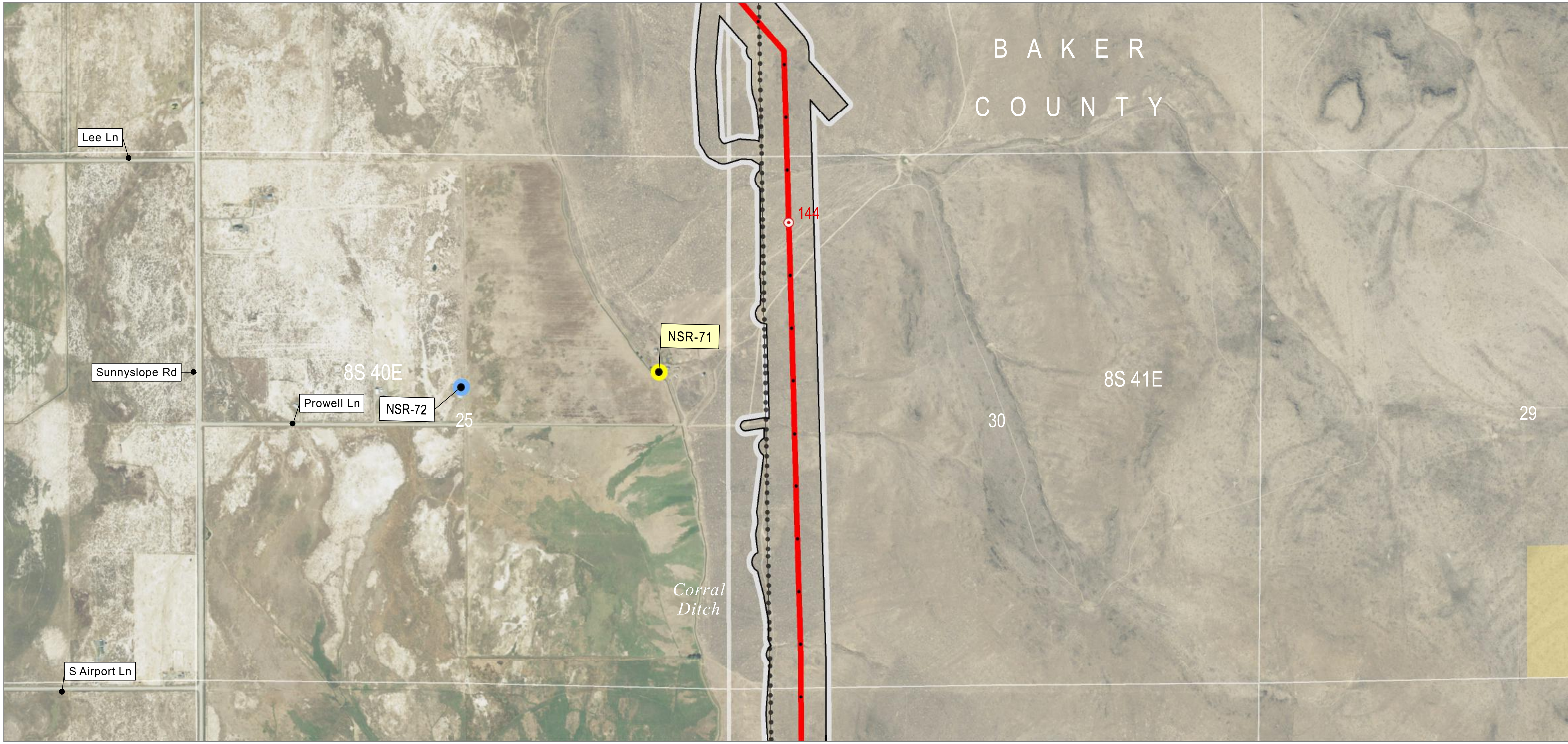
Boardman to Hemingway Transmission Line Project

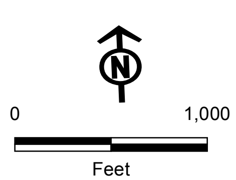
Attachment X-5

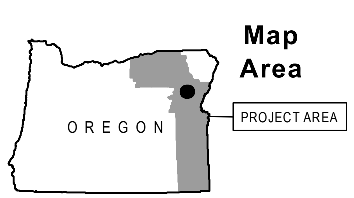
Noise Sensitive Receptors

Baker County

Map 21







Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- Predicted Exceedance
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

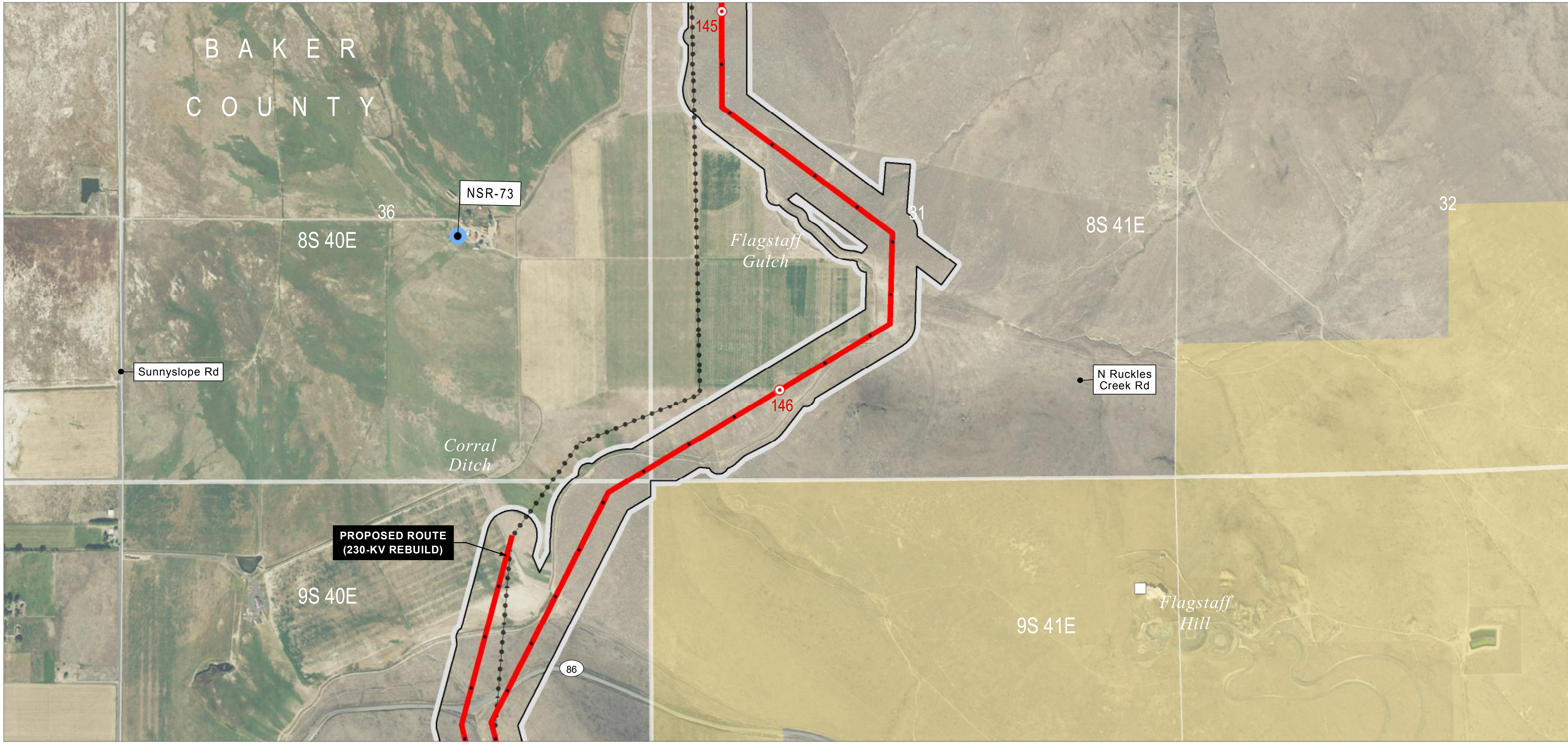
Boardman to Hemingway Transmission Line Project

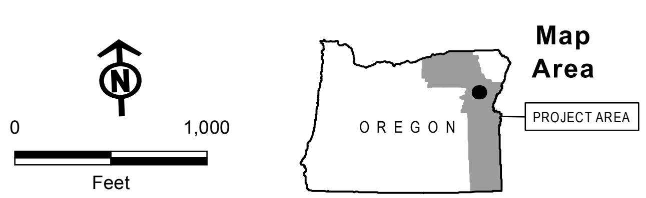
Attachment X-5

Noise Sensitive Receptors

Baker County

Map 22





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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines

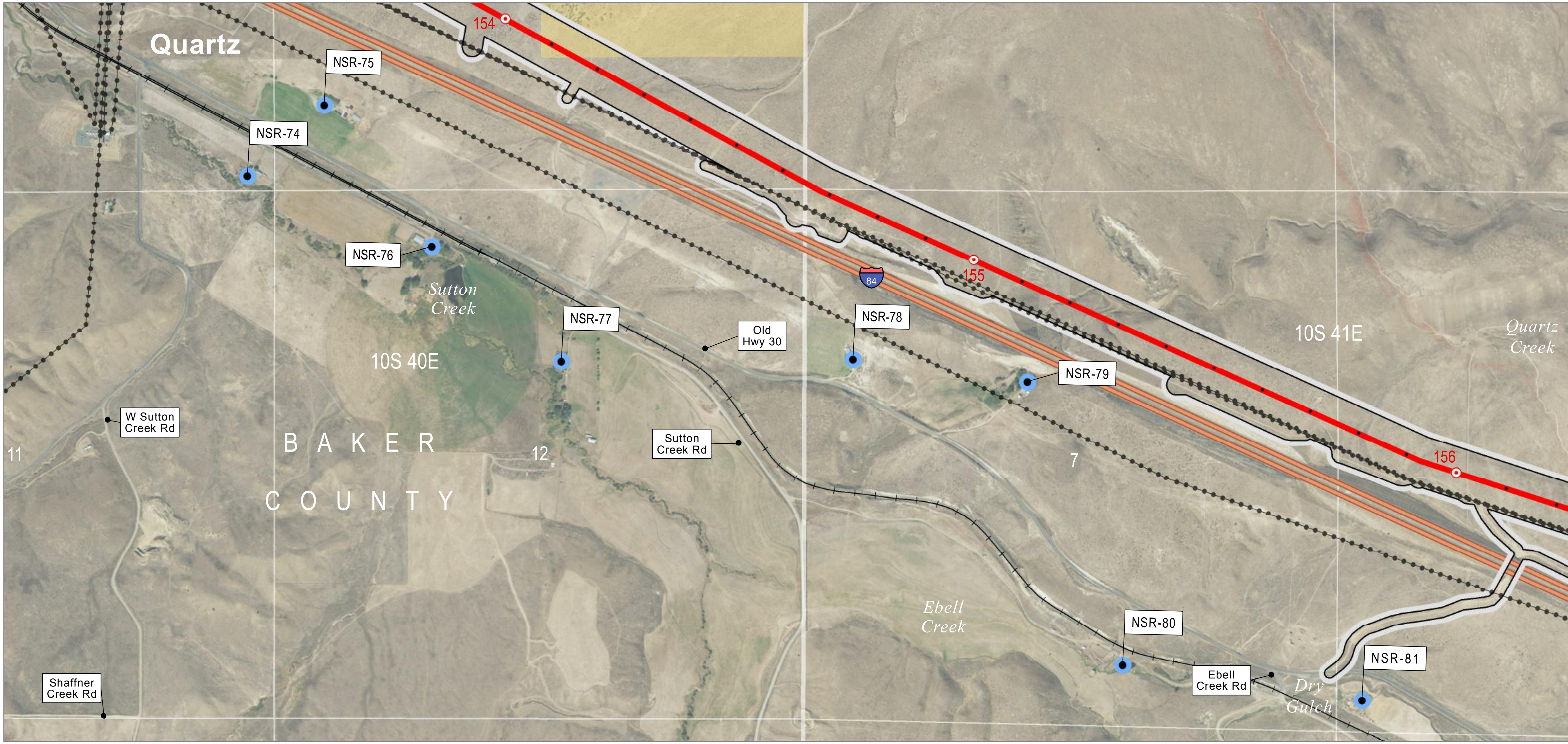
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Baker County

Map 23



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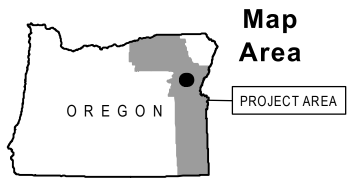
Feet

Map Area



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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER. An IDACORP Company

