Exhibit X
Noise

Boardman to Hemingway Transmission Line Project

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Preliminary Application for Site Certificate

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ACRONYMS AND ABBREVIATIONS

Note: Not all acronyms and abbreviations listed will appear in this Exhibit.

°C	degrees Celsius
4WD	4-wheel-drive
A	ampere
A/ph	amperes/phase
AC	alternating current
ACDP	Air Contaminant Discharge Permit
ACEC	Area of Critical Environmental Concern
ACSR	aluminum conductor steel reinforced
AIMP	Agricultural Impact Mitigation Plan
AMS	Analysis of the Management Situation
aMW	average megawatt
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
ARPA	Archaeological Resource Protection Act
ASC	Application for Site Certificate
ASCE	American Society of Civil Engineers
ASP	Archaeological Survey Plan
AST	aboveground storage tank
ASTM	American Society of Testing and Materials
ATC	available transmission capacity
ATV	all-terrain vehicle
AUM	animal unit month
B2H	Boardman to Hemingway Transmission Line Project
BCCP	Baker County Comprehensive Plan
BCZSO	Baker County Zoning and Subdivision Ordinance
BLM	Bureau of Land Management
BMP	best management practice
BPA	Bonneville Power Administration
BOR	Bureau of Reclamation
C and D	construction and demolition
CAA	Clean Air Act
CadnaA	Computer-Aided Noise Abatement
CAFE	Corona and Field Effects
CAP	Community Advisory Process
CBM	capacity benefit margin
CFR	Code of Federal Regulations
CH	critical habitat
CIP	critical infrastructure protection
CL	centerline
cm	centimeter
cmil	circular mil
COA	Conservation Opportunity Area
CO_2e	carbon dioxide equivalent
COM Plan	Construction, Operations, and Maintenance Plan

CPCN	Certificate of Public Convenience and Necessity
cps	cycle per second
CRP	Conservation Reserve Program
CRT	cathode-ray tube
CRUP	Cultural Resource Use Permit
CSZ	Cascadia Subduction Zone
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CWA	*Clean Water Act of 1972*
CWR	Critical Winter Range
dB	decibel
dBA	A-weighted decibel
DC	direct current
DoD	Department of Defense
DOE	U.S. Department of Energy
DOGAMI	Oregon Department of Geology and Mineral Industries
DPS	Distinct Population Segment
DSL	Oregon Department of State Lands
EA	environmental assessment
EDRR	Early Detection and Rapid Response
EIS	Environmental Impact Statement (DEIS for Draft and FEIS for Final)
EFSC or Council	Energy Facility Siting Council
EFU	Exclusive Farm Use
EHS	extra high strength
EMF	electric and magnetic fields
EPA	Environmental Protection Agency
EPC	Engineer, Procure, Construct
EPM	environmental protection measure
EPRI	Electric Power Research Institute
ERO	Electric Reliability Organization
ERU	Exclusive Range Use
ESA	Endangered Species Act
ESCP	Erosion and Sediment Control Plan
ESU	Evolutionarily Significant Unit
EU	European Union
FAA	Federal Aviation Administration
FCC	Federal Communication Commission
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FFT	find, fix, track, and report
FLPMA	Federal Land Policy and Management Act
Forest Plan	Land and Resource Management Plan
FPA	Forest Practices Act
FSA	Farm Services Agency
FWS	U.S. Fish and Wildlife Service
G	gauss
GeoBOB	Geographic Biotic Observation
GF	Grazing Farm Zone

GHG	greenhouse gas
GHz	gigahertz
GIL	gas insulated transmission line
GIS	geographic information system
GPS	Global Positioning System
GRMW	Grande Ronde Model Watershed
GRP	Grassland Reserve Program
HAC	Historic Archaeological Cultural
HCNRA	Hells Canyon National Recreation Area
HPFF	high pressure fluid-filled
HPMP	Historic Properties Management Plan
HUC	Hydrologic Unit Code
Hz	hertz
I-84	Interstate 84
ICC	International Code Council
ICES	International Committee on Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDWR	Idaho Department of Water Resources
ILS	intensive-level survey
IM	Instructional Memorandum
INHP	Idaho Natural Heritage Program
INRMP	Integrated Natural Resources Management Plan
IPC	Idaho Power Company
IPUC	Idaho Public Utilities Commission
IRP	integrated resource plan
IRPAC	IRP Advisory Council
ISDA	Idaho State Department of Agriculture
JPA	Joint Permit Application
KCM	thousand circular mils
kHz	kilohertz
km	kilometer
KOP	Key Observation Point
kV	kilovolt
kV/m	kilovolt per meter
kWh	kilowatt-hour
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
lb	pound
LCDC	Land Conservation and Development Commission
LDMA	Lost Dutchman’s Mining Association
LiDAR	light detection and ranging
LIT	Local Implementation Team
LMP	land management plan
LOLE	Loss of Load Expectation
LRMP	land and resource management plan

LUBA	Land Use Board of Appeals
LWD	large woody debris
m	meter
mA	milliampere
MA	Management Area
MAIFI	Momentary Average Interruption Frequency Index
MCC	Malheur County Code
MCCP	Morrow County Comprehensive Plan
MCE	Maximum Credible Earthquake
MCZO	Morrow County Zoning Ordinance
mG	milligauss
MHz	megahertz
mm	millimeter
MMI	Modified Mercalli Intensity
MP	milepost
MPE	maximum probable earthquake
MRI	magnetic resonance imaging
MVAR	megavolt ampere reactive
Mw	mean magnitude
MW	megawatt
µV/m	microvolt per meter
N_2O	nitrous oxide
NAIP	National Agriculture Imagery Program
NED	National Elevation Dataset
NEMS	National Energy Modeling System
NEPA	*National Environmental Policy Act of 1969*
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NF	National Forest
NFPA	National Fire Protection Association
NFS	National Forest System
NGDC	National Geophysical Data Center
NHD	National Hydrography Dataset
NHOTIC	National Historic Oregon Trail Interpretive Center
NHT	National Historic Trail
NIEHS	National Institute of Environmental Health Sciences
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries Division
NOI	Notice of Intent to File an Application for Site Certificate
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSR	noise sensitive receptor
NTTG	Northern Tier Transmission Group
NWGAP	Northwest Regional Gap Analysis Landcover Data

NWI	National Wetlands Inventory
NWPP	Northwest Power Pool
NWR	National Wildlife Refuge
NWSRS	National Wild and Scenic Rivers System
NWSTF	Naval Weapons Systems Training Facility
O_3	ozone
O&M	operation and maintenance
OAIN	Oregon Agricultural Information Network
OAR	Oregon Administrative Rules
OATT	Open Access Transmission Tariff
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OHGW	overhead ground wire
OHV	off-highway vehicle
OPGW	optical ground wire
OPRD	Oregon Parks and Recreation Department
OPS	U.S. Department of Transportation, Office of Pipeline Safety
OPUC	Public Utility Commission of Oregon
OR	Oregon (State) Highway
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
ORWAP	Oregon Rapid Wetland Assessment Protocol
OS	Open Space
OSDAM	Oregon Streamflow Duration Assessment Methodology
OSHA	Occupational Safety and Health Administration
OSSC	Oregon Structural Specialty Code
OSWB	Oregon State Weed Board
OWC	Oregon Wetland Cover
P	Preservation
PA	Programmatic Agreement
pASC	Preliminary Application for Site Certificate
PAT	Project Advisory Team
PCE	Primary Constituent Element
PEM	palustrine emergent
PFO	palustrine forested
PGA	peak ground acceleration
PGE	Portland General Electric
PGH	Preliminary General Habitats
Pike	Pike Energy Solutions
PNSN	Pacific Northwest Seismic Network
POD	Plan of Development
POMU	Permit to Operate, Maintain and Use a State Highway Approach
PPH	Preliminary Priority Habitats
Project	Boardman to Hemingway Transmission Line Project

PSD	Prevention of Significant Deterioration
PSS	palustrine scrub-shrub
R	Retention
R-F	removal-fill
RCM	Reliability Centered Maintenance
RCRA	Resource Conservation and Recovery Act
ReGAP	Regional Gap Analysis Project
RFP	request for proposal
RLS	reconnaissance-level survey
RMP	resource management plan
ROD	Record of Decision
ROE	right of entry
RNA	research natural area
ROW	right-of-way
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SC	Sensitive Critical
SEORMP	Southeastern Oregon Resource Management Plan
SF6	sulfur hexafluoride
Shaw	Shaw Environmental and Infrastructure, Inc.
SHPO	State Historic Preservation Office
SLIDO	Statewide Landslide Inventory Database for Oregon
SMS	Scenery Management System
SMU	Species Management Unit
SPCC	Spill Prevention, Containment, and Countermeasures
SRMA	Special Recreation Management Area
SRSAM	Salmon Resources and Sensitive Area Mapping
SSURGO	Soil Survey Geographic Database
STATSGO	State Soil Geographic Database
SUP	special-use permit
SV	Sensitive Vulnerable
SWPPP	Stormwater Pollution Prevention Plan
T/A/Y	tons/acre/year
TDG	Total Dissolved Gas
TES	threatened, endangered, and sensitive (species)
TG	Timber Grazing
TMIP	Transmission Maintenance and Inspection Plan
TNC	The Nature Conservancy
tpy	tons per year
TSD	treatment, storage, and disposal
TV	television
TVES	Terrestrial Visual Encounter Surveys
TVMP	Transmission Vegetation Management Program
UBAR	Umatilla Basin Aquifer Restoration
UBWC	Umatilla Basin Water Commission
UCDC	Umatilla County Development Code
UCZPSO	Union County Zoning, Partition and Subdivision Ordinance
UDP	Unanticipated Discovery Plan