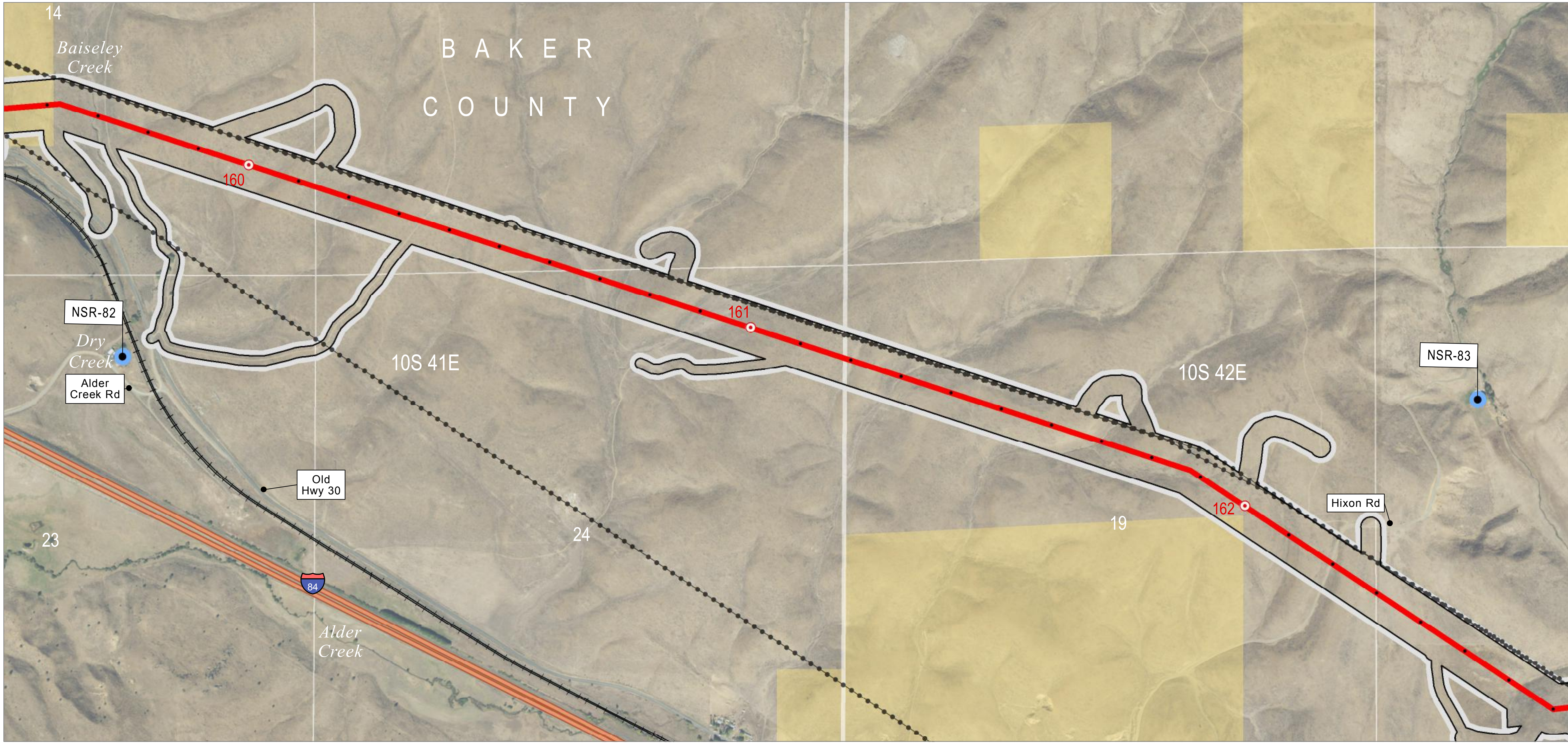
Boardman to Hemingway Transmission Line Project

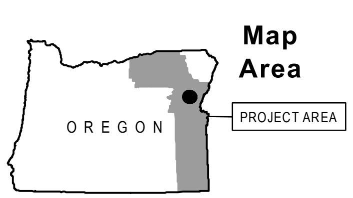
Attachment X-5

Noise Sensitive Receptors

Baker County

Map 24





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Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER. An IDACORP Company

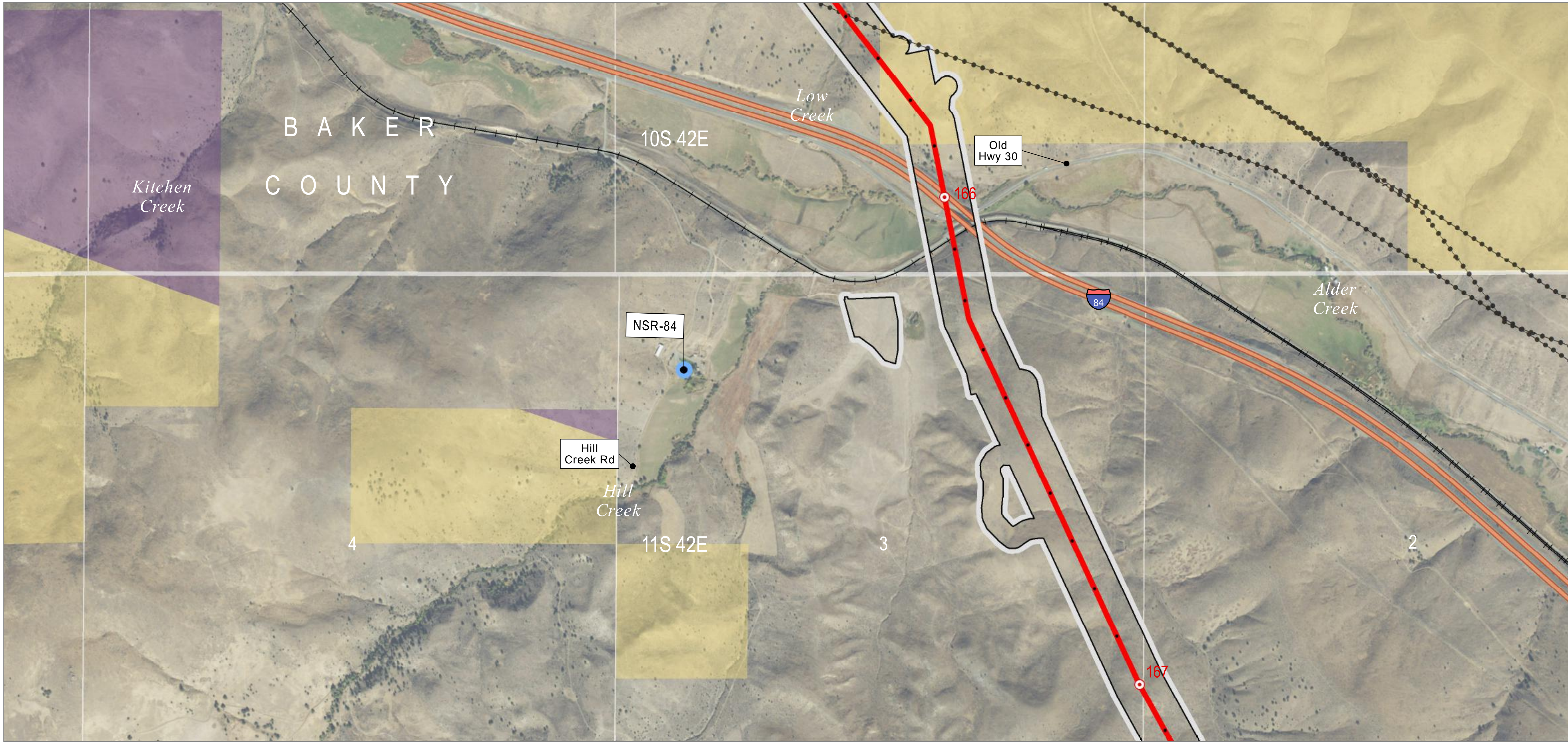
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Baker County

Map 25



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Feet

Map Area

OREGON

PROJECT AREA

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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Boardman to Hemingway Transmission Line Project

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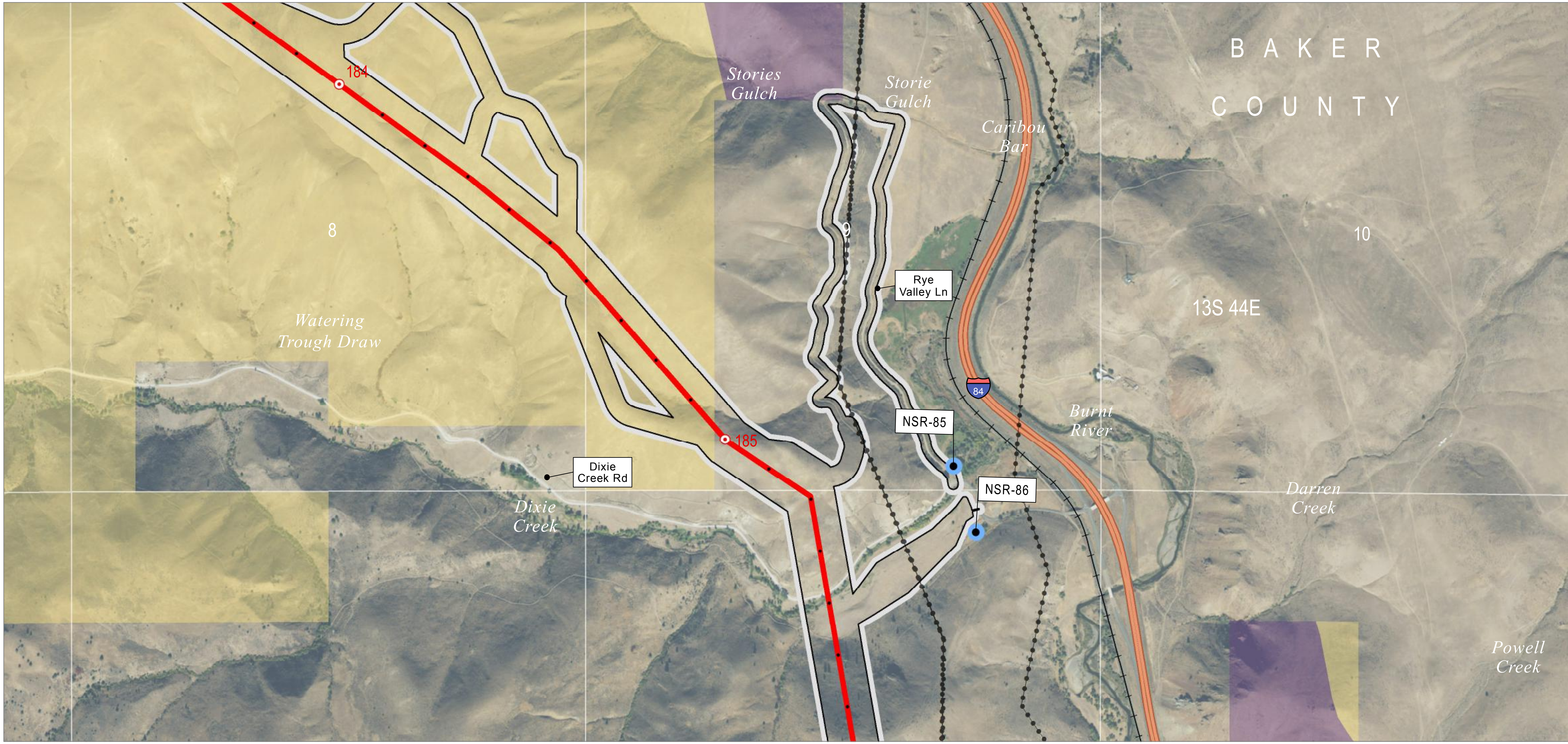
Noise Sensitive Receptors

Baker County

Map 26



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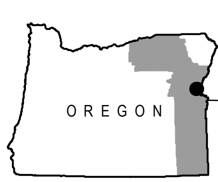

Map Area

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

IDAHO POWER
An IDACORP Company

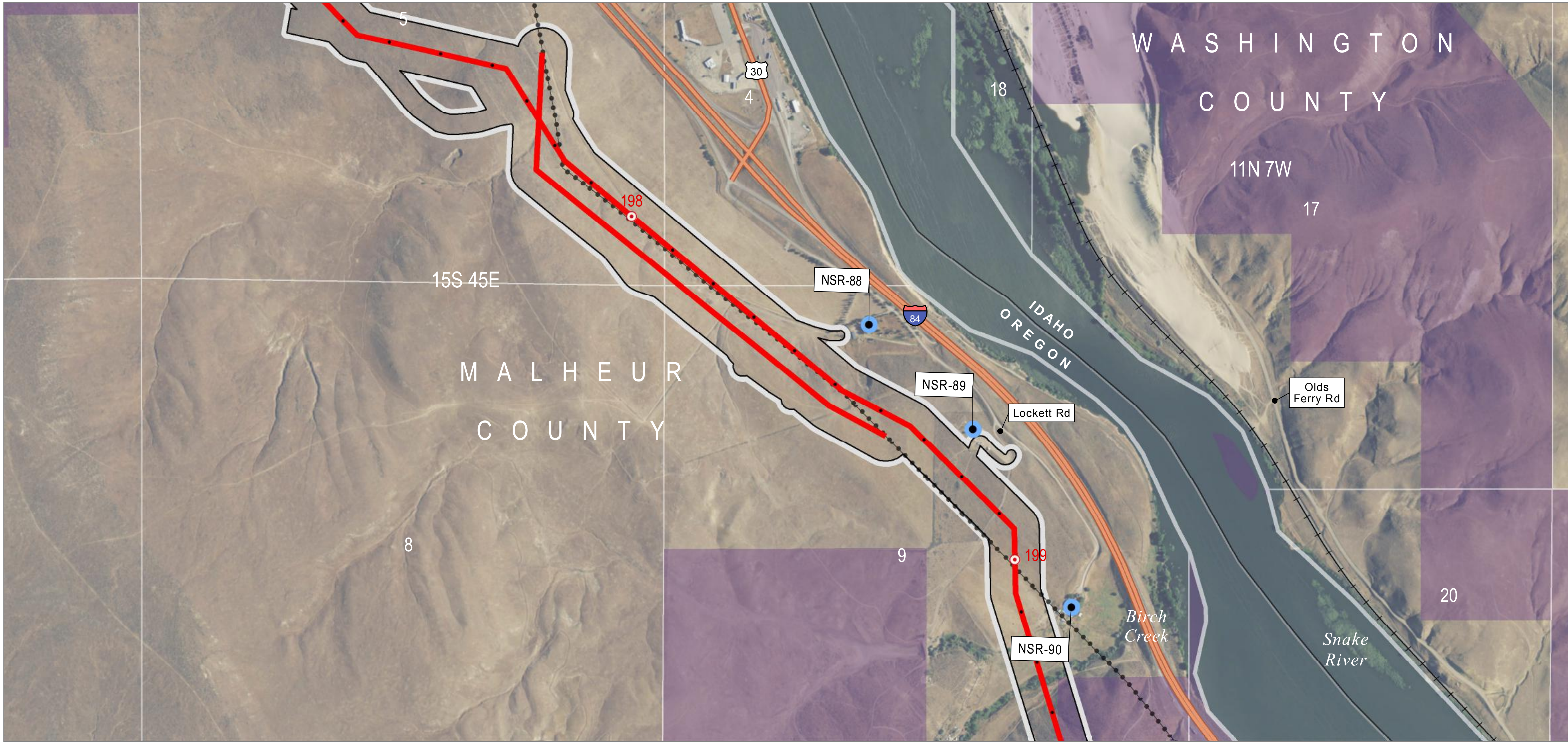
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Baker County

Map 27



Map
Area

OREGON

PROJECT AREA

0 1,000
Feet

Noise Sensitive Receptors

No Exceedance

Project Features

Site Boundary

Proposed Route

Mileposts

Mile

Tenth-mile

Land Status

Bureau of Land Management

Private

Other Features

Existing Transmission Lines

Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Baker County

Map 28

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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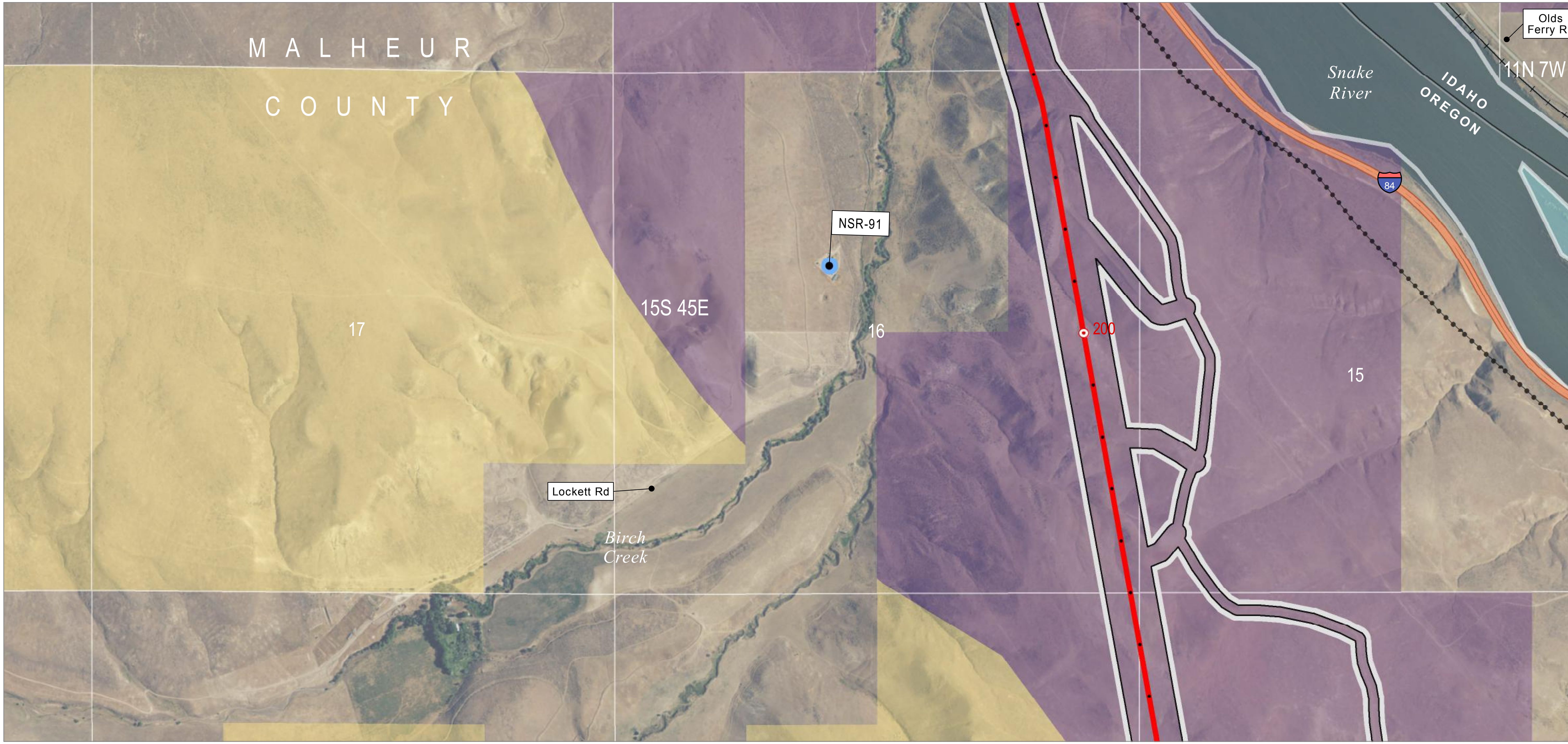
June 2017



Map
Area

OREGON

PROJECT AREA

0 1,000
Feet

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- No Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private
- State or Local

Other Features
- Existing Transmission Lines
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

IDAHO POWER
An IDACORP Company

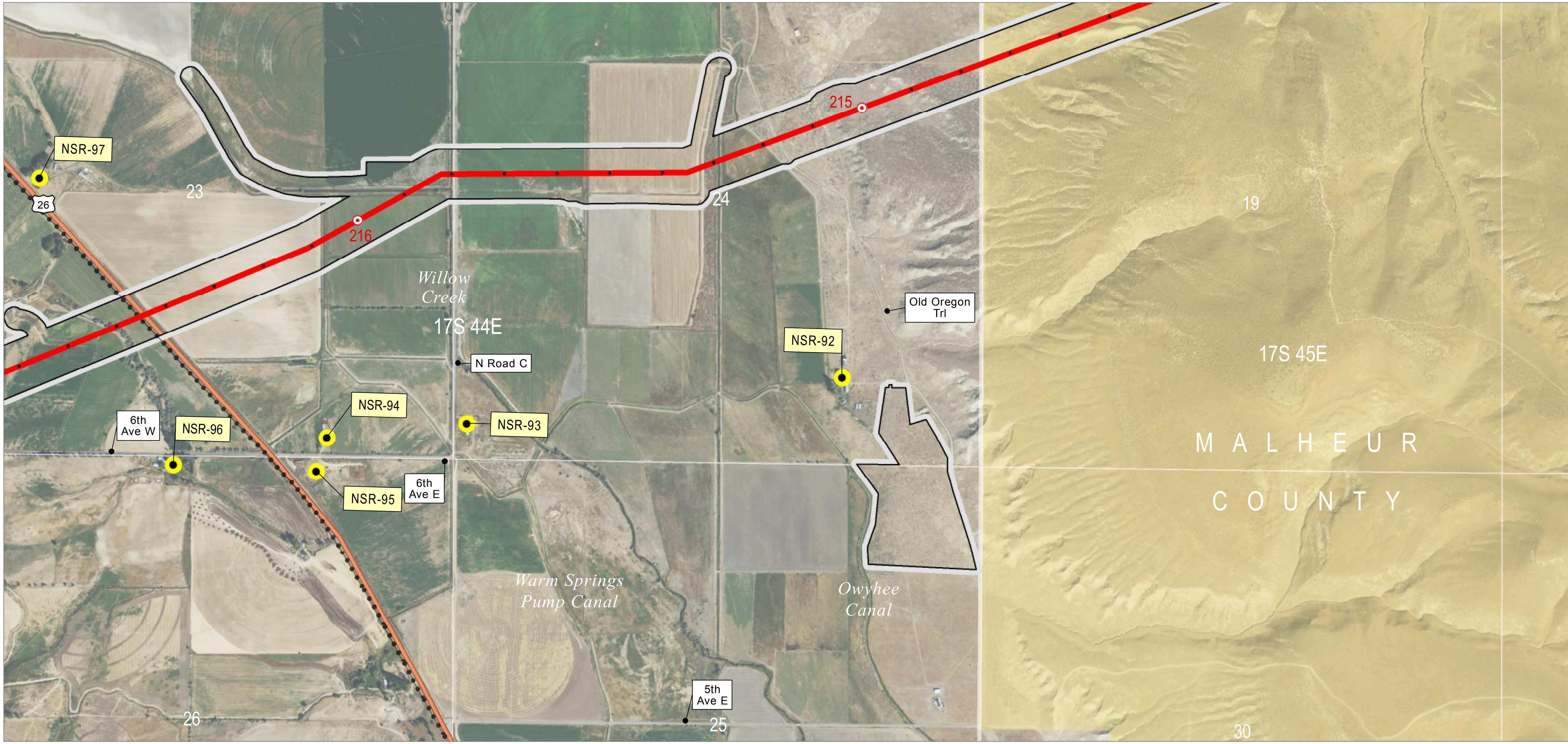
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Baker County

Map 29



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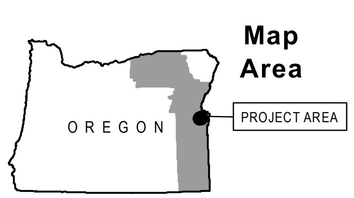
Feet



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June 2017

Noise Sensitive Receptors
- Predicted Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Private

Other Features
- Existing Transmission Lines

IDAHO POWER An IDACORP Company

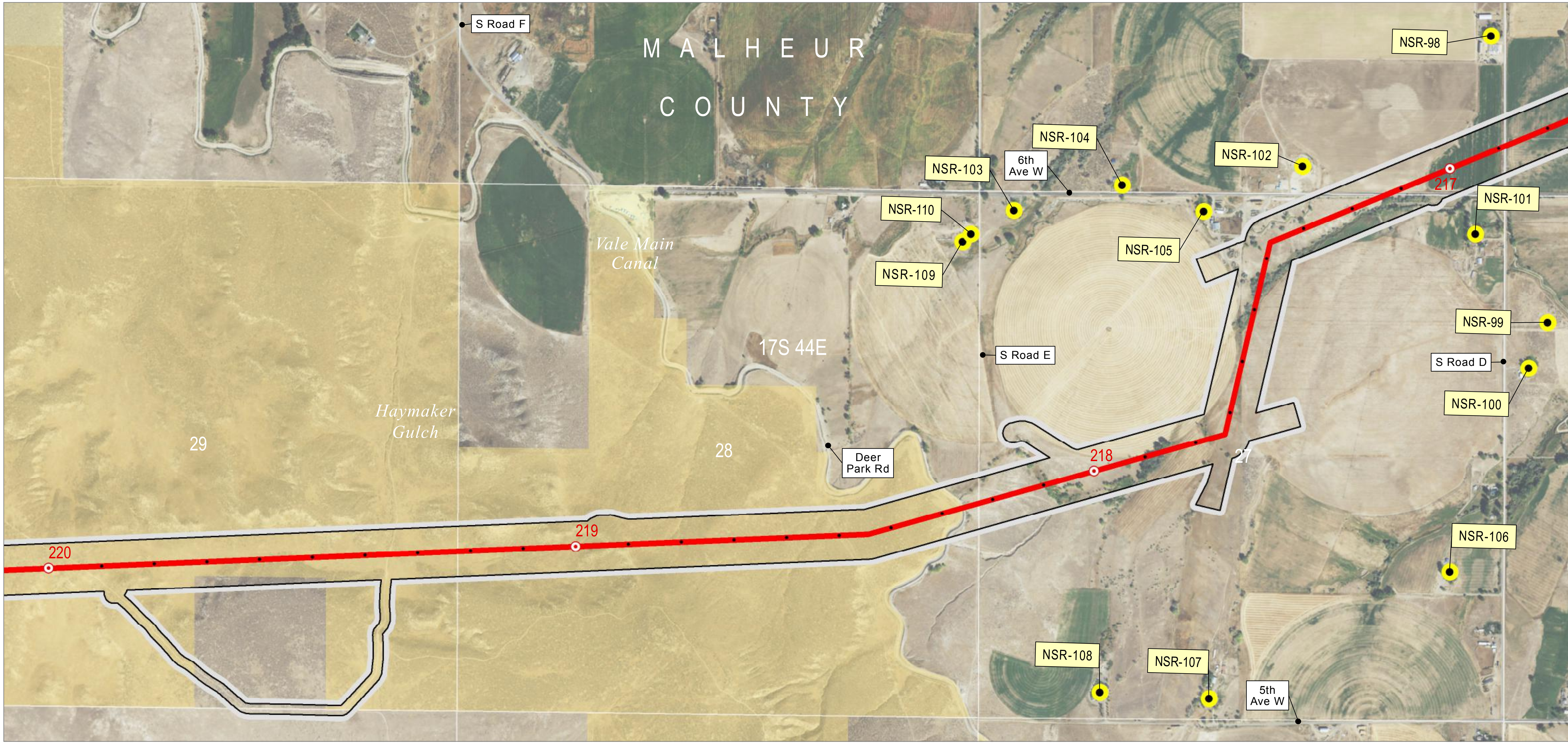
Boardman to Hemingway Transmission Line Project

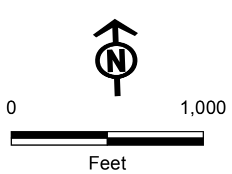
Attachment X-5

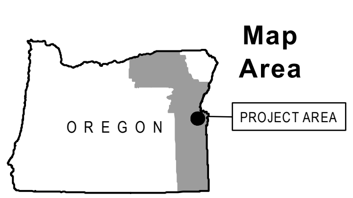
Noise Sensitive Receptors

Malheur County

Map 30







Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Noise Sensitive Receptors
- Predicted Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Bureau of Reclamation
- Private

IDAHO POWER An IDACORP Company

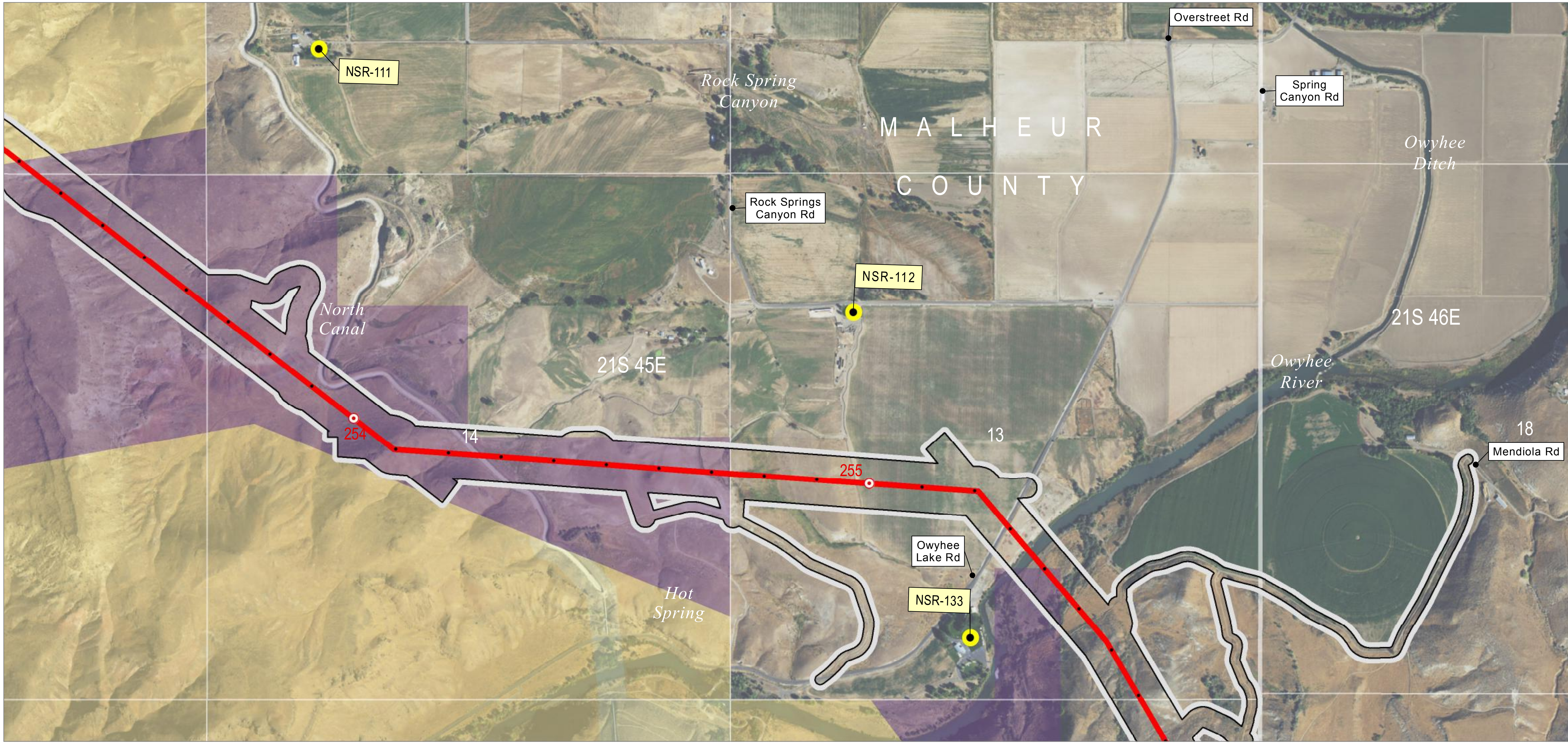
Boardman to Hemingway Transmission Line Project