U.S.	United States
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Department of Agriculture, Forest Service
USGS	U.S. Geological Survey
UWIN	Utah Wildlife in Need
V/C	volume to capacity
V	volt
VAHP	Visual Assessment of Historic Properties
VMS	Visual Management System
VQO	Visual Quality Objective
VRM	Visual Resource Management
WAGS	Washington ground squirrel
WCU	Wilderness Characteristic Unit
WECC	Western Electricity Coordinating Council
WHO	World Health Organization
WMA	Wildlife Management Area
WOS	waters of the state
WOUS	waters of the United States
WPCF	Water Pollution Control Facility
WR	winter range
WRCC	Western Regional Climate Center
WRD	(Oregon) Water Resources Division
WRP	Wetland Reserve Program
WWE	West-wide Energy
XLPE	cross-linked polyethylene

Exhibit X
Noise

1.0 INTRODUCTION

Exhibit X provides analysis regarding potential noise impacts from the Project, as required by Oregon Administrative Rule (OAR) 345-021-0010(1)(x), paragraphs (A) through (E). Exhibit X presents substantial evidence that the Boardman to Hemingway Transmission Line Project (Project) will comply with the Oregon Department of Environmental Quality's (ODEQ) noise control standards in Oregon Administrative Rule (OAR) 340-035-0035 (ODEQ Noise Rules),[1] by either demonstrated compliance, an exception, or a variance.

Specifically, Exhibit X describes how noise generated by the Project may be perceived at "noise sensitive receptors" (NSRs) as defined in OAR 340-035-0015(38). As required by the Project Order, Idaho Power Company (IPC) identified all NSRs within one-half mile of the Project Site Boundary. As presented in detail in this exhibit, IPC predicted noise levels likely to result from Project construction and operations and then analyzed the Project's compliance with the ODEQ Noise Rules as applicable. The ODEQ Noise Rules do not regulate noise from construction activities. Exhibit X therefore focuses on noise caused by Project operations and primarily the corona noise generated by the transmission line itself.

The ODEQ Noise Rules contain both a maximum permissible sound level (50 A-weighted decibels [dBA]) and an ambient antidegradation standard. The antidegradation standard prohibits a new industrial or commercial noise source located on a previously unused site from increasing "ambient" L_{50} statistical noise levels by more than 10 dBA. The term "ambient noise" means all noise associated with a given environment; ambient noise is usually made up of composite of sounds from many sources near and far as described in OAR 345-035-0015(5).

In order to establish existing ambient acoustic conditions at pre-selected NSRs and in accordance with the Project Order, IPC's consultant prepared a noise monitoring protocol, which was reviewed with comments and subsequently approved by the Oregon Department of Energy (ODOE). Baseline sound monitoring was completed at 22 monitoring positions, which were used to help determine the ambient sound levels during meteorological time periods that may be conducive to corona noise generation. The future noise contribution from the Project was predicted, using both the Corona and Field Effects (CAFE) program to determine transmission line source levels and the DataKustik Computer-Aided Noise Abatement (CadnaA) software model to calculate received sound levels at NSRs. The Project's predicted noise contribution at each NSR was then added to the existing measured ambient sound level to determine net incremental increases. This net incremental increase in ambient sound level was then reviewed to determine whether the Project would increase ambient noise by more than the 10 dBA permitted by the ambient antidegradation standard.

Exhibit X demonstrates that the Project has been adequately designed, inclusive of a number of conservative assumptions, to operate in compliance at the majority of NSRs within the analysis area. In these areas, the Project is not expected to increase ambient sound levels by more than 10 dBA under expected operational conditions. However, IPC has concluded that at four NSRs

[1] IPC does not stipulate to the applicability of OAR 340-035-0035 to the Project, and reserves the right to dispute its applicability to the Project. Further, IPC reserves the right and opportunity to address compliance with OAR 345-021-0010(1)(x) through all necessary means, including without limitation proposing alternative methodologies, assumptions, and interpretation arguments, variances, waivers, and other mitigation measures, and through application of the Energy Facility Siting Council's (EFSC or Council) "balancing" authority in accordance with Oregon Revised Statute (ORS) 469.501 and OAR 345-022-0000(2).

the Project may exceed the ambient antidegradation standard during foul weather conditions that occur on average, 1.3 percent of the calendar year.

For these limited circumstances, 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" within the meaning of OAR 345-035-0035(6)(a). In authorizing this exception pursuant to OAR 345-035-0010, the Council should take into consideration the fact that, in most instances where the Project may exceed the ambient antidegradation standard, the noise generated by the Project is minimal and in all circumstances well below the maximum permissible sound level (50 dBA) in the ODEQ Noise Rules. Alternatively, IPC requests that the Council grant a variance pursuant to OAR 340-035-0100 on the basis that requiring the Project to strictly comply with the ODEQ Noise Rules is unreasonable and likely to make the Project unpermittable. Exhibit X presents substantial evidence to support a finding by the Council that the Project will comply with the ODEQ Noise Rules at all NSRs, by either demonstrated compliance, an exception, or a variance.

2.0 APPLICABLE RULES AND STANDARDS

This section describes the primary sources of law applicable to the Project that relate to noise, including the Council's rule regarding the contents of Exhibit X, the ODEQ Noise Rules, and the Project Order.

2.1 Required Contents of Exhibit X

In accordance with OAR 345-021-0010(1)(x), Exhibit X must include the following:

> *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.*
>
> *(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.*
>
> *(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 Rules

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.[2]

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 X-1, below, contains the Table 8 statistical noise limits referenced in the ODEQ 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."[3] 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.[4]

"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."[5] Noise sensitive properties are referred to as NSRs in this Exhibit and are identified in Attachment X-1. 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 X-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

[2] 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.
[3] OAR 340-035-0035(3)(b)
[4] *Id.*
[5] OAR 345-035-0015(5)

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 quiet measurement range and the presence of foul meteorological conditions resulting in expected 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.

2.2.1 OAR 340-035-0035(5) Exemptions

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

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

2.2.2 OAR 340-035-0010 and OAR 340-035-0035(6) Exceptions

Because strict application of the ODEQ Noise Rules is not always reasonable or feasible, the Rules provide for exceptions in certain circumstances. Relevant to the Project, the ODEQ Noise Rules allow for an exception for infrequent events.

> *OAR 340-035-0010*
>
> *(1) Upon written request from the owner or controller of a noise source, the Department may authorize exceptions as specifically listed in these rules.*
>
> *(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. For those exceptions which it authorizes the Department shall specify the times during which the noise rules can be exceeded and the quantity and quality*

of the noise generated, and when appropriate shall specify the increments of progress of the noise source toward meeting the noise rules.

OAR 340-035-0035(6) describes the exceptions to the ODEQ Noise Rules:

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."

2.2.3 OAR 340-035-0100(1) Variances

OAR 345-035-0100(1) and ORS 467.060 provide the Environmental Quality Commission (or in this context, the Council) with the authority to grant specific variances from the ODEQ Noise Rules. Prior to development of the ODEQ Noise Rules specifically applicable to wind facilities, the Council considered the possibility of issuing a variance for special circumstances "inherent in a wind energy facility."[6] Specifically ,the Council stated that it "could consider a variance, supported by findings necessary under ORS 467.060 and OAR 340-035-0100, if there were an insufficient basis for finding a wind facility in compliance with the noise standard."

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.

2.3 Project Order Requirements

Additionally, the Project Order requires Exhibit X to include the following specific information:

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*

[6] Stateline Wind Order on Amendment 2 at 103 (June 6, 2003).

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) 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 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.*

3.0 ANALYSIS

3.1 Analysis Area

As provided in the Project Order, the analysis area for Exhibit X is the Site Boundary and one-half mile from the Site Boundary. The Site Boundary is defined in OAR 345-001-0010(55) 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." The Site Boundary for the Project includes the following related and supporting facilities in Oregon:

- Proposed Corridor: 277.2 miles of 500-kilovolt (kV) transmission line corridor, 5.0 miles of double circuit 138/69-kV transmission line corridor, and 0.3 mile of 138-kV transmission line corridor.
- Alternate Corridor Segments: Seven alternate corridor segments consisting of approximately 134.1 miles that could replace certain segments of the Proposed Corridor. IPC has proposed these alternate corridor segments in order to allow flexibility for IPC and EFSC, as well as federal agencies, to reconcile competing resource constraints in several key locations.
- One proposed substation expansion of 3 acres; two alternate substation sites (one 3-acre substation expansion and one new 20-acre substation). IPC ultimately needs to construct and operate only one substation expansion or substation in the Boardman area.
- Eight communication station sites of less than one acre each in size; four alternate communication station sites along alternate corridor segments.
- Temporary and permanent access roads.
- Temporary multi-use areas, pulling and tensioning sites, and fly yards.

The features of the Project are fully described in Exhibit B and the Site Boundary for each Project feature is described in Exhibit C, Table C-21. The location of the Project (Site Boundary) is outlined in Exhibit C.

Operational Noise Analysis Area

For the purposes of the operational noise modeling analysis,[7] IPC based its studies on the transmission line corridors, because the Project's primary operational noise-generating facility is the transmission line.[8] For the Proposed Corridor and alternate corridor segments, the Site Boundary consists of a 500-foot-wide corridor that will allow for flexibility for micrositing the transmission line ROW. IPC modeled operational noise for the areas within the 500-foot-wide transmission line corridors and one-half mile from the transmission line corridors (Operational Noise Analysis Area).

To ensure the adequacy of the Operational Noise Analysis Area, IPC conducted additional modeling and analysis along the Operational Noise Analysis Area boundary to further evaluate sound levels resulting from the Project at a distance of one-half mile from the transmission line. A cursory desktop review of NSRs located just beyond the Operational Noise Analysis Area boundary was also completed and the Operational Noise Analysis Area was determined to sufficiently capture appreciable operational sound generated by the transmission line. For additional discussion, see Section 3.4.1.2.

3.2 Audible Noise that May be Generated by the Project

This section discusses the types of audible noise that may be generated by construction and operations of the Project.

[7] For analysis of impacts from construction noise, see Section 3.4.1.1.
[8] IPC did not model operational noise from other Project facilities that are not expected to generate operational noise, such as access roads and communication sites.

3.2.1 Construction Noise

Transmission line construction will periodically generate audible noise levels. Additional noise sources may include commuting workers and trucks moving material to and from the work sites.

Transmission line 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. One new substation or substation expansion will also be constructed at the Proposed Grassland Substation Expansion, the Alternate Longhorn Substation Expansion, or the Alternate Horn Butte Substation. Overhead line construction is typically completed in the following stages, but various construction activities may overlap, with multiple construction crews operating simultaneously:

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

The following subsections discuss specific construction techniques such as blasting and rock breaking, implosive devices used during conductor stringing, and helicopter operations.

3.2.1.1 Blasting and Rock Breaking

Blasting is a short duration event as compared to rock removal methods, such as using track rig drills, rock breakers, jack hammers, rotary percussion drills, core barrels, and/or rotary rock drills. Modern blasting techniques include the electronically controlled ignition of multiple small-explosive charges in an area of rock 8/1,000 of a second apart, resulting in a total event duration of approximately 3/10 of a second. The detonations are timed so the energy from individual detonations destructively interferes with each other, called wave canceling. As a result, very little of the kinetic energy generated during the detonations is wasted as audible noise. Impulse (instantaneous) noise from blasts could reach up to 140 dBA at the blast location or over 90 dBA for NSRs within 500 feet.

Lattice tower foundations for the Project will typically 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 study area is conducted during the detailed design. Areas where blasting may potentially take place have been identified on a geologic basis described in Exhibit H. Areas of shallow bedrock exist along the Proposed Corridor and alternate corridor segments. Depth to bedrock varies considerably along the Proposed Corridor and alternate corridors, ranging from 1 to 4 feet below ground to greater than 12 feet below ground. The number of potentially impacted NSRs is directly related to the critical distance determined from the blasting criteria described in Exhibit H.

Blasting plans will be prepared by the contracted blasting specialist that demonstrate compliance with all applicable state and local blasting regulations including the use of properly licensed personnel and obtaining all necessary authorizations.

3.2.1.2 Implosive Devices

Compression or implosive devices are used to make connections between conductors, which is the current industry-preferred method in contrast to conventional hydraulic compression fittings. The use of implosive devices will vary depending on what segment of the transmission line is under construction and the number of conductors per bundle. A three-conductor bundle (IPC

2011) is used for each phase, and there are three phases per 500-kV circuit. At each single-circuit 500-kV dead-end structure and in-line sections where reel ends need to be connected 18 implosive dead-end sleeves will be required (6 per one phase, one for each of the three subconductors on each of the three phases, and on each side of the structure). Additionally, 18 compression or implosive sleeves will be required to fabricate and install the jumpers that connect the conductors from one side of the dead-end structure to the other for a total of 36 sleeves for each single-circuit dead-end structure. Broadband implosive device sound-source levels were provided by an equipment manufacturer's test report for a similar size charge for comparable implosive dead-end and sleeve compression connector technologies. An average sound-level measurement between 118 and 122 dBA at an approximate distance of 200 feet was reported (Pasini 2006). The duration of sound emitted from the detonation of an implosive device is short, ranging from approximately 210 to 360 milliseconds. Since the potential for noise startle effects at NSRs at these distances exists, the use of implosive devices will be limited to daytime periods. Implosive sleeves are typically applied in series allowing for multiple connections to be made simultaneously.

3.2.1.3 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 using helicopters and this will be the major source of audible noise during the construction phase. 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 low altitudes; therefore, potential temporary increases to ambient sound levels will occur in the area where helicopters are operating as well as along their flight path. The fly yards will be approximately 10 to 15 acres and sited at locations to permit a maximum fly time of 4 to 8 minutes to reach structures typically located in about 10-mile intervals. Helicopter operations are expected to be limited to daylight hours.

3.2.2 Operational Noise

Operations of the Project will periodically generate audible noise. The following subsections discuss specific types of operational noise sources, including aeolian noise, noise from maintenance of the transmission line, noise from substations, and corona noise.

3.2.2.1 Aeolian Noise

Wind blowing across power lines and power poles can generate noise when airflow is non-laminar or turbulent. Aeolian, or wind, noise is produced when a steady flow of wind interacts with an object such as a transmission line. Wind must blow steadily and perpendicular to the lines to set up oscillating forces. The resulting vibration which can produce resonance if the frequency of the vibration matches the natural frequency of the line. Dampeners can be attached to the lines to minimize Aeolian noise.

The occurrence of aeolian noise is dependent on several factors and is difficult to predict. Wind noise from a stationary source requires perfect conditions: the wind must blow in a specific direction at a specific speed, and for a sufficient amount of time in order to produce any sound; a slight deviation in either the direction or intensity would disrupt the conditions necessary to produce noise. Aeolian noise is not considered to be a significant contributor to operational noise and is therefore not considered further in the acoustic analysis.

3.2.2.2 Vegetation Maintenance

Right-of-way vegetation maintenance 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. Due to safety requirements, chainsaw activities would be limited to day light hours only.

3.2.2.3 General Maintenance

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

3.2.2.4 Substations

As a component of the Project in Oregon, the 500-kV transmission line will be built to connect to Portland General Electric's planned Grassland Substation. IPC will develop the Proposed Grassland Substation Expansion to electrically terminate the Project. The Proposed Grassland Substation Expansion will house equipment such as high-voltage circuit breakers and associated transmission line termination structures, high-voltage switches, bus supports, controls, and other equipment. The principal noise sources in substations are transformers; however, no new transformers or other auxiliary equipment that may change the future noise profile are expected to be installed at the Proposed Grassland Substation Expansion.

While no transformers will be installed at the Proposed Grassland Substation Expansion, 500-kV shunt reactor banks will be installed. Shunt reactors contain components similar to power transformers but noise from shunt reactors is generated primarily from vibrational forces resulting from magnetic "pull" effects at iron-air interfaces. Unlike transformers, operation of shunt reactors is typically intermittent, operating when voltage stabilization is needed during load variation. There are no NSRs identified within one-half mile of the Site Boundary of the Proposed Grassland Substation Expansion. Therefore, the addition of shunt reactor banks is not expected to generate increases in received sound levels at NSRs that would exceed the applicable regulations. No transformers or other major noise-generating equipment (see Exhibit B, Table B-10) would be installed at the Alternate Longhorn Substation Expansion or Alternate Horn Butte Substation, and no NSRs have been identified within one-half mile of the construction disturbance area for the alternate sites.

3.2.2.5 Corona Noise – General Discussion

Audible noise generated by corona on transmission lines is composed of two major components. The first is a broadband component that has a significant high-frequency content distinguishing it from more common environmental noises. The random phase relationship of the pressure waves generated by each corona source along a line combined with the significant high-frequency content result in the crackling, frying, or hissing characteristic of transmission line noise. The second component is a low-frequency pure tone that is superimposed over the broadband noise. The corona discharges produce positive and negative ions that under the influence of the alternating electric field around alternating current (AC) conductors are alternately attracted to and repelled from the conductors. This motion establishes a sound-pressure wave having a frequency twice that of the voltage, namely 120 hertz (Hz) for a 60-Hz system. Higher harmonics (e.g., 240 Hz) may also be present, but they are of generally less significance (EPRI 1982).

Any newly constructed transmission line will initially generate a higher level of noise for a short period (typically one 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. The level of corona noise generated by a transmission line is highly dependent on weather conditions, altitude, gradient and condition of the conductor wires. The corona effect is initiated where the conductor’s electric field is concentrated by imperfections in the conductor surface such as nicks or scratches, or by substances on the lines such as water droplets, dirt or dust, and/or bird droppings. Corona activity increases with increasing altitude, and with increasing voltage in the line, but is generally not affected by system loading. Audible corona noise from transmission lines occurs primarily in foul weather. Audible noise from the transmission line during fair weather will not exceed limits set by the State of Oregon.

3.2.2.6 Corona Noise – Foul Weather

As mentioned above, there are several conditions that may cause audible noise on transmission lines—including certain conditions that may occur in fair weather. However, as a general matter, the highest audible noise levels occur in conditions of foul weather which, for these purposes, includes rain, snow or sleet, or high levels of moisture in the air (essentially but not limited to measureable precipitation events) that cause the transmission line to become wet, and therefore produce corona. (EPRI 2005).

Noise levels in rain may vary over a wide range. During the initial stages of rain when the conductors are not thoroughly wet, there may be a considerable fluctuation in the noise level as the rain intensity varies. When the conductors are thoroughly wet, the noise fluctuations will often be less significant because even as the rain intensity lessens the conductors will still be saturated with water drops that act as corona sources. The variation in noise levels during rain depends greatly on the condition of the conductor surface and on the voltage gradient at which the conductors are operating. At high operating gradients the audible noise is less sensitive to rain rate than at low gradients. Consequently, the variation in noise levels is less for the higher gradients (EPRI 2005). In different weather conditions the relative magnitudes of random noise and hum may be different.