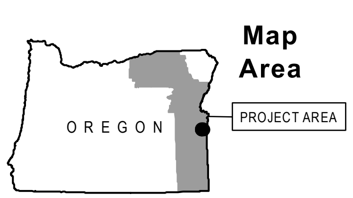
Attachment X-5

Noise Sensitive Receptors

Malheur County

Map 31





0 1,000
Feet

Noise Sensitive Receptors
- Predicted Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Bureau of Reclamation
- Private
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

IDAHO POWER. An IDACORP Company

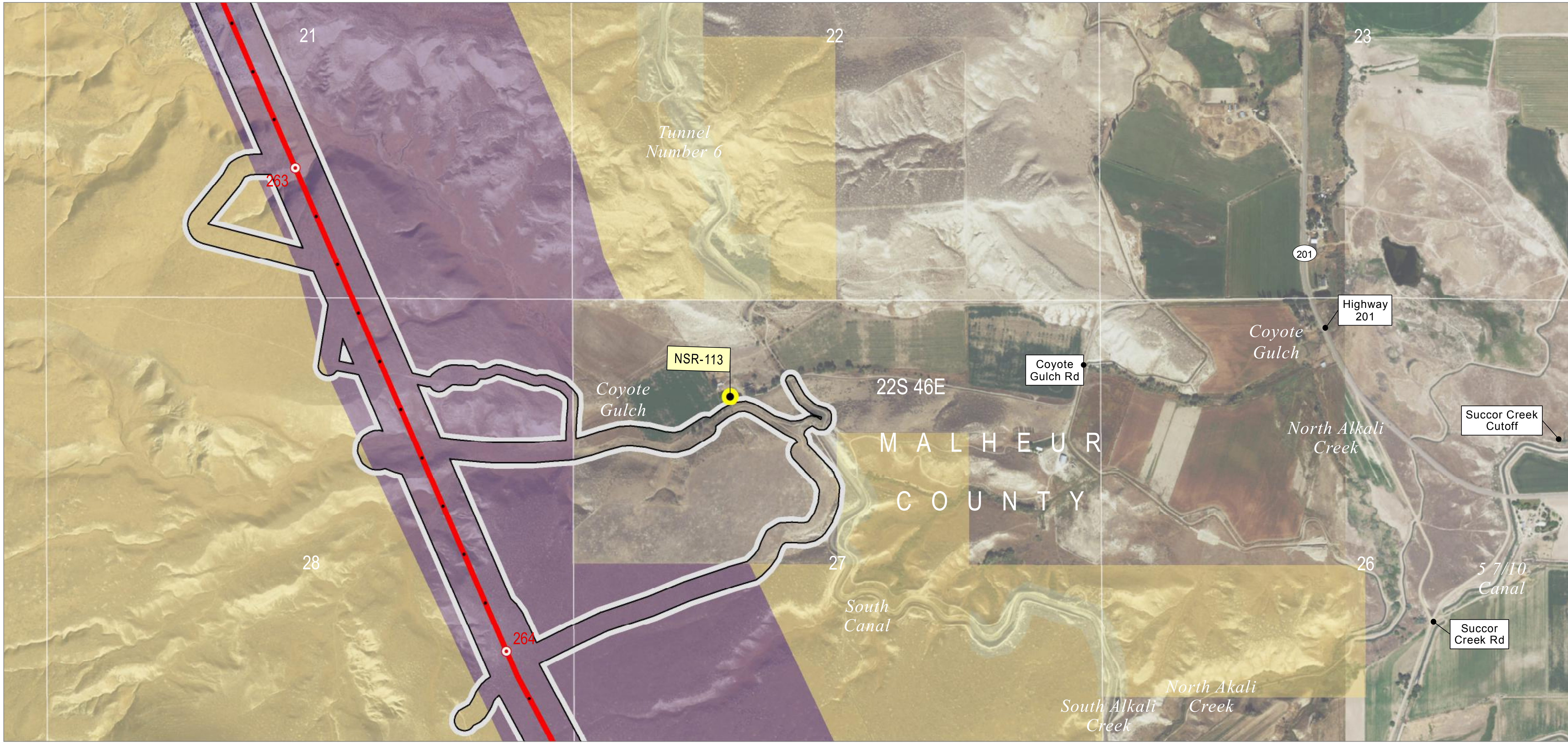
Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Malheur County

Map 32



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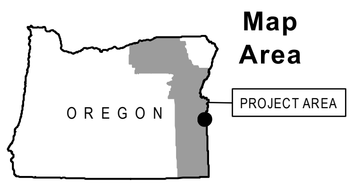
Feet



Noise Sensitive Receptors
- Predicted Exceedance

Project Features
- Site Boundary
- Proposed Route

Mileposts
- Mile
- Tenth-mile

Land Status
- Bureau of Land Management
- Bureau of Reclamation
- Private
- Designated Utility Corridor (BLM, Forest Service, or West-wide Energy)

Source(s): BLM, IPC, ODFW, ODOT, NPS, USDA, USFS, USGS, Ventyx, Esri, DigitalGlobe, GeoEys, Earthstar Geographics, CNES/Airbus DS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

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June 2017

Boardman to Hemingway Transmission Line Project

Attachment X-5

Noise Sensitive Receptors

Malheur County

Map 33

ATTACHMENT X-6
MONITORING POSITION APPLICABILITY TO NOISE SENSITIVE RECEPTORS WITH OREGON DEPARTMENT OF ENERGY APPROVAL

From: Woods, Maxwell [mailto:maxwell.woods@state.or.us]
Sent: Friday, May 06, 2016 1:41 PM
To: Stanish, David <DStanish@idahopower.com>
Cc: FRANCE Renee M <renee.m.france@state.or.us>; Funkhouser, Zach <ZFunkhouser@idahopower.com>
Subject: [EXTERNAL] RE: B2H - Exhibit X re: Noise Comment

Hi David,
This revised noise memo has the information I was looking for. Thank you. I think you have made an adequate demonstration as to why the selected MPs are representative of the NSRs along the new B2H route.

I would like to be clear with a similar caveat as we provided on the roads guidance document, ODOE doesn't necessarily "approve" the use of these MPs as baseline data for the NSRs, and should it be challenged during the contested case it would ultimately be up to EFSC to make a decision on compliance with the noise regulations.

Please let me know if you have any questions. Thanks.

Max

Maxwell Woods
Energy Facility Siting Analyst
Oregon Department of Energy
625 Marion Street NE
Salem, OR 97301
P: Direct: (503) 378-5050
C: (503) 551-8209

Oregon.gov/energy

From: Stanish, David [mailto:DStanish@idahopower.com]
Sent: Friday, April 29, 2016 10:59 AM
To: 'Woods, Maxwell' <maxwell.woods@state.or.us>
Cc: FRANCE Renee M <renee.m.france@state.or.us>; Gustafson, Virginia <virginia.gustafson@state.or.us>; Funkhouser, Zach <ZFunkhouser@idahopower.com>
Subject: B2H - Exhibit X re: Noise Comment

Hi Max:

Please find attached Idaho Power's response to your inquiry below regarding the noise monitoring sites. We've also attached a Google Earth file showing the location of the sites and possible NSRs. Please let us know if this information is sufficient and we may rely on the existing monitoring sites as outlined in the tech memo.

Thanks much.

David Stanish | **Senior Counsel** | Idaho Power Company
1221 W. Idaho Street, Boise, Idaho 83702 | ☎:(208) 388-2631
🖷:(208) 433-2807 | ✉: DStanish@idahopower.com

TECHNICAL MEMORANDUM

Updated Monitoring Point applicability for Boardman to Hemingway (B2H)

PREPARED FOR:	Oregon Department of Energy
FROM:	Idaho Power Company
PREPARED BY:	Mark Bastasch, P.E., INCE/CH2M Jonathon Koenig, P.E./CH2M
DATE:	March 15, 2016

This Memorandum provides an update to the February 3, 2016 review of sound monitoring points (MPs) for the Boardman to Hemingway (B2H) project for acoustical representativeness at various noise sensitive receptors (NSRs) along the revised route. Analysis was performed for the Bureau of Land Management (BLM) National Environmental Policy Act (NEPA) Preliminary Environmentally Preferred route provided to CH2M on March 7, 2016.

Methodology

NSR locations were taken from the dataset of structures (residential dwellings) contained in a geodatabase previously provided by TetraTech. The available existing database of residential structures did not provide coverage for all alternatives. Therefore, CH2M conducted a preliminary review of Google Earth imagery to identify likely NSRs along these alternative routes.

The NSR screening approach identified 132 NSRs for the NEPA route, 15 NSRs for the Sand Hollow-Whittaker Flat alternative, and 38 NSRs for the Mill Creek alternative worthy of additional analysis by evaluating distances of 3,100 feet or less between NSRs and the proposed and alternative routes. For each NSR, an acoustically representative monitoring point (MP) was selected where sound measurements were collected during 2012 and 2013. Typically, the nearest monitoring point is most representative of the background conditions at a given NSR. However, sound levels can be elevated significantly when there is a nearby source, such as a major roadway, industrial facility, or river. Therefore, CH2M also considered the acoustical environment of each NSR to determine the most representative MP.

Results

Table 1 presents a list of NSRs near the proposed and alternative routes, grouped by the MP that is considered acoustically representative. Of the structures previously identified in the TetraTech database, 51 had blank receptor IDs – these are labeled as “blanks” in this analysis with the number of blanks indicated (e.g., 2-blanks indicates 2 receptors without ID’s). Structures newly identified by CH2M’s preliminary review of aerial imagery were labeled “new” (e.g., “8-new” indicates 8 new potential residences were identified in CH2M’s review of aerial photography). Attachment A provides snapshots from Google Earth with polygons showing the spatial extents of these relationships between MPs and NSRs.

Table 1. Monitoring Points representing Noise Sensitive Receptors
Monitoring point applicability along NEPA and alternative routes

MP	County	NSR List (1)	Applicable Alternatives
MP39	Morrow	1008, 1009	NEPA Preliminary
MP05	Umatilla	1176, 3-new	Sand Hollow-Whittaker Flats Alternative
MP06	Umatilla	5-new	Sand Hollow-Whittaker Flats Alternative
MP28	Umatilla	5-new	Sand Hollow-Whittaker Flats Alternative
MP08	Umatilla	1-new	Sand Hollow-Whittaker Flats Alternative
MP09	Umatilla	118, 123, 128	NEPA Preliminary
MP11	Union	98, 100, 106, 107, 108, 111, 255, 256, 257, 258, 259, 260, 261, 262, 263, 265, 266, 1237, 45-blanks	NEPA Preliminary; Mill Creek Alternative
MP13	Union	91, 1-blank	NEPA Preliminary
MP14	Union	85, 1-blank	NEPA Preliminary
MP15	Baker	78, 80, 82, 83, 1-blank	NEPA Preliminary
MP16	Baker	71, 72, 523, 1262, 1266, 1269, 2-blanks	NEPA Preliminary
MP17	Baker	68, 227	NEPA Preliminary
MP19	Baker	1714	NEPA Preliminary
MP25	Baker	34, 36	NEPA Preliminary
MP32	Baker	873, 876, 877, 1-blank	NEPA Preliminary
MP33	Baker	936	NEPA Preliminary
MP34	Baker	887, 888, 890, 891, 892, 895, 896, 899, 904, 905, 911, 913, 914, 915, 916, 919, 924, 925, 929, 1415, 1420, 1422	NEPA Preliminary

Notes:
(1) List gives Receptor IDs attributed to each structure identified in the geodatabase near the proposed and alternative routes. Previously identified receptors that were not assigned an ID number are indicated as "blank" and the number preceded by the # of blanks ("2-blanks" indicates two previously identified but un labeled receptors). Potential new NSRs identified during our preliminary review of aerial photography are listed as "new" and "5-new" indicates 5 potential new NSRs.

The relationships identified in Table 1 are expected to be representative of the existing sound levels at the NSRs. Notable aspects of determining these relationships include:

- Newly identified NSRs along the Sand Hollow - Whittaker Flat alternative are well represented by the rural MP06 and MP28 monitoring points, both of which have lower existing sound levels than MP07 which is closer to a roadway.
- MP11 was selected for NSRs near the Mill Creek alternative since MP13 is located much closer to Interstate 84 than the NSR's along the alternative are. MP09 was also considered as representative for these NSRs, but existing sound levels at MP11 are lower making MP11 a more conservative choice.
- MP34 was selected as a representative location for NSRs north of Vale, OR at the intersection with US-26; as well as those further south in Malheur County. MP27 was ruled out because of its valley location in close proximity to running water, unlike the NSRs in the area. The existing sound levels at MP34 and MP35 are similar and less than those at MP27 and MP31, making MP34 a conservative choice.