Audible noise may also be present from the conductors when there may be some water droplets on the conductors such as just after rain (conductor not yet dried off) or a light mist or heavy fog, although these conditions result in highly variable corona noise levels dependent in part on the duration of the event. Depending on the magnitude, resistive heating effect of load current can discourage the formation of hoarfrost on the conductors and even melt hoarfrost if it has already formed; and it can melt snow that lands on the surface of the conductors. It can also increase the rate at which conductors dry after rain (EPRI 2005). When a line carries a significant load current, there is less probability of water drops forming on the surface of the conductors by limiting the formation of condensation on the conductors. Conversely, higher noise levels as indicated herein may be encountered periodically during conditions when condensation occurs. Noise levels in fog and snow do not typically attain the same magnitude as compared to rain, and elevated noise levels during fog and snow are usually for a shorter duration in proportion of the entire event (EPRI 1982).

3.3 Methods

For purposes of the acoustic analysis, the Project was considered a new noise source on a previously unused site as defined in OAR 340-035-0015(47). To demonstrate compliance with the ODEQ Noise Rules, IPC consultants conducted an acoustic analysis of the Project. The acoustic analysis required the use of the multi-step process described below.

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 (the area within the Site Boundary and one-half mile from the Site Boundary).
   b. Each structure was analyzed by geographic information systems (GIS) professionals interpreting aerial photography to deterimine if the structure was an NSR.
   c. Where it was unclear if a structure was noise sensitive (e.g., residence, school, campground, etc.) vs. non-noise sensitive (e.g., barn, garage, etc.) 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 it was assumed to be noise sensitive.
2. Sound source characteristics for noise modeling of the transmission line during foul weather conditions were calculated using the Bonneville Power Administration (BPA) CAFE program (see Attachment X-2).
3. Initial screening level modeling results of the proposed 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 study area. This likely maximum received sound level was added to a conservative assumed ambient sound level of 20 dBA, as requested by 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.
4. For NSRs that showed a potential exceedance condition of the ODOE requested 30 dBA threshold, baseline sound measurements were conducted at or near these locations.
5. Per the Project Order, a noise monitoring protocol was reviewed, expanded, and ultimately approved by the ODOE. Measurements were conducted over a period of 2 to 4 weeks at pre-selected monitoring positions in targeted areas as described in Attachment X-4.
6. From baseline measurements, the regularly occurring L_{50} sound levels were calculated and new compliance thresholds were therefore defined on which to assess conformance with the ambient antidegradation standard. The regularly occurring L_{50} sound levels were calculated by taking the average of the L_{50} sound levels for the late night time period (12:00 a.m. to 5:00 a.m.) during periods of rain or high humidity (relative humidity of 90 percent or greater). Atypical sources of extraneous sound, such as sound produced by field crews setting up or calibrating the equipment, were removed from the dataset.
7. NSRs where sound levels were not monitored were correlated with the baseline sound measurement data from the nearest monitoring position that also had a similar acoustic environment. Several areas did not warrant further field investigation due to low expected future sound level generated by the Project. For the remaining areas, the

ambient L_{50} background sound level for that receptor was correlated and assessment under the ambient antidegradation standard was conducted.

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 detailed 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 corona noise at the NSRs.

3.3.1 Operational Noise Modeling Methodology

Noise modeling for the Project involves two separate analytical methods. Modeling with the BPA CAFE program is used to determine anticipated corona noise levels generated along the transmission line conductors. CadnaA is then used to model how sound propagates from the transmission line to NSRs. Together these two methods are used to predict levels of Project noise at 100 NSRs that were identified within the Operational Noise Analysis Area.

3.3.1.1 Assumptions for Modeling Project Noise Contribution

The Project includes 277.2 miles of proposed 500-kV transmission line corridor, 5.0 miles of proposed double circuit 138/69-kV transmission line corridor, and 0.3 mile of proposed 138-kV transmission line corridor:

- The proposed conductor for the 500-kV lattice structure lines is 1,272 KCM[9] aluminum conductor steel reinforced (ACSR) “Bittern” 45/7. Each phase of a 500-kV three-phase circuit will be composed of three subconductors in a triple bundle configuration.
- The proposed conductor for the 138/69-kV monopole structure lines is 397 KCM 26/7 ACSR “Ibis” (138-kV, one conductor per phase), 4/0 6/1 ACSR “Penguin” (69-kV, one conductor per phase), and a 3/8-inch EHS 7-strand shield wire.

Representative broadband and octave band center frequencies were derived using the BPA CAFE program and from standardized engineering technical guidelines based on measurements from similar equipment types and line types operating after the burn-in period. It is expected that the transmission line installed will exhibit sound source characteristics similar to the sound data used in the acoustic modeling analysis; however, it is possible that the final values may vary.

Table X-2 further summarizes setup parameters used in the acoustic modeling analysis.

Table X-2. Operational Acoustic Modeling Parameters

Model Input	Parameter Value
500-kV Transmission Line Source Characteristics	See Attachment X-2 for audible noise level results using the Bonneville Power Administration (BPA) Corona and Field Effects (CAFE) program.
Engineering Design	Site plan dated June 2012
Terrain Parameters	U.S. Geological Survey digital elevation data
Transmission Line Source Heights	Range from 15.2 meters (50 feet) to 59.4 meters (195 feet)
Receiver Characteristics	1.52 meters (5 feet) above ground level
Temperature	50°F (10°C)

[9] KCM = one thousand circular mils

Table X-2. Operational Acoustic Modeling Parameters (continued)

Model Input	Parameter Value
Relative Humidity	For Computer-Aided Noise Abatement (CadnaA), >90%
Meteorological Factors	CadnaA assumes moderate downwind propagation. The CAFE program assumes a wind speed of 0.5 mile per hour. For CAFE, rain rate is assumed to be 1 millimeter/hour
Ground Absorption	Non-spectral using “alternate method” of calculation for elevated transmission lines.
Standards	ISO 9613-2, Acoustics – Attenuation of sound during propagation outdoors.
Search radius	5,000 meters (16,404 feet)
Elevation for transmission line source term	Range from a minimum transmission line height above ground of 10.4 meters (34 feet) to a maximum height above ground of 59.4 meters (195 feet)
Noise Modeling Software	BPA CAFE program DataKustik CadnaA v 4.2.141

3.3.1.2 Corona and Field Effects Program

To support engineering design and permitting efforts for the Project, audible noise calculations were performed for each structural segment cross section by Exponent. Corona source noise levels were calculated using methodologies described in the BPA CAFE program. Developed by the U.S. Department of Energy (DOE) and the BPA, CAFE algorithms have been validated and used by engineers and scientists for many years to calculate the expected levels of audible noise produced by transmission lines. The inputs to the model include line voltage, load flow (current), altitude, meteorological conditions that would result in the conductors being wet, the physical dimensions of the line, conductor diameter, spacing, and height of the conductors and receivers above ground level. The BPA method of calculating audible noise from transmission lines is based on long-term statistical data collected from operating and test transmission lines. This method calculates the foul weather L_{50} noise level during rainy conditions of 1 millimeter per hour (mm/hr) (0.039 inch/hr). Long-term measurements show that L_{50} audible noise levels occur at this rain rate (EPRI 2005). The BPA CAFE program assumes this standard rain rate, and does not allow for adjustments or modifications. Results during fair weather conditions are also estimated. Received sound levels generated by the Project at the edge of the ROW during fair weather conditions will be substantially lower than during foul weather conditions. See Attachment X-2 for more information on the BPA CAFE program analysis.

3.3.1.3 CadnaA

DataKustik GmbH’s CadnaA, a computer-aided noise abatement program (DataKustik v 4.2.141) was used for the acoustic modeling analysis. CadnaA is a comprehensive three-dimensional acoustic software model that conforms to the ISO 9613-2 standard (ISO 1996). The engineering methods specified in this standard consist of full (1/1) octave band algorithms that incorporate geometric spreading due to wave divergence, reflection from surfaces, atmospheric absorption, screening by topography and obstacles, ground effects, source directivity, heights of both sources and receptors, seasonal foliage effects, and meteorological conditions. The modeling was adjusted for the specialized sound propagation conditions associated with elevated sound sources (i.e., high-voltage power lines) by applying the “alternate method of calculation.”

CadnaA allows for three basic types of sound sources to be introduced into the model: point, line, and area sources. Point sources can be used for small sources such as fans or for larger sources with proportioned dimensions that are located away from the relevant receptors. Line sources are used for linear sources such as transmission lines. Area sources can be vertical such as transformers or noise-radiating façades. The Project was represented as a continuous line source. The lateral attenuation from a line source of noise such as a transmission line is governed by the laws of acoustics and is due to the divergence of the sound pressure waves with increased distance from the source. The acoustic model calculations assumed corona is uniformly distributed along the conductor with the resulting pressure wave propagating in a cylindrical fashion.

Molecular absorption of energy as the sound waves propagate through the air results in additional attenuation. Atmospheric absorption is a function of frequency, temperature, and relative humidity. The absorption effect increases with frequency. At distances farther from the transmission line the frequency spectrum will shift towards the lower end of the spectrum as greater attenuation of the high frequency sound component will occur. Sound propagation calculations applied meteorological conditions consistent with weather conditions that typically result in greater noise production (i.e., high humidity conditions which includes all precipitation events) as identified in the Project Order. CadnaA does not allow for use of a rain rate as an assumption. Accordingly, attenuation rates due to air absorption were predicted using 90 percent or greater relative humidity (RH).

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

3.3.2 Baseline Sound Monitoring Program

Screening level modeling of corona noise was completed at identified NSRs within the Operational Noise Analysis Area to assist in the initial site selection for baseline ambient sound monitoring. Screening level modeling of construction noise was not completed because sound from construction activities will be short-term and temporary. Construction noise is exempt under OAR 340-035-0035(5).

The modeling methodologies involved two separate analytical methods. The first was the CAFE program of the DOE and BPA, which was used to determine anticipated corona noise source levels (DOE and BPA n.d.). The second modeling methodology, the CadnaA program, which conforms to the Organization for International Standardization (ISO) standard 9613-2 (1996), *Attenuation of Sound During Propagation Outdoors*, was used to model how sound travels outward from the transmission line to receptors in three dimensions. These two methods in conjunction with the monitoring data were used to estimate the net increase in sound levels as a result of the Project.

Initial screening level modeling results of the proposed transmission line were calculated based on foul weather scenario, and assessment was completed to determine the likely maximum received sound at NSRs within the monitoring study area. This likely maximum received sound level was added to a conservative assumed ambient sound level of 20 dBA, as requested by 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. For NSRs that showed a potential exceedance condition of 30 dBA, the ODOE requested threshold, baseline sound measurements were conducted at or near these locations.

IPC's consultants then proposed field monitoring positions, based on whether this preliminary acoustic modeling indicated a potential exceedance as defined by OAR 340-035-0035(1)(b)(B)(i). A draft noise monitoring protocol was submitted for review and approval by ODOE including 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 (see Attachment X-3). Baseline sound measurements were completed at a total of 22 NSRs. As a part of granting protocol approval, ODOE also asked that field observations be conducted at several monitoring positions to identify existing sound sources in the vicinity of each monitoring position. Midway through monitoring at each monitoring position, data were downloaded and evaluated to identify occurrences of irregularities in sound levels that warranted investigation. Observations were then scheduled during those specific time periods when irregularities occurred to determine area contributors to the acoustic environment. The locations of monitoring positions and NSRs are shown in Attachment X-4.

3.3.2.1 Field Measurement Methodology

Wherever possible, a monitoring positionwas set up on each of the 22 properties at a point 25 feet towards the noise source to conform to 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 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 Attachment X-4.

At each of the 22 monitoring positions 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.) and nighttime (10:00 p.m. to 7:00 a.m.) periods. The measurement period commenced March 6, 2012, and ended on May 10, 2012. Sound measurements at each monitoring position were collected continuously over a 2- to 4-week duration. 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 including conditions when generation of corona noise would be expected. Calibration was achieved with two ANSI Type 1 calibrators, which have accuracy traceable to the National Institute of Standards and Technology (NIST). Calibration drift observed during pre-survey and post-survey calibration was found to be within acceptable tolerances.

Each sound analyzer was programmed to measure and log broadband A-weighted sound pressure levels in ten and one-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 10 percent of the measurement period. The equivalent sound level (L_{eq}), L_{10} (intrusive noise level), 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 (kHz). The locations of monitoring positions were recorded 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 on 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 assure the quality of the performance of the equipment and to identify any commonly occurring sound sources that might warrant in-person observation. 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 monitoring position. Monitoring positions 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.

3.3.2.2 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 has an operating range of 5 dB to 140 dB, an overall frequency range of 8 to 20,000 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 was laboratory calibrated within the previous 12-month period with calibration documentation provided in Appendix A of Attachment X-4, the Baseline Sound Survey Report.

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 pseudonoise. Air blowing over a microphone diaphragm creates a pressure differential and turbulence. All sound level analyzer microphones were protected with 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. Most baseline monitoring stations were also equipped with Vaisala meteorological sensor units. The Vaisala unit 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. Where Vaisala units were deployed, these types of meteorological data (i.e., rainfall, humidity) were collected and stored in 10-minute increments and this information was correlated with the ambient sound measurement data.

3.3.3 Methodology for Evaluating Frequency of Foul Weather Conditions

To determine the frequency of foul weather conditions in the study area an analysis of the most recent 4-year (August 2008 – current) historical meteorological data 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. The Western Regional Climate Center 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 (°F), RH (%), and solar radiation (w/m^2). The data were analyzed so as to effectively determine the frequency of foul weather in the vicinity of potentially impacted NSRs, which was assumed to occur at a rain rate of 0.8-5 mm/hour. Further details regarding these foul weather conditions and the results of the meteorological data analysis are given in Section 3.4.2.4.

3.4 Information Required by OAR 345-021-0010(1)(x)

3.4.1 Predicted Noise Levels

OAR 345-021-0010(1)(x)(A)

Predicted noise levels resulting from construction and operation of the proposed facility.

Section 3.4.1.1 presents predicted noise levels resulting from construction of the Project and Section 3.4.1.2 presents predicted noise levels resulting from operation of the Project.

3.4.1.1 Construction Noise

Transmission line construction will generate audible noise levels. Additional noise sources may include 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, tree removal, etc.). Transmission line 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 line construction is typically completed in the following stages, but various construction activities may overlap, with multiple construction crews operating simultaneously:

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

Noise levels from overhead transmission line construction were evaluated using a screening-level analysis approach. The calculation methodology requires the input of the number and type of construction equipment by phase, as well as a typical noise-source level associated with that equipment, to determine the composite sound levels for standard distances of 50 and 1,000 feet. Table X-3 summarizes results for the four conceptual construction phases.

Received sound levels at NSRs from construction will depend on the type of equipment used, the mode of equipment operation, the length of time the equipment is in use, the amount of equipment used simultaneously, and the distance between the sound source and NSR. All of these factors are expected to vary regularly throughout the construction period making the calculation of a specific received sound-level value at each NSR location difficult.

Work in the proximity of any single general location will likely last no more than a few days to one week as construction activities move along the corridor; therefore, no single receptor will be exposed to significant noise levels for an extended period.

Table X-3. Transmission Line Construction Noise Levels by Phase

Phase No.	Construction Phase	Example Construction Equipment	Equipment Noise Level at 15 m (50 ft) dBA	Composite Noise Level at 15 m (50 ft) dBA	Composite Leq Noise Level at 305 m (1,000 ft) dBA
1	Site Access and Preparation	Bulldozer Grader Roller—compactor Loader Water truck Dump truck	86 82 73 78 80 80	85	51
2	Installation of Structure Foundations	Bulldozer Loader Backhoe-loader Fork lift Mobile crane Mobile crane Auger rig Drill rig Compressor Pump Portable mixer Jackhammer Cement mixer truck Dump truck Slurry truck Specialty truck Water truck	86 78 80 80 82 82 85 87 81 83 82 90 80 80 80 75 80	91	56
3	Erecting of Support Structures	Forklift Mobile crane Compressor Flatbed truck Flatbed truck Water truck Heavy Lift Helicopter	80 82 81 75 75 80 95	95	60
4	Stringing of Conductors, Shield Wire, and Fiber Optic Ground Wire	Tracked dozer Backhoe-loader Compressor Line puller Mixed trucks Specialty truck Specialty truck Water truck	86 80 81 81 80 75 75 80	86	52

Note: Data compiled, in part, from the following sources: FHWA 1992, 2006; Bolt, Beranek and Newman, Inc. 1977.

One new substation expansion or substation will be constructed at the Proposed Grassland Substation Expansion, the Longhorn Alternate Substation Expansion or the Alternate Horn Butte Substation. Construction activities at the substations could last from several weeks to several months on an intermittent schedule. Construction equipment will be operated on an as-needed basis during this period, and activities will occur for limited lengths of daytime hours at a specific location to minimize impacts at NSRs. There are no NSRs within one-half mile of construction disturbance areas for the Proposed Grassland Substation Expansion, the Longhorn Alternate Substation Expansion or the Horn Butte Alternate Substation. The majority of construction activities will occur away from population centers; therefore, the potential for the Project to result in a substantial temporary or periodic increase in ambient noise levels will be low. IPC will attempt to minimize noise levels associated with Project construction to the extent practicable.

3.4.1.2 Operational Noise

Section 3.2.2 describes the types of operational noise that may be generated by the Project, and IPC expects that operational noise from maintenance of the transmission line, from substations, and from aeolian noise will not be significant contributors to sound at NSRs in the Operational Noise Analysis Area. However, IPC expects that during infrequent foul weather events, noise associated with corona may be perceptible at NSRs in the Operational Noise Analysis Area. 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 BPA CAFE program. The CAFE program has a default assumption of 1 mm/hour rain rate and low wind speed of 0.5 m/s for purposes of modeling transmission line noise during foul weather events. The results of the BPA CAFE (see Attachment X-2) analysis for an altitude of 5,380 feet, which is the highest estimated altitude expected along the Proposed Corridor, and an overvoltage of 550 kV (10% overvoltage can be considered “worst-case”) on the line, 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 27 dBA sound level at the edge of the ROW is considered 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. These foul weather audible noise values are used in the conjunction with CadnaA to predict Project operational noise levels at NSRs. Operational noise levels at each NSR in the Operational Noise Analysis Area are included in Attachment X-5.

Acoustic modeling using CadnaA was conducted along the Operational Noise Analysis Area boundary to further evaluate sound levels resulting from the Project at this distance from the transmission line. A cursory desktop review of NSRs located just beyond the Operational Noise Analysis Area boundary was also completed. Based on this review, it is safe to assume that no NSRs between the Operational Noise Analysis Area boundary and extending out an additional one-half mile would experience a net incremental increase in ambient sound levels by more than 10 dBA, assuming a conservative rural ambient L_{50} sound level of 20 dBA. This demonstrates that the Operational Noise Analysis Area is adequate for the purposes of assessing compliance under the ambient antidegradation standard.