Conclusions

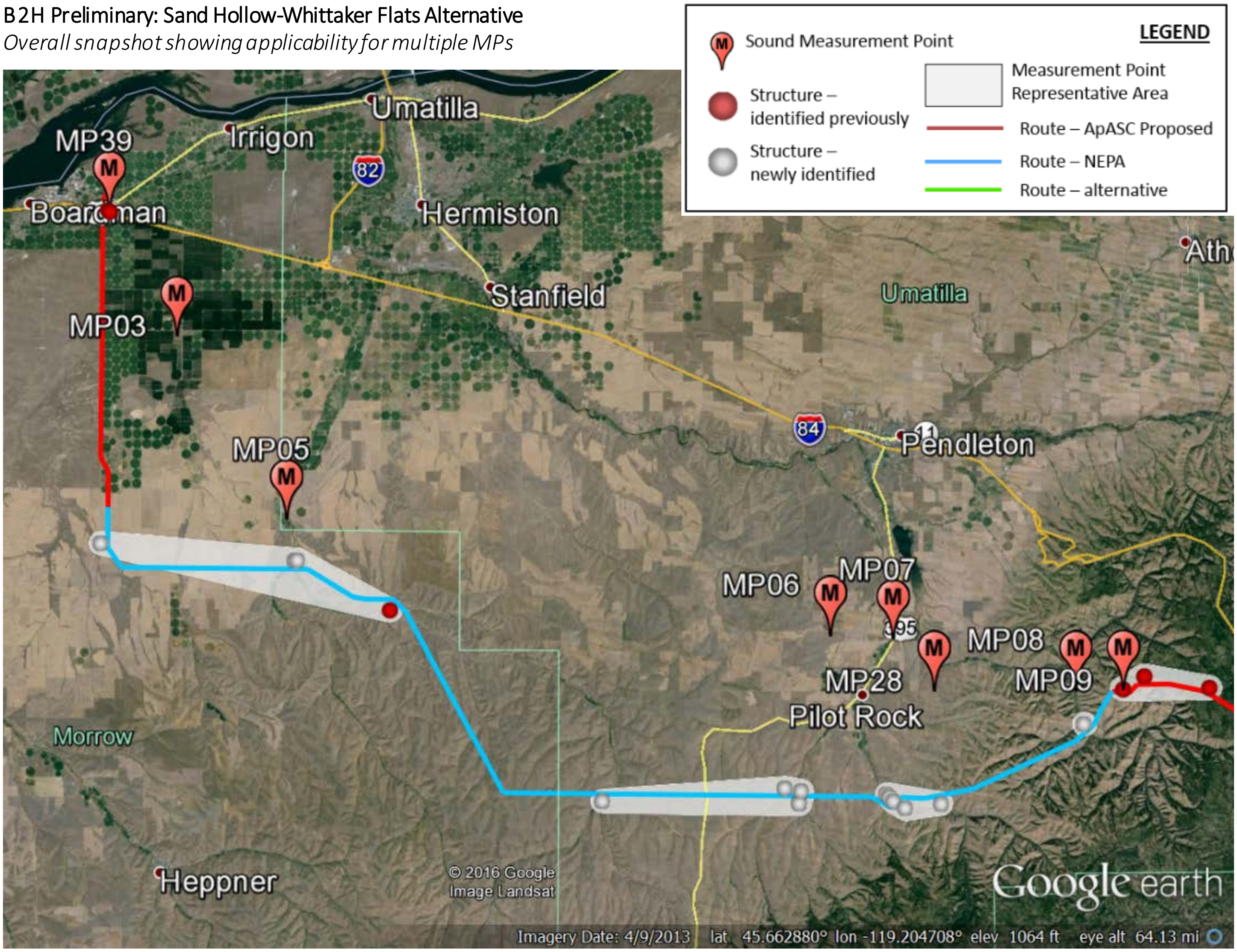
An applicability analysis was performed relating background sound level monitoring data to NSRs along BLM's NEPA Preliminary Environmentally Preferred route and the Sand Hollow - Whittaker Flat and Mill Creek alternative routes. Monitoring data at existing MPs that are expected to be acoustically representative of sound levels along the preferred and alternative routes have been identified.

Attachment A: Google Earth snapshots

Figures are snapshots of the B2H NEPA preliminary environmentally preferred and alternative routes. Points are labeled either with MP, measurement points from 2012 or 2013 sound monitoring studies conducted by TetraTech (e.g., MP34), or structures that were previously identified or newly identified as part of this evaluation. Shaded polygons are used to outline the area of acoustical representativeness.

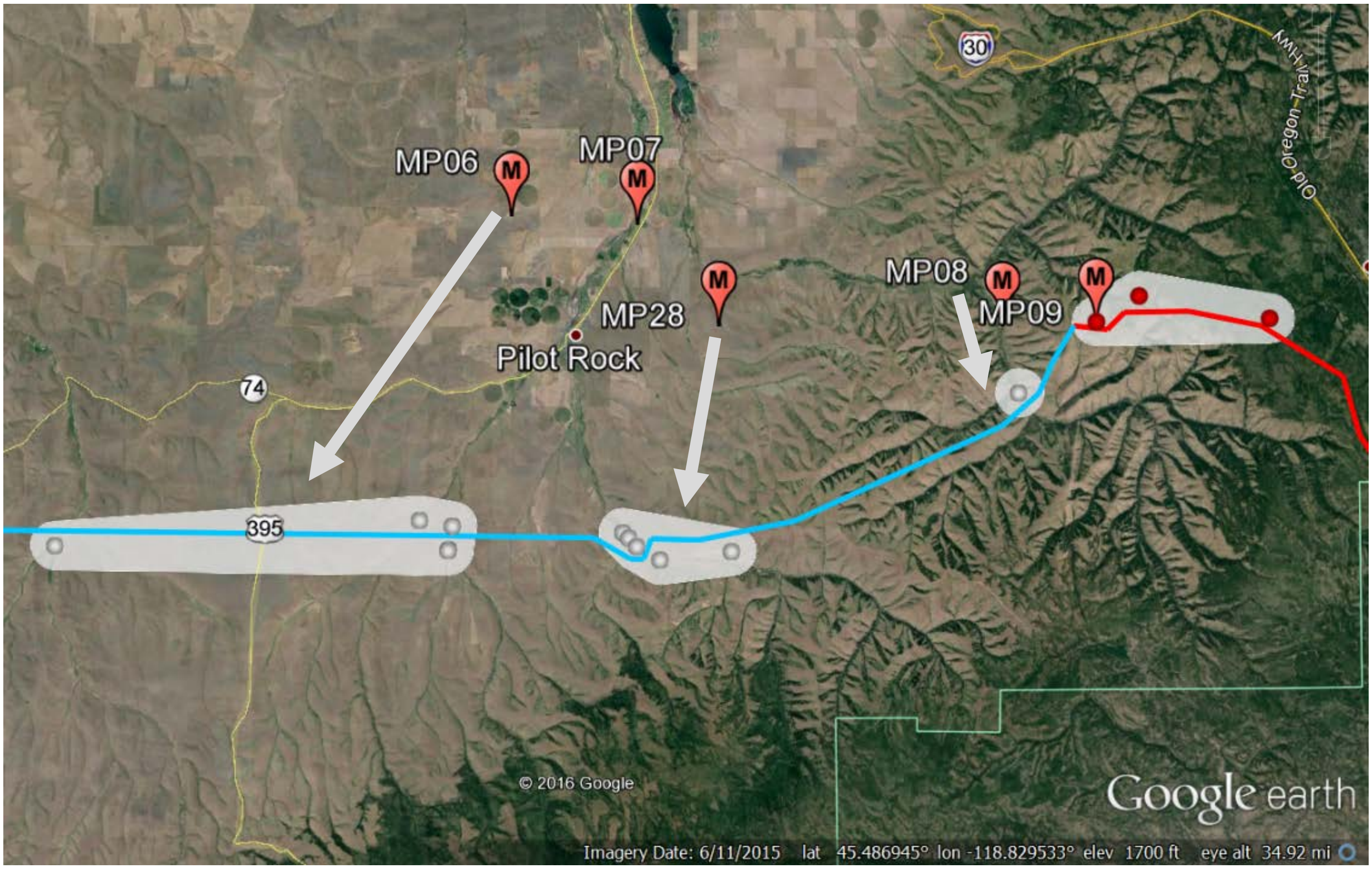
B2H Preliminary: Sand Hollow-Whittaker Flats Alternative

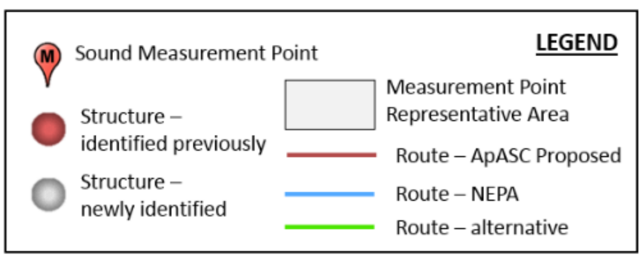
Overall snapshot showing applicability for multiple MPs



B2H Preliminary: Sand Hollow-Whittaker Flats Alternative

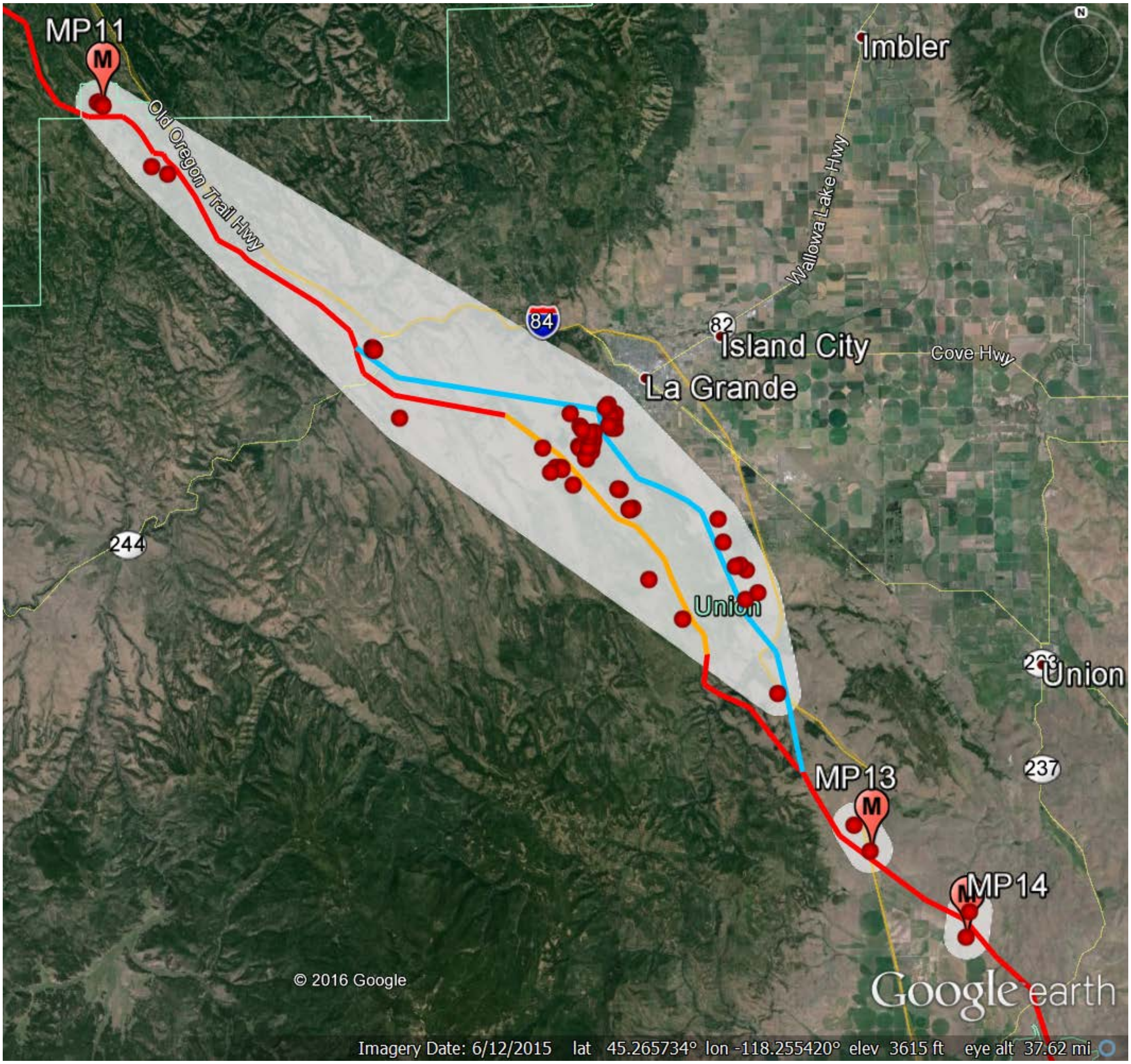
Zoomed in for better visibility of MP06 and other nearby MPs