3.4.2 Compliance with OAR 340-035-0035

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

As discussed in Section 2.2, the ODEQ Noise Rules applicable 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 ambient antidegradation standard and maximum permissible statistical noise levels for new industrial or commercial noise sources on a previously unused site.[10]

3.4.2.1 Maximum Permissible Sound Levels and 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, 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).

Project Will Not Exceed Maximum Permissible Sound Level – 50 dBA

Table X-1 (above) contains the Table 8 statistical noise limits. Because the transmission line will operate continuously during day and night, the more stringent nighttime permissible sound level will become the controlling limit. Accordingly, the maximum permissible received sound level for any given NSR is L_{50} 50 dBA. IPC's modeling demonstrates that the Table 8 maximum permissible sound limits will not be exceeded, even during foul weather conditions likely to generate corona.

Project Compliance with Ambient Antidegradation Standard

To analyze the Project's compliance with the ambient antidegradation standard, IPC surveyed baseline ambient noise levels and modeled future noise level contributions based on foul weather assumptions. The results of these analyses are discussed below.

3.4.2.2 Sound Survey Analysis and Results

Measurement of existing sound levels is necessary to determine the ambient baseline sound at NSRs in the Operational Noise Analysis Area. 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. Therefore, the most logical approach is to compare the maximum corona sound level that occurs during rainy conditions with the monitored sound level that occurred during rainy conditions.[11]

Background sound levels may also vary temporally and the diurnal effect describes the variation that results in quieter conditions during the night than during the daytime, typically due to decreased levels of human activity. An exception may occur seasonally when evening and nighttime insect noise may dominate or during predawn and early morning time periods, when bird calls are most active. OAR 340-035-0035(1)(b)(A) defines daytime (7:00 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.) statistical noise limits as summarized in Table X-1, from OAR 340-035-0035 Table 8. The Project will operate during the day or night; therefore, the more stringent nighttime permissible sound level will become the controlling limit. To provide a consistent approach with the absolute limits prescribed by the OAR, the baseline measurement

[10] 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.

[11] However, it was not possible to obtain adequate data based on rainy conditions alone. Because it is so seldom rainy in the Project area, sound levels during high humidity conditions were also included in order to obtain an adequate dataset on which to calculate baseline ambient sound levels.

data were correlated by daytime and nighttime measurement periods, for purposes of assessing compliance with the ambient antidegradation standard.

A number of statistical sound levels were measured by the monitors in consecutive 1-hour intervals over the entire survey. Of these, the median, or L_{50} level (the sound level exceeded 50 percent of the time) is considered the most meaningful sound level when characterizing baseline and in terms of association with the antidegradation standard. The L_{50} measurement captures the consistently present sound level that exists during each one-hour period in the absence of sporadic and extraneous noise events such as wind gusts or aircraft over flights. 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 Operational Noise 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}.

Table X-4 presents a summary of survey results at each monitoring position providing information including sound level meter serial number, measurement period, and daytime and nighttime 1-hour L_{10} and L_{50} parameters during periods of RH greater than 90 percent and rain[12]during daytime (7 a.m. to 10 p.m.), nighttime (10 p.m. to 7 a.m.) and late night (12 a.m. to 5 a.m.) periods. Further information can be found in Attachment X-4, the Baseline Sound Survey Report, which also presents time histories of baseline monitoring data, engineer's observations, and pictures of the monitoring stations.

Table X-4. Description of Monitoring Positions, Measurement Durations, and Results (March 6 to May 10, 2012)

Monitoring Location	Nearest Receptor ID	Attachment X-1 Map Number	Time Period/ Meteorology	L10 1-hour dBA Mean	L50 1-hour dBA Mean	Measurement Period Date / Start Time	Measurement Period Date / End Time
MP2 (SN 2575)	168	3	Daytime	45	39	Mar 6 12:00	Mar 19 10:00
			Nighttime	40	35		
			Late-Night	39	34		
MP3 (SN 1711)	642	58	Daytime	44	36	Mar 9 15:00	Apr 9 12:00
			Nighttime	38	32		
			Late-Night	37	31		
MP5 (SN 2663)	146	8	Daytime	49	41	Mar 6 14:00	Apr 7 23:00
			Nighttime	39	32		
			Late-Night	39	32		
MP6 (SN 2665)	142	14	Daytime	45	38	Mar 6 16:00	Apr 6 23:00
			Nighttime	39	33		
			Late-Night	38	33		
MP7 (SN 2442 / and 2665)	285	15	Daytime	53	46	Mar 6 16:00	Apr 24 10:00
			Nighttime	47	40		
			Late-Night	45	40		

[12] Again, because it is so seldom rainy in the Project area, sound levels during high humidity conditions were also included in order to obtain an adequate dataset on which to calculate baseline ambient sound levels. This assumption is conservative because it likely results in a quieter baseline ambient sound level than if only rainy conditions were monitored.

Table X-4. Description of Monitoring Positions, Measurement Durations, and Results (March 6 to May 10, 2012) (continued)

Monitoring Location	Nearest Receptor ID	Attachment X-1 Map Number	Time Period/ Meteorology	L10 1-hour dBA Mean	L50 1-hour dBA Mean	Measurement Period: Date / Start Time	Measurement Period: Date / End Time
MP8 (SN 2667)	120	17	Daytime	43	40	Mar 7 9:23	Apr 8 23:00
			Nighttime	42	41		
			Late-Night	43	41		
MP9 (SN 2665)	123	17	Daytime	43	38	Apr 24 16:00	May 10 12:00
			Nighttime	40	36		
			Late-Night	41	37		
MP11 (SN 1708)	107	19	Daytime	46	34	Mar 7 12:00	Apr 6 23:00
			Nighttime	46	31		
			Late-Night	46	31		
MP13 (SN 2574 and 1710)	91	25	Daytime	64	58	Mar 7 13:00	Apr 23 23:00
			Nighttime	61	52		
			Late-Night	59	49		
MP14 (SN 1671)	85	26	Daytime	47	41	Mar 7 17:00	Apr 10 14:00
			Nighttime	42	36		
			Late-Night	42	36		
MP15 (SN 2667 and 1710)	80	30	Daytime	43	36	Apr 10 14:00	May 10 14:00
			Nighttime	35	30		
			Late-Night	32	27		
MP16 (SN 1710)	72	33	Daytime	55	47	Mar 7 17:00	Apr 8 05:00
			Nighttime	52	42		
			Late-Night	51	41		
MP17 (SN 2661 and 2670)	227	34	Daytime	55	46	Mar 22 12:00	Apr 25 11:00
			Nighttime	55	43		
			Late-Night	55	42		
MP19 (SN 1350 and 1711)	67	35	Daytime	55	50	Mar 21 18:00	Apr 25 11:00
			Nighttime	54	47		
			Late-Night	54	45		
MP20 (SN 2668)	748	36	Daytime	54	47	Mar 7 13:00	Apr 8 23:00
			Nighttime	51	42		
			Late-Night	50	41		
MP22 (SN 2661)	55	38	Daytime	65	59	Mar 7 16:00	Mar 29 23:00
			Nighttime	62	52		
			Late-Night	62	51		
MP23 (SN 2662 and 2668)	53	38	Daytime	61	60	Mar 21 17:00	Apr 25 13:00
			Nighttime	63	62		
			Late-Night	64	63		

Table X-4. Description of Monitoring Positions, Measurement Durations, and Results (March 6 to May 10, 2012) (continued)

Monitoring Location	Nearest Receptor ID	Attachment X-1 Map Number	Time Period/ Meteorology	L10 1-hour dBA Mean	L50 1-hour dBA Mean	Measurement Period	
						Date / Start Time	Date / End Time
MP25 (SN 2664)	36	39	Daytime	58	52	Mar 7 18:00	Apr 9 23:00
			Nighttime	57	47		
			Late-Night	57	46		
MP27 (SN 1009)	700	74	Daytime	37	32	Mar 8 14:00	Mar 29 23:00
			Nighttime	35	32		
			Late-Night	35	33		
MP28 (SN 2573 and 1009)	279	16	Daytime	43	36	Apr 13 14:00	May 10 11:00
			Nighttime	37	32		
			Late-Night	35	31		
MP30 (SN 1708 and 2661)	66	36	Daytime	51	37	Apr 11 12:00	May 10 19:00
			Nighttime	49	34		
			Late-Night	45	33		
MP31 (SN 1671and 2668)	32	43	Daytime	45	34	Apr 12 11:00	May 5 23:00
			Nighttime	37	29		
			Late-Night	33	25		

dBA – A-weighted decibels; L_{10} – intrusive noise level; L_{50} – median sound level; SN – serial number
Note: Mean L_{10} and L_{50} values were derived using only those hours where meteorological conditions included rain and/or relative humidity of greater than 90% as these are comparable meteorological conditions that can result in elevated levels of transmission line corona noise.

3.4.2.3 Potential Exceedances of Ambient Antidegradation Standard

In accordance with the Project Order and to analyze compliance with the ambient antidegradation standard in the ODEQ Noise Rules, IPC consultants measured ambient baseline sound levels and compared the baseline with predicted future Project sound level contributions. The results of this analysis indicate that a potential increase of more than 10 dBA above the L_{50} baseline may occur at four of the NSRs in the Operational Noise Analysis Area during foul weather conditions. Conservative assumptions have been employed in the assessment to allow some design margin for these circumstances and to avoid underestimating the potential impact of the Project. These conservative assumptions included the following:

- Calculations were completed for meteorological conditions corresponding to downwind propagation, or equivalently, propagation under a well-developed, moderate, ground-based temperature inversion, which is conducive to sound propagation.
- Sound attenuation through foliage and diffraction around and over existing anthropogenic structures such as buildings was ignored under all acoustic modeling scenarios. The results are therefore representative of defoliate winter-time conditions.
- All input sound power levels to the model (the most critical component with respect to accuracy and usefulness) have been developed with the use of the BPA CAFE program and from standardized engineering technical guidelines reflecting actual measurements of existing transmission lines of similar design under similar weather conditions.

- The acoustic model assumes that the transmission lines are operating continuously and concurrently at the maximum rated sound level. Corona noise emission levels were calculated under foul weather meteorological conditions using the CAFE program. Received sound levels calculated at NSRs include an added 3 dB safety factor to account for uncertainty associated with how transmission line sound propagates with distance according to the ISO 9613-2 standard (ISO 1996).
- The acoustic modeling analysis was also based 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 was placed nearest the most limiting NSRs as would be allowed under applicable safety requirements or other design constraints. Refer to Table X-2 for additional acoustic modeling input parameters.

Table X-5 describes the four NSRs at which the Project may exceed the regularly occurring baseline during late night hours, defined as the mean of measured statistical L_{50} sound levels occurring from midnight to 5 a.m. during meteorological conditions conducive to corona noise.

The resultant Project contribution is considered cumulatively with the existing acoustic environment to determine expected incremental increase in sound levels relative to baseline. The baseline sound levels were derived from the measurement data set and formed the basis of this compliance demonstration.

In accordance with the Project Order, tabulated data in Attachment X-5 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. Receptors that are not considered noise-sensitive per OAR definition (e.g., barns, commercial properties, etc.) were removed from consideration. There were several NSRs where this determination was difficult to ascertain from public roadway rights-of-way and these circumstances are so noted in Attachment X-5.

Table X-5. Summary of Acoustic Modeling Results – Comparison of Future Project Sound Levels to Late Night Baseline L_{50}

Receptor ID	Nature of Receptor	County	Corridor	Nearest Milepost	Attachment X-1 Map Number	Associated Monitoring Position	Monitored Late Night Baseline Sound Level (dBA)	Future Project Sound Level (dBA)	Cumulative Sound Level with Project (dBA)	Incremental Increase Relative to Baseline (dBA)
169	Residence	Morrow	Proposed Corridor	9.3	3	MP-2	34	47	47	+13
642	Residence	Morrow	Longhorn Alternate	9.5	58	MP-3	31	47	47	+16
82	Residence	Baker	Flagstaff Alternate	0.8	30	MP-15	27	38	38	+11
719	Residence	Malheur	Willow Creek Alternate	17.1	66	MP-31	25	39	39	+14

3.4.2.4 "Infrequent Event" Exception for Corona Noise During Foul Weather

> **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 Rules permit the owner or controller of an industrial noise source to request that the Department (or in this context, the Council) issue an exception from application of the ODEQ Noise Rules.[13] Pursuant to this rule, IPC requests that the Council grant an exception to the ODEQ Noise Rules on the basis that the meteorological conditions resulting in maximum corona generation, when they occur, would be "infrequent events" within the meaning of the ODEQ Noise Rules. As illustrated by Figure X-1, much of the Project area is arid high desert with relatively little annual precipitation.

Data Demonstrating Infrequent Occurrence of Corona Noise

The acoustic modeling results presented in Section 3.4.2 demonstrate there is the potential for exceedances to occur at four NSRs during foul weather conditions when maximum levels of corona noise are generated. However, the predicted exceedances at these four 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 dried off) or a light mist or heavy fog although these latter conditions are highly variable. The rain rate of 1 mm/hour used in the BPA CAFE model does not necessarily cover light rains when lower levels of corona noise may be generated. Therefore, the Project has assumed foul weather to be a rain rate of ranging from 0.8 to 5 mm/hour for the following reasons:

- It is a slightly more conservative definition of the weather conditions likely to result in maximum corona noise than the 1 mm/hour used by BPA's CAFE program.
- It also correctly excludes precipitation heavy enough that it could be reasonably expected that the noise from the weather would increase ambient sound levels to the extent that the corona noise would be masked.
- It is a rain rate that BPA has historically considered as foul weather in concluding that such conditions east of the Cascades constitute "infrequent events" for purposes of deeming such occurrences as exceptions per the ODEQ Noise Rules.

Four meteorological stations were selected to effectively characterize weather trends and patterns within the Project area including Flagstaff Hill, La Grande, Owyhee Ridge, and Umatilla NWR. Four-year meteorological analysis of these stations demonstrates that foul weather, i.e. precipitation between 0.8 and 5 mm/hour, has historically occurred 1.3 percent of the time in the Project area.

[13] Indeed, EFSC has previously considered and granted an exception to the ODEQ Noise Rules. Biglow Canyon Wind Project, Final Order on Amendment #2 (May 2007).

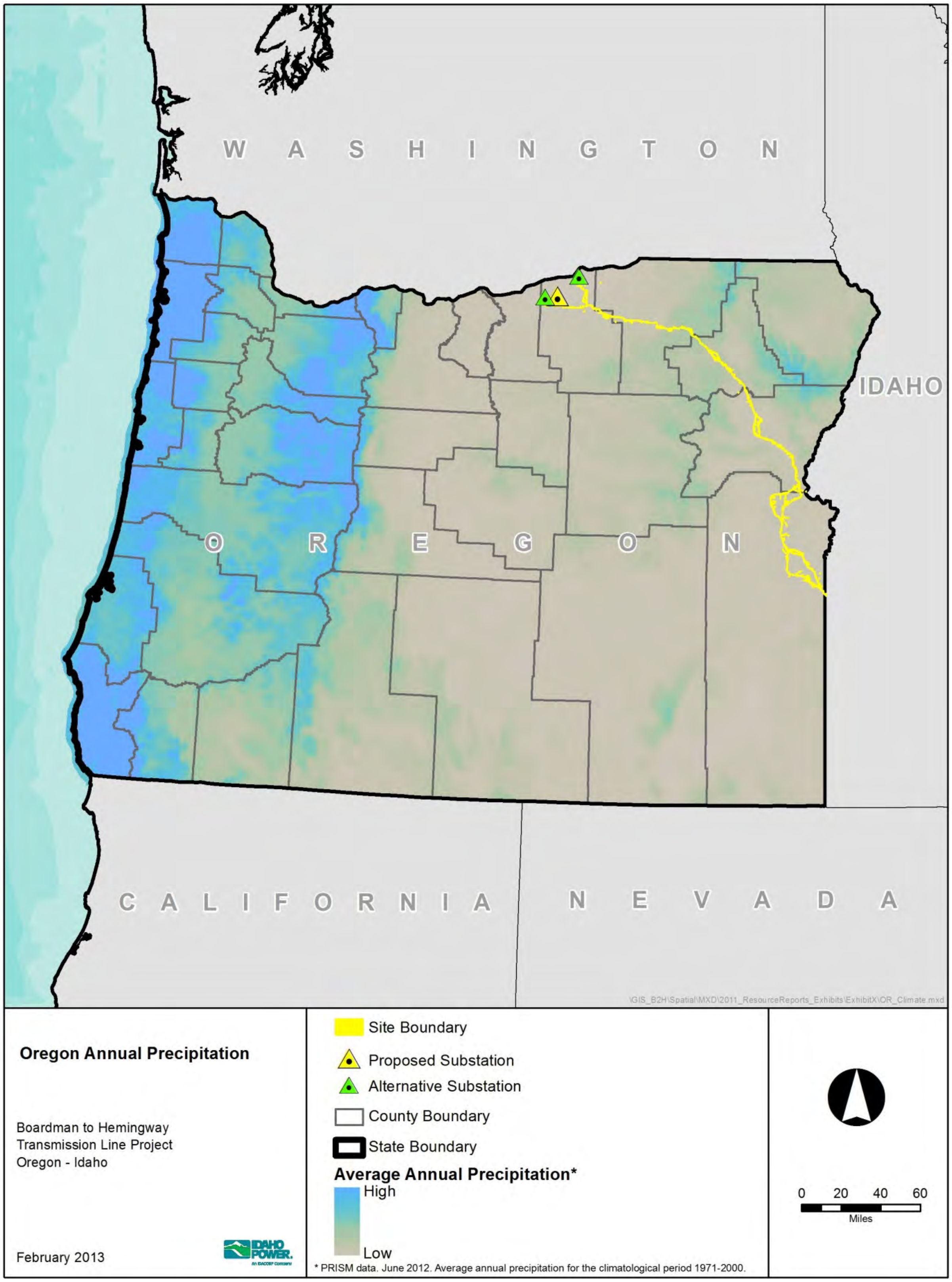

Figure X-1. Oregon Annual Precipitation

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 mm/hour occurred in the Project area. Figure X-2, below, shows the location of the potential exceedances with respect to the meteorological data stations.

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

Condition	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 Western Regional Climate Center (WRCC) station were analyzed in more detail to ascertain diurnal and seasonal variations. Additionally, periods of rainfall events over the course of consecutive days of and/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% during daytime hours.