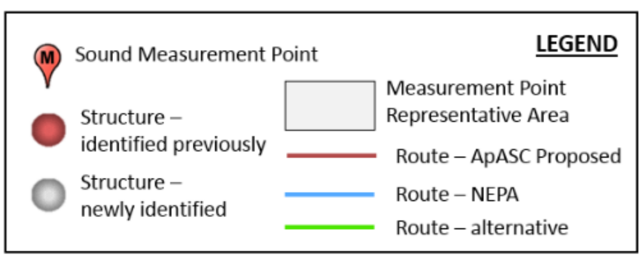




B2H Preliminary: Morgan Lake and Mill Creek Alternatives

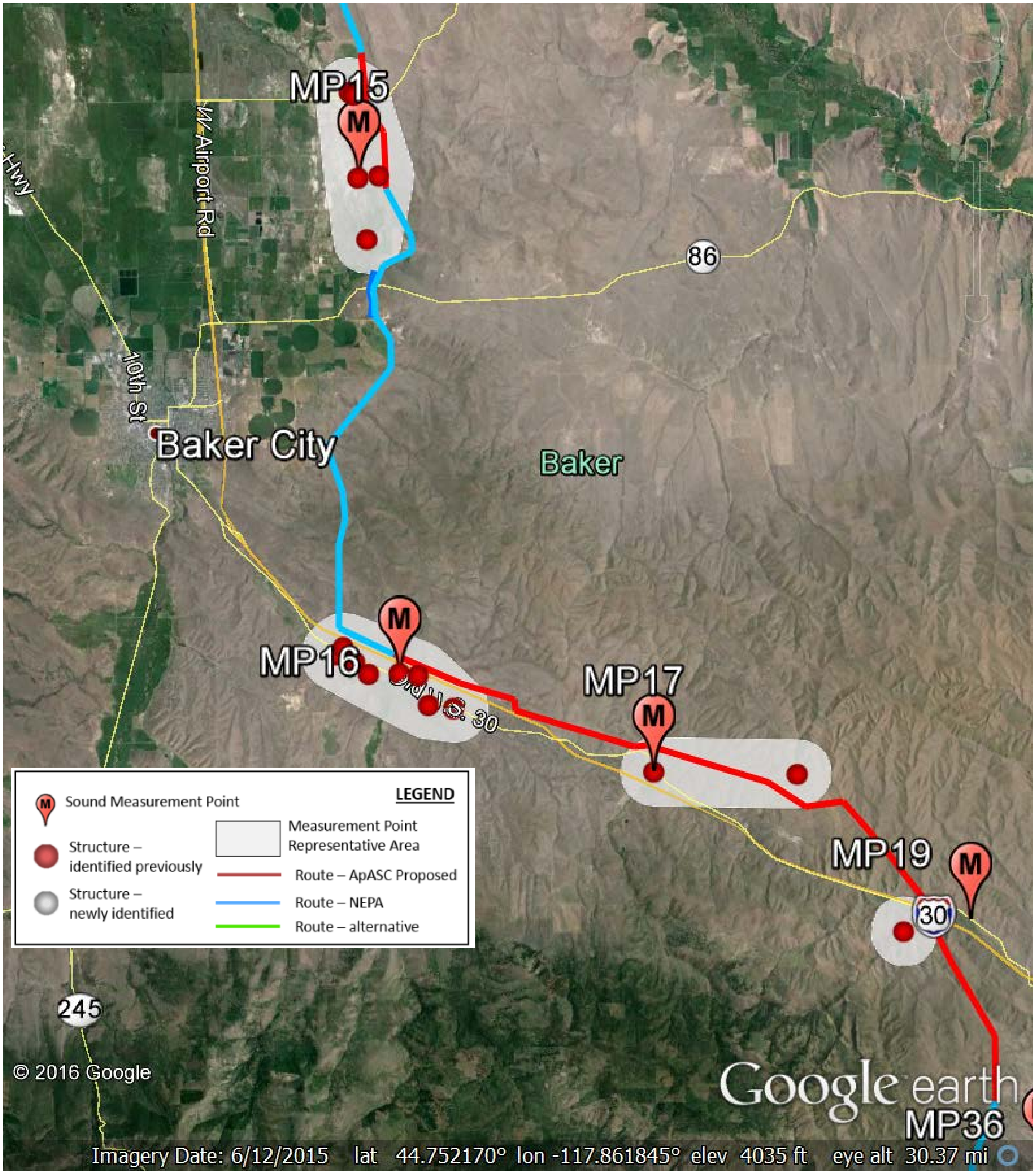
Overall view of MP11, MP13, and MP14





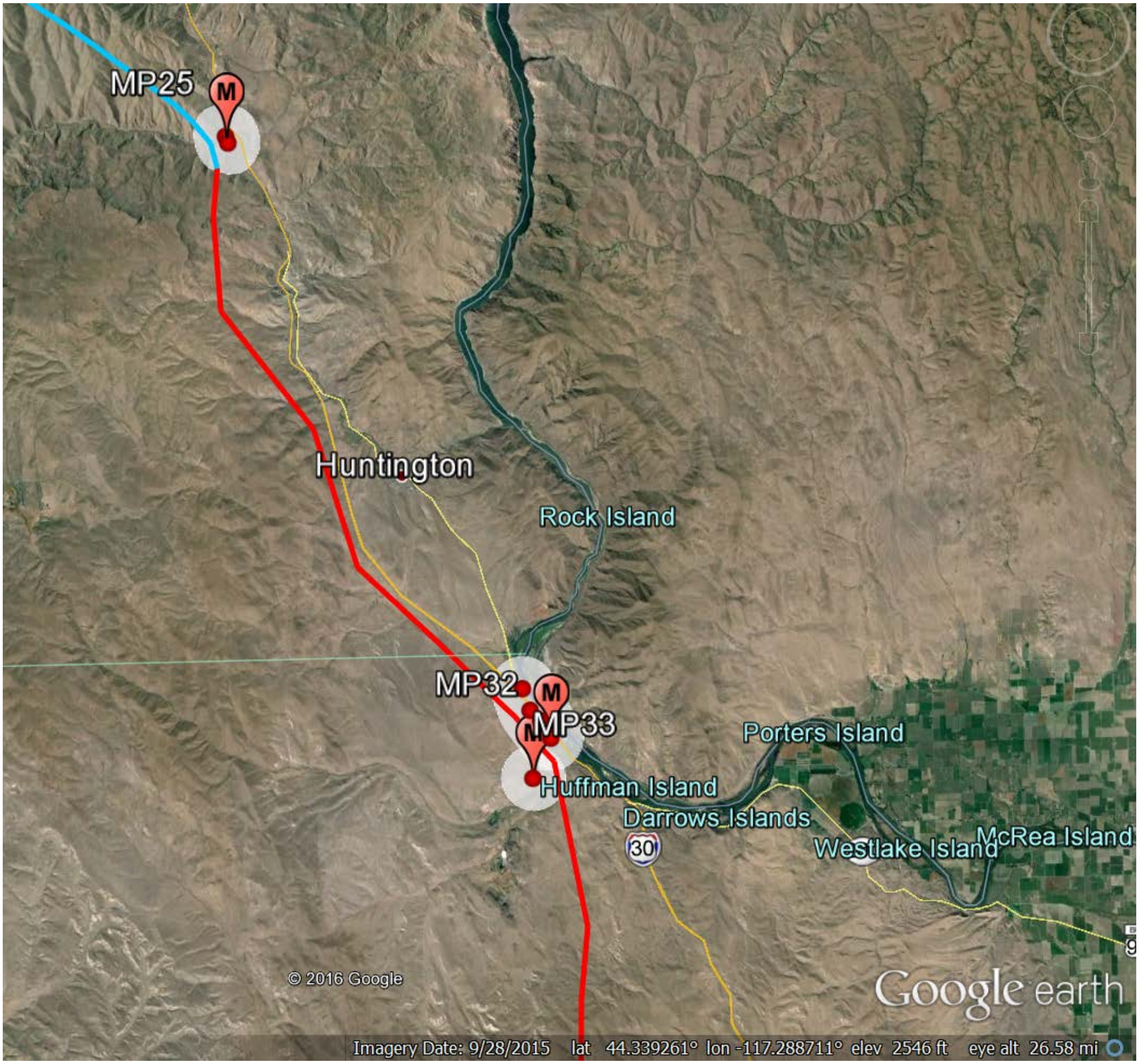
B2H Preliminary: 2016 Proposed

Overall view of MPs near Baker City, OR



B2H Preliminary: 2016 Proposed

Overall view of MPs near Huntington, OR

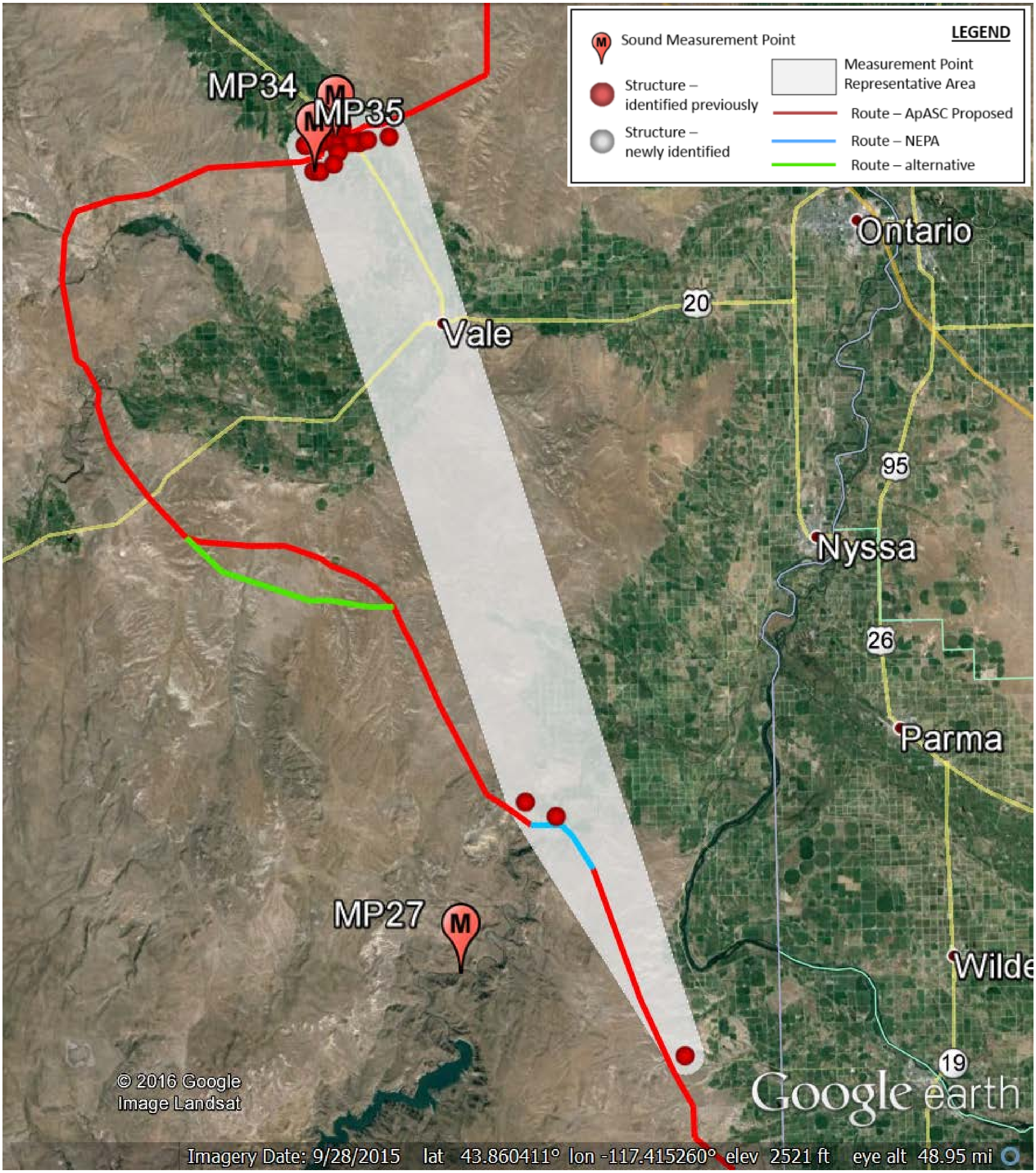


LEGEND

- Sound Measurement Point
- Structure – identified previously
- Structure – newly identified
- Measurement Point Representative Area
- Route – ApASC Proposed
- Route – NEPA
- Route – alternative

B2H Preliminary: 2016 Proposed

Overall view of MP34 area of representativeness, showing additional MPs in the area for reference



Review of Proposed Noise Monitoring Point Plan

The proposed noise monitoring point plan (March 15, 2016) does not currently have adequate information for ODOE to assess the suitability and applicability of the proposed plan. Specifically, ODOE requests that IPC provide information in the table below (or similar format) explaining why the ambient noise levels at the proposed MPs are representative of the ambient noise at the new NSRs. In the March 15, 2016 memo, on page 2, there is a short bullet-point list that provides some information related to three specific MPs; ODOE envisions that this type of information should be provided for all the proposed MPs and associated NSRs to explain why the acoustic environment at the MPs are representative of the acoustic environment at the associated NSRs. Please include information related to current noise sources at the MPs and NSRs, such as proximity to a road, highway, running water, as well as any other relevant information such as local topography or landscape (i.e., forested, wheat fields, etc.) that may influence ambient noise volumes, if necessary.

Ultimately, ODOE requires adequate information to be able to assess the facility's compliance with the DEQ Noise Rule (OAR 345-035-0035). The DEQ Noise Rule sets a noise standard for new noise sources on previously unused sites as no more than 10 dBA in any one hour above ambient hourly L10 and L50 statistical noise levels. (The rule also sets a maximum noise standard, not related to the ambient noise level.) As the DEQ Noise Rule standard is related to an increase from ambient, it is necessary that IPC provide its assessment of the ambient noise conditions, so that it can then assess the anticipated noise increase by the facility, and identify appropriate mitigation if necessary. Because DEQ does not administer its own noise rules, ultimately, it will be EFSC that makes a determination on compliance with the DEQ Noise Rule for purposes of the B2H site certificate.

Example

MP	Conditions that contribute to MP ambient noise	NSR	Conditions at NSR that are represented by chosen MP
MP number	• *Local conditions at MP, such as "rural house, surrounded by wheat farms," or "intersection of highway and local road."* • *Immediate environmental conditions, such as "forested area in Blue Mountains," or "flat farming area with no trees."* • *Noise influences, such as distance from major road, running water, etc.*	NSR number	• *Rural house, surrounded by wheat fields* • *Similar topography, flat* • *Similar distance from a highway, or, further from a highway so MP is more conservative, etc.*

TECHNICAL MEMORANDUM

Review of Sound Monitoring Locations for Boardman to Hemingway (B2H)

PREPARED FOR:	Oregon Department of Energy
FROM:	Idaho Power Company
PREPARED BY:	Mark Bastasch, P.E., INCE/CH2M Jonathon Koenig, P.E./CH2M
DATE:	April 29, 2016
PROJECT NUMBER:	650158

This Memorandum responds to April 19, 2016 comments from the Oregon Department of Energy (ODOE) regarding the sound monitoring points (MPs) for the Boardman to Hemingway (B2H) project. The requested information regarding the acoustical representativeness of MPs for various noise sensitive receptors (NSRs) along the B2H route is provided.

Methodology

This review is based on the Bureau of Land Management (BLM) preliminary agency preferred route released on March 22, 2016. NSR locations were taken from the dataset of structures (residential dwellings) contained in a geodatabase previously provided by TetraTech. The available existing database of residential structures did not provide coverage for all segments along this route. Therefore, CH2M conducted a preliminary review of Google Earth imagery to identify likely NSRs along the revised alignment.

The NSR screening approach identified 132 NSRs along the BLM route worthy of additional analysis by reviewing imagery for areas within 3,100 feet of the proposed and alternative routes. For each identified NSR, an acoustically representative monitoring point (MP) was selected. Typically, the nearest monitoring point is most representative of the background conditions at a given NSR. However, sound levels can be elevated significantly when there is a nearby source, such as a major roadway, industrial facility, or river. Therefore, CH2M also considered the acoustic environment of each NSR to determine the most representative MP.

Results

Table 1 presents a list of NSRs near the proposed route, grouped by the MP that is considered acoustically representative. NSRs are listed together in Table 1 where the attributes are the same; such as for NSRs in the same area that share similar acoustic environments. Of the structures previously identified in the TetraTech database, for 51 structures the ID field was blank (i.e., a receptor ID had not been assigned) – these are labeled as “blanks” in this analysis with the number of blanks indicated (i.e., 2-blanks indicates 2 receptors without IDs). Structures newly identified by CH2M’s cursory review of aerial imagery were labeled “new” (and “8-new” indicates 8 new potential residences identified in CH2M’s review of aerial photography). For “blank” or “new” receptors that are not uniquely identified in the Google Earth file, Attachment A provides aerial snapshots with polygons depicting the areas where the referenced blanks or new structures are located.

Table 1. Monitoring Points representing Noise Sensitive Receptors

MP	Conditions contributing to MP ambient noise (1) (3)	NSR List (2)	Conditions at NSR represented by MP
MP39	• Near major roadways, US 730 (530 feet) and I-84 (850 feet). • Union Pacific Railroad approx. 2,500 feet north.	1008, 1009	• NSRs closer to roadways than MP; MP is more conservative.
MP05	• Rural house surrounded by farms. • Truck traffic on Butter Creek Road (147 feet).	1176, 3-new	• Rural NSRs with nearby farms, along the same roadways. [see Figure A-1]
MP06	• Rural house surrounded by farms, far from major roadways.	5-new	• Rural NSRs in similar terrain. • Nearby creeks similar to MP07, but more conservative because of lower ambient sound levels at MP06. [see Figure A-2]
MP28	• Rural house in hilly terrain with ranches, far from major roadways.	5-new	• Rural NSRs in similar terrain. • Nearby creek and road similar to MP07, but more conservative because of lower ambient sound levels at MP28. [see Figure A-2]
MP08	• Rural hilly terrain with nearby creek and low-traffic roadway.	1-new	• Approximately 2 miles south from MP along McKay Creek Rd, similar distance to creek and roadway. [see Figure A-2]
MP09	• Rural hilly terrain, forested area in the Blue Mountains.	123	• MP and NSR are the same location.
		118, 128	• Similar topography and forested area.
		68	• Similar topography and forested area. • Nearby MP17 and MP19 ruled out because of their proximity to I-84; MP09 is more conservative with lower ambient sound levels.
MP11	• Cabin in forested area in the Blue Mountains, Union Pacific Railroad (207 feet).	107	• MP and NSR are the same location.
		106, 108, 111, 265, 266	• Similar terrain and close proximity to the MP.
		98, 100, 255, 256, 257, 258, 259, 260, 261, 262, 263, 1237, 29-blanks	• Similar terrain. • MP09 was also evaluated for these mountain NSRs, but ambient sound levels were higher at MP09 than MP11, therefore MP11 is a more conservative choice. [see Figure A-3]
		16-blanks	• Similar terrain. • MP-13 and MP-9 were also evaluated for these NSRs which are in on the outskirts of La Grande. MP13 is closer to I-84 and ambient sound levels are higher at both MP13 and MP09 than MP11, making MP11 a more conservative choice. [see Figure A-3]
MP13	• Hilly terrain outside of Union, OR. • Distance to I-84 580 feet.	91	• MP and NSR are the same location.
		2-blanks	• Similar topography and distances to I-84. [see Figure A-4]
MP14	• Rural hilly farm area, 1.2 miles from major roadway.	85	• MP and NSR are the same location.
		1-blank	• NSR 0.7 miles north along local roadway. [see Figure A-5]
MP15	• Rural flat farm area, nearby railway (0.5 miles) and airport (2.5 miles).	80	• MP and NSR are the same location.
		78, 82, 83, 1-blank	• Similar topography, MP further from roadways than other NSRs. [see Figure A-6]

Table 1. Monitoring Points representing Noise Sensitive Receptors

MP	Conditions contributing to MP ambient noise (1) (3)	NSR List (2)	Conditions at NSR represented by MP
MP16	• Rural valley near Old Highway 30 (340 feet), Union Pacific Railroad (0.23 miles), and I-84 (0.2 miles).	72	• MP and NSR are the same location.
		71, 523	• Similar topography and distances to road/rail noise sources.
		1262, 1266, 1269, 2-blanks	• Similar topography and distances to road/rail noise sources, NSRs closer to railway than MP. [see Figure A-6]
MP17	• Rural valley near Old Highway 30 (363 feet), Union Pacific Railroad (161 feet), and I-84 (0.2 miles).	227	• MP and NSR are the same location.
		1714	• Similar distance to highway and railway. • MP19 also considered, but MP17 is more conservative with lower ambient sound levels.
MP25	• Rural valley near I-84 (719 feet) and Union Pacific Railroad (598 feet).	36	• MP and NSR are the same location.
		34	• NSR 700 feet south, similar distance to rail and highway.
MP32	• River valley near I-84 (550 feet) and existing transmission line (approx. 150 feet).	877	• MP and NSR are the same location.
		873, 876, 1-blank	• Similar terrain and distances to river and highway I-84. [see Figure A-7]
MP33	• River valley near I-84 (0.75 miles) and existing transmission line (approx. 0.5 miles).	936	• MP and NSR are the same location.
MP34	• Rural flat farm area, distance to US-26 (approx. 0.5 miles).	899	• MP and NSR are the same location.
		888, 890, 891, 892, 929	• Similar terrain, and NSRs closer to US-26 than MP, making MP a conservative choice.
MP35	• Rural flat farm area, distance to US-2626 (approx. 0.5 miles).	911	• MP and NSR are the same location.
		887, 895, 896, 904, 905, 913, 914, 915, 916, 919, 924, 925	• Similar terrain and distance to roadway. • Ambient sound levels higher at MP34 and MP31; making MP35 a conservative choice.
		1415, 1420, 1422	• MP27 ruled out due to location in valley with running water, high ambient sound levels. • Ambient sound levels higher at MP27, MP34 and MP31; making MP35 a conservative choice.

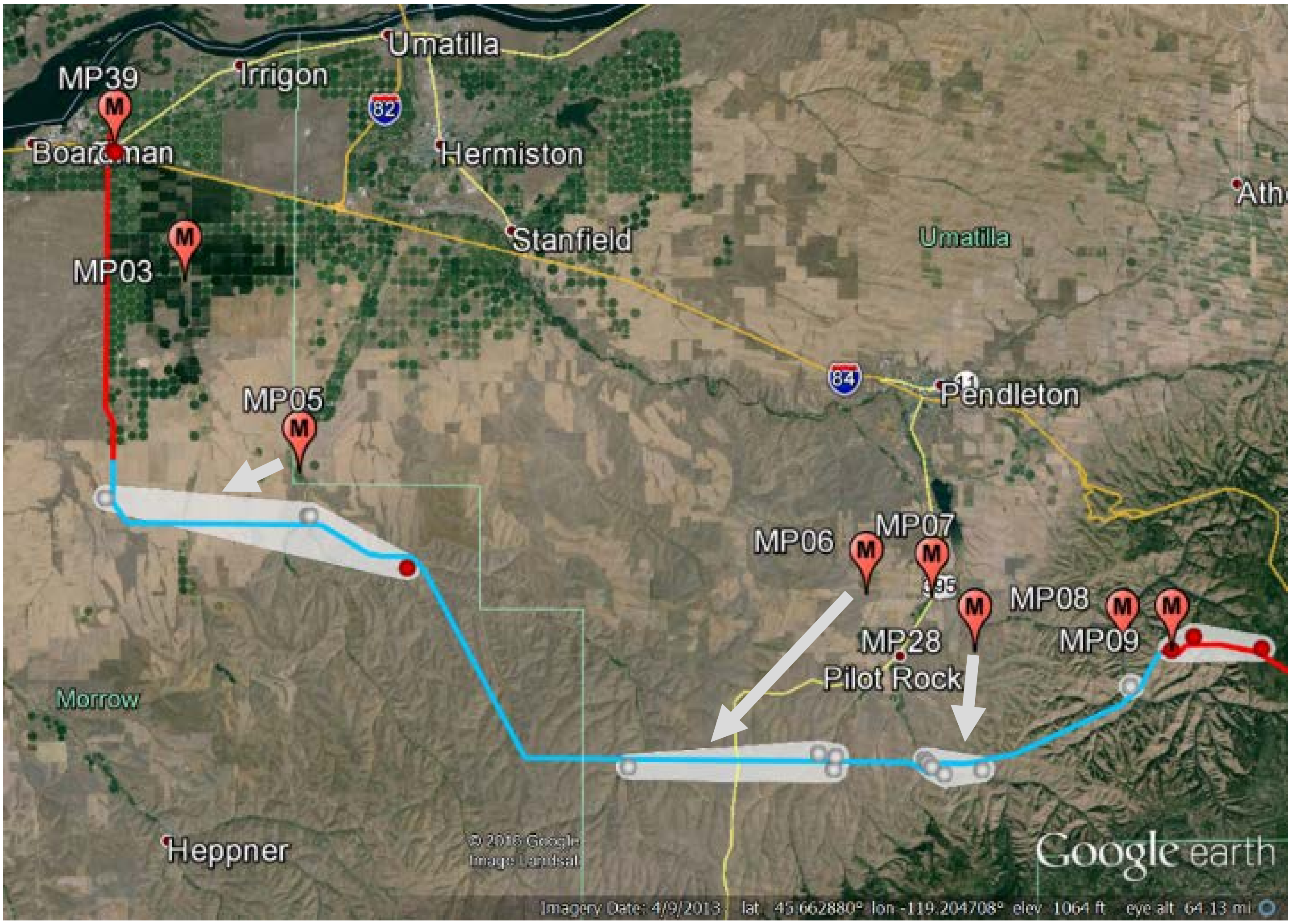
Notes:
(1) Refer to previously filed sound survey documents for more detailed maps, photographs and descriptions of monitoring points. MP 02 through 31 are described in "Baseline Sound Survey" (Tetra Tech, January 2013). MP 32 through 39 are described in "Supplemental Baseline Sound Survey for the Tub Mountain, Burnt River, and East of Bombing Range Road Alternate Corridors" (Tetra Tech, August 2013).
(2) Receptor IDs attributed to each structure were identified in the geodatabase near the proposed and alternative routes. Previously blank receptor IDs are noted as "blank". Potential NSRs identified in this effort are listed as "new".
(3) Distance to railway is included for completeness where appropriate, but trains are not expected to influence the ambient L_{50} metric used in Oregon.

Attachment A: Google Earth snapshots

Figures are snapshots of the BLM preliminary agency preferred route focusing on areas where receptor ID had not been established. Measurement point (MP) from the 2012 or 2013 sound monitoring studies conducted by TetraTech (e.g. MP34) are labeled and identified noise sensitive receptors (NSR) structures are depicted (refer to GoogleEarth file for NSR identification numbers). Shaded polygons outline the area of acoustical representativeness.

Figure A-1: B2H 2016 Proposed ("Sand Hollow-Whittaker Flats Alternative")

Overall snapshot showing applicability for multiple MPs



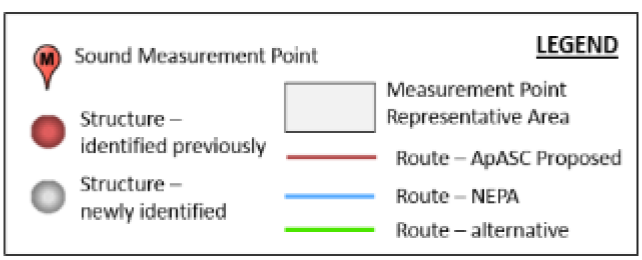


Figure A-2: B2H 2016 Proposed ("Sand Hollow-Whittaker Flats Alternative")

Zoomed in for better visibility of MP06 and other nearby MPs

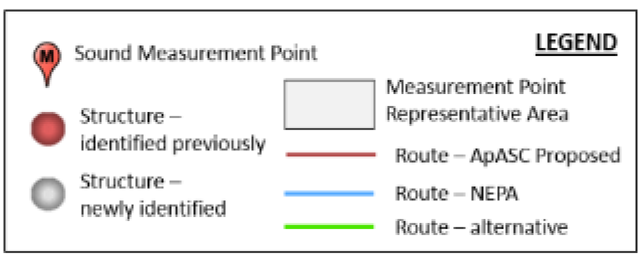
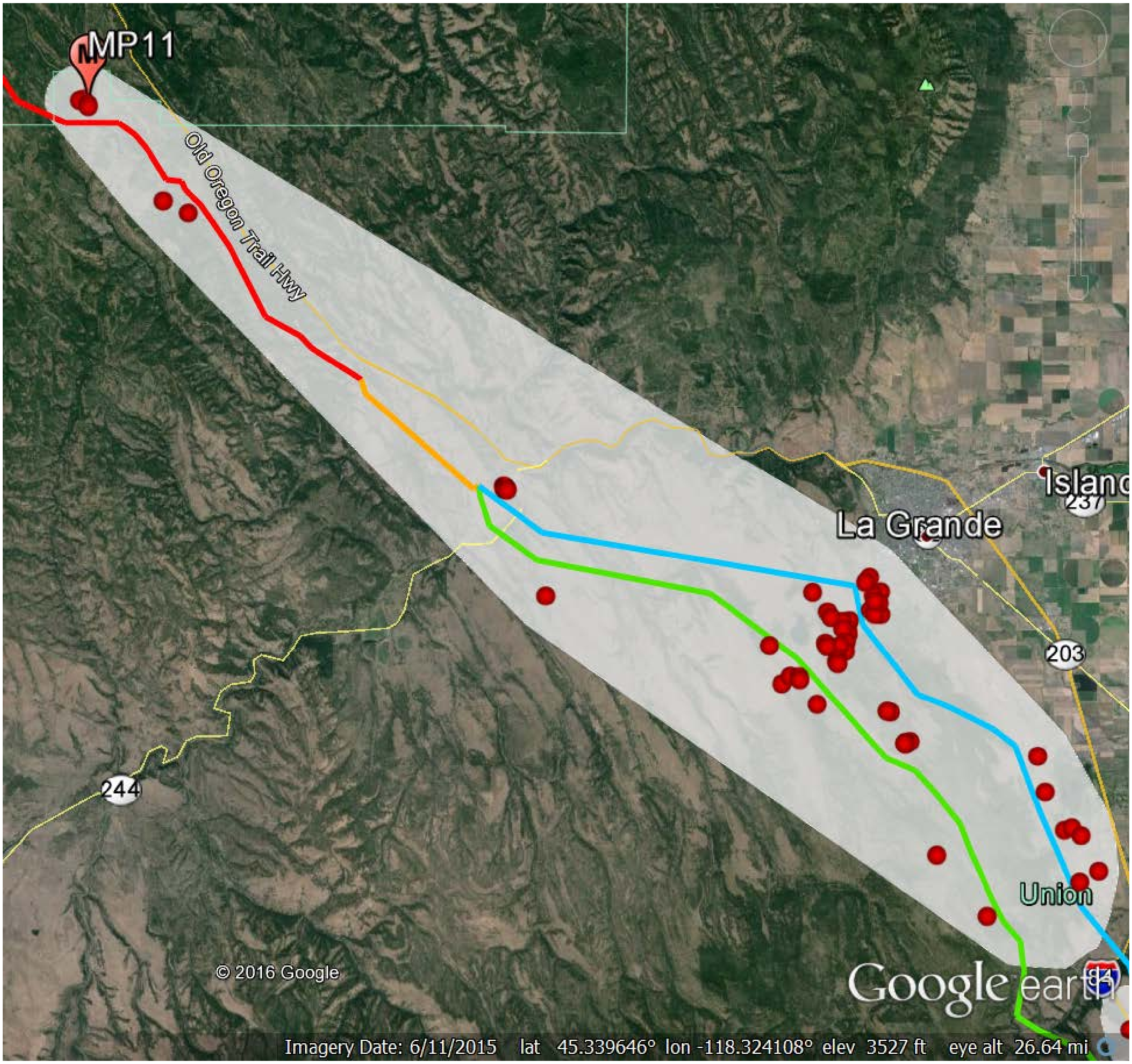


Figure A-3: B2H 2016 Proposed ("Morgan Lake and Mill Creek Alternatives")

Detailed view of MP11 NSRs



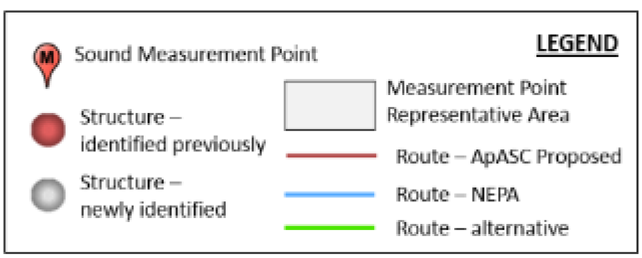


Figure A-4: B2H 2016 Proposed

Detailed view of MP13 NSRs

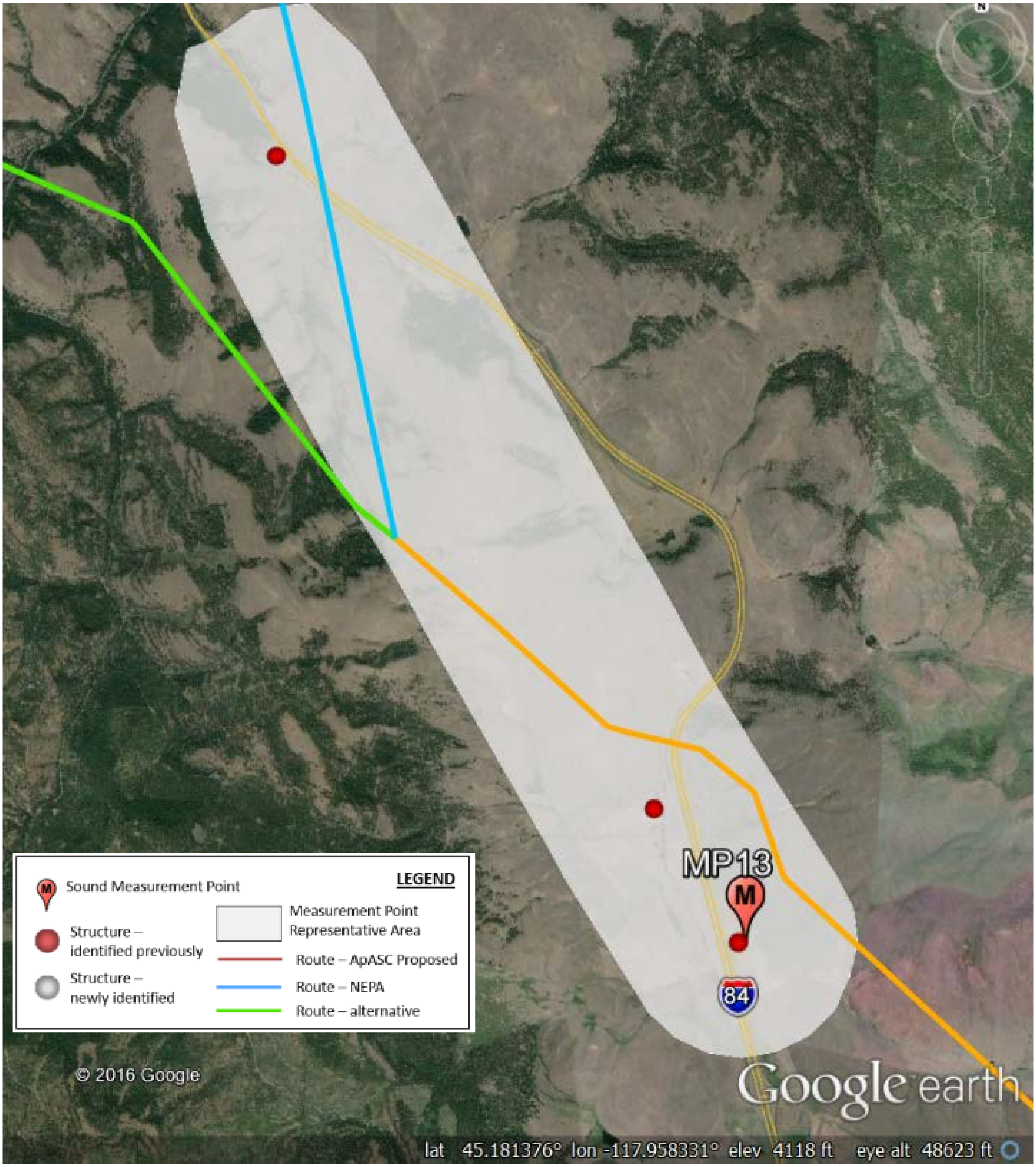


Figure A-5: B2H 2016 Proposed
Detailed view of MP14 NSRs

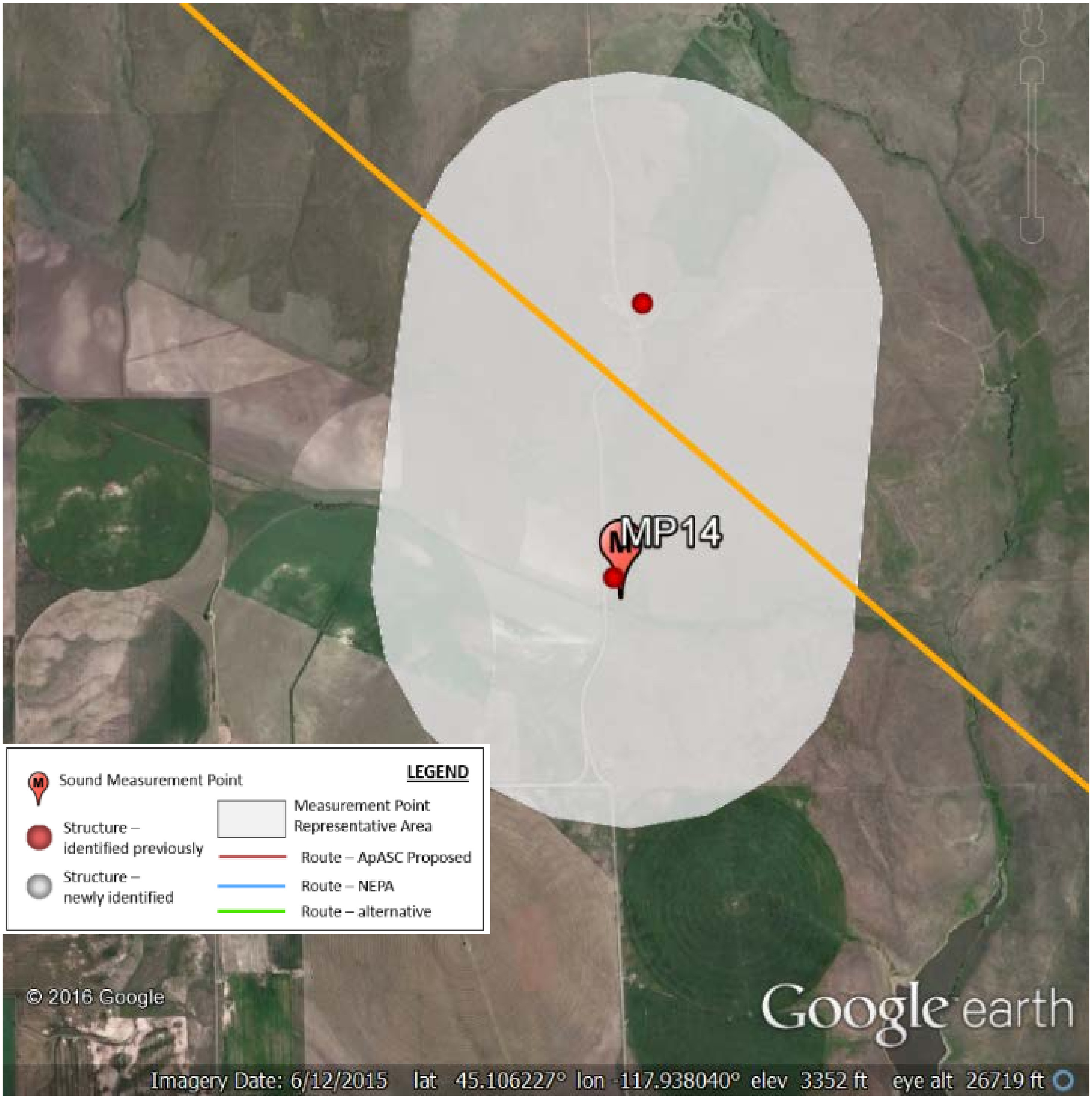


Figure A-6: B2H 2016 Proposed

Overall view of MPs near Baker City, OR

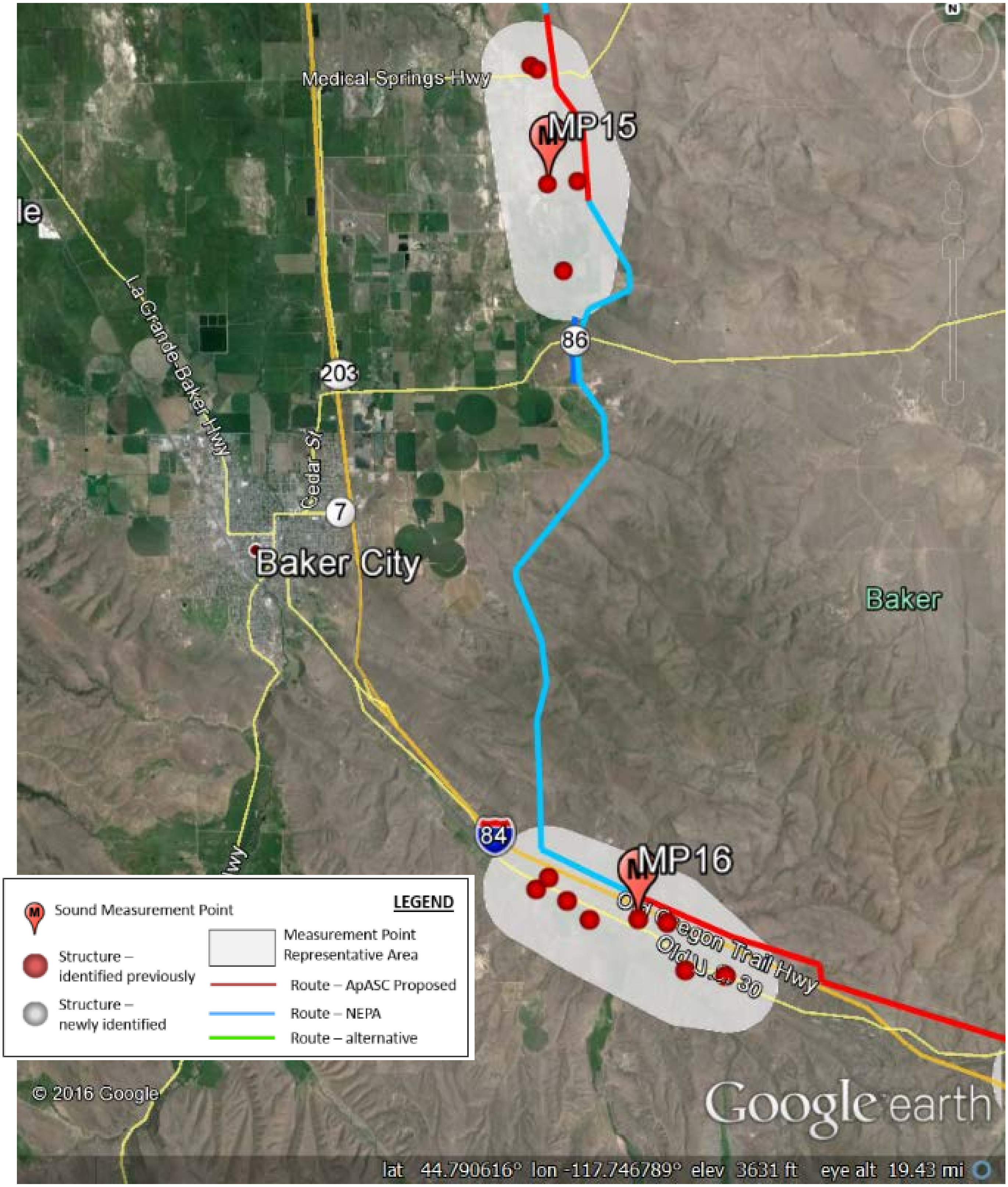


Figure A-7: B2H 2016 Proposed

Detailed view of MP32 and MP33 NSRs