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

	All Met Stations		Flagstaff		La Grande		Umatilla NWR		Owyhee	
Season / Time of Day	**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%**

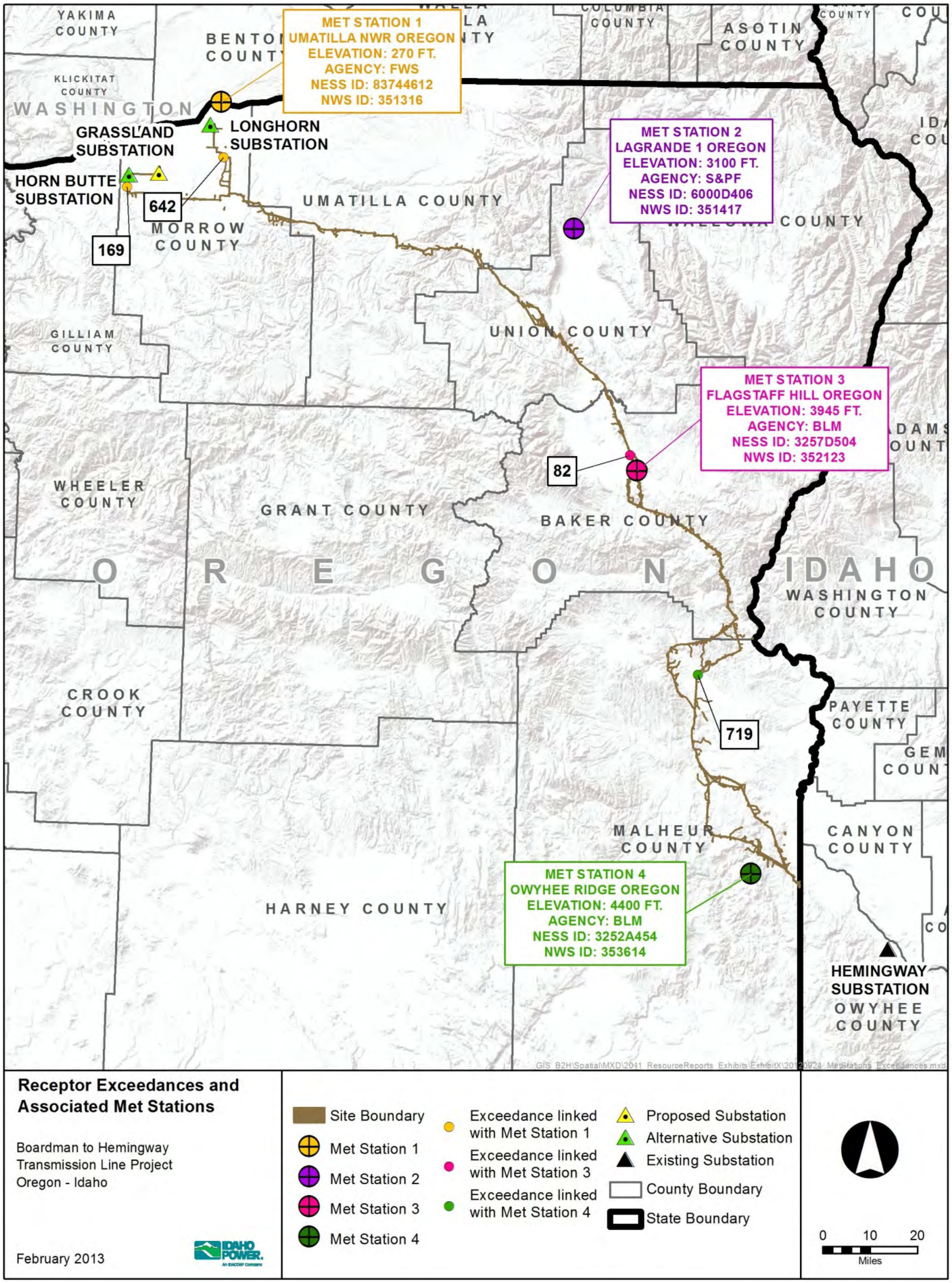

Figure X-2. Receptor Exceedances and Associated Met Stations

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-8 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 Consecutive Days with 1-hour or more of Foul Weather	Average Number of Consecutive Days with Foul Weather	Maximum Consecutive Hours of Foul Weather	Average Number of Consecutive Hours of Foul Weather
Flagstaff	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**

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 hours and occurred in the Umatilla area in December 2010 over the course of two 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 incident of foul weather days having 22 percent of days with 1 hour or more of foul weather. While predominantly (i.e., 78% 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 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 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	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

Application of Legal Standard of Infrequent Event

ODEQ Noise Rules do not define the phrase “infrequent event” for purposes of the exception. However, the application of the common definition of the word “infrequent,” suggests that maximum corona noise will in fact constitute an “infrequent event.” Webster’s defines the word “infrequent” to mean

> *“1: seldom happening or occurring: rare; and*
> *2: placed or occurring at wide intervals in space or time (infrequent visits).”*

Thus, an infrequent event is not something that *never* occurs, but rather something that *does* occur but only every so often. Any potential exceedances that result from the Project will be exactly that-- infrequent events that do occur, but only “once in a while.”

To allow the Council to fully evaluate the frequency of potential exceedences, IPC has analyzed the meteorological data to determine the frequency with which the foul weather that causes corona noise can be expected at the relevant NSRs. As shown in Table X-6, the overall percentage of time that foul weather can be expected is just 1.3 percent—a percentage that on its face would appear to satisfy any common understanding of the term “infrequent.”

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 Rules, BPA has concluded that corona noise caused by foul weather conditions (defined as the occurrence of rain rates of 0.8–5 mm/hr) east of the Cascades would be”infrequent”.[14] In addition, for purposes of analyzing noise effects from specific proposed transmission projects in National Environmental Policy Act (NEPA) 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.[15]

[14] (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”)

[15] *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); Klondike III/Biglow Canyon Wind Integration Project, Final EIS (September 2006), Appendix C at 20

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

Thus, consistent with BPA precedent, the meteoroligcal data confirm that the foul weather events that cause corona noise can be expected to occur only a small percentage of the time and that therefore exceedances of ODEQ's antidegradation standard will constitute an infrequent occurrence. Moreover, the data showing the expected distribution and duration support such a conclusion as well. For this reason the Council should find that any expected exceedences of the ODEQ's antidegradation standard for noise will be "infrequent" as that term is used in OAR 340-035-0035(6).

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. For those exceptions which it authorizes the Department shall specify the times during which the noise rules can be exceeded and the quantity and quality of the noise generated, and when appropriate shall specify the increments of progress of the noise source toward meeting the noise rules.

Once the Council has determined that potential exceedances due to corona noise will qualify as "infrequent events," the Council should consider the following in determining whether to grant an exception. As discussed below, an analysis of the above factors supports IPC's request for an exception.

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

There are several factors specific to the corona noise that 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 therefore non-intrusive. Sleep disturbance is typically a result of sound with rapid onset times at magnitudes that vary greatly from background noise levels, i.e. impulsive noise events.

Second, the fact that the corona noise primarily is produced during foul weather is highly significant on this point. Foul weather in itself produces noise due to 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 corona noise will be masked to a greater degree than suggested by the study.

(describing frequency of foul weather events as 6% of the year based on meteorological data); McNary-John Day 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)

Similarly, the study modeled the level of corona noise audible at an NSR—***outside of any home or other dwelling***. 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 in relatively porous structures 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 quite low.

Moreover, in most instances in which the Project sound level contribution might exceed the ambient antidegradation standard, the total noise level would nevertheless be appropriately characterized as "quiet." Table X-10 presents estimates of common noise sources or outdoor acoustic environments, and notes the relative loudness. The highest cumulative sound level resulting from Project operation at an NSR is predicted to be 47 dBA. According to the sound levels listed in Table X-10 this is in the range of what might be heard in a quiet rural residential area with no activity or light auto traffic at a distance of 100 feet. For context, 41 dBA constitutes a very low level of noise, the average of a living room library.[16]

Table X-10. Sound Pressure Levels and Relative Loudness of Typical Noise Sources and Soundscapes

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

Adapted from: Beranek (1988) and EPA (1971)

[16] Final Hearings Officer Report to the Oregon Environmental Quality Commission on Noise Rulemaking Standards for Wind Energy Facilities at 12 (April 19, 2004).

Regardless, in the event that IPC receives a valid complaint regarding an exceedance caused by the Project at a specific NSR, IPC commits to working with the owners, and/or persons dwelling at such NSR, to identify appropriate measures that could be implemented to resolve the concern.

Thus, because the exceedances of the ambient antidegradation standard would occur infrequently, would be fairly characterized as “quiet,” and further because IPC commits to working to resolve concerns caused by any exceedances, the issuance of an exception protects the health, safety, and welfare of Oregon citizens.

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

As discussed above, IPC can work with individual NSRs to help resolve concerns about noise exceedances when appropriate. However, IPC ***cannot*** reasonably prevent the potential exceedances at the source.

At the outset, it is important to note that the Project was designed to produce as little corona noise as possible while at the same time meeting design requirements. However, all 500-kV transmission lines will emit corona noise under foul weather conditions. Moreover, while many types of industrial noise sources can be mitigated at the source through the installation of insulation or dampers, 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 re-routing. Unfortunately, when IPC analyzed the possibility of re-routing 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 re-routing 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 due to other 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-3 is a map of siting constraints the Project is required to consider in consideration and balancing of public input from the Community Advisory Process, with many of which competing.

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

The ODEQ Noise Rules appear to be concerned primarily with the effect of noise on human sleep, and therefore it is fair to conclude that exceedances that might occur in residential zones would be considered to be the most problematic. The four possible 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 that would indicate that significant future land use changes are likely to occur in the area.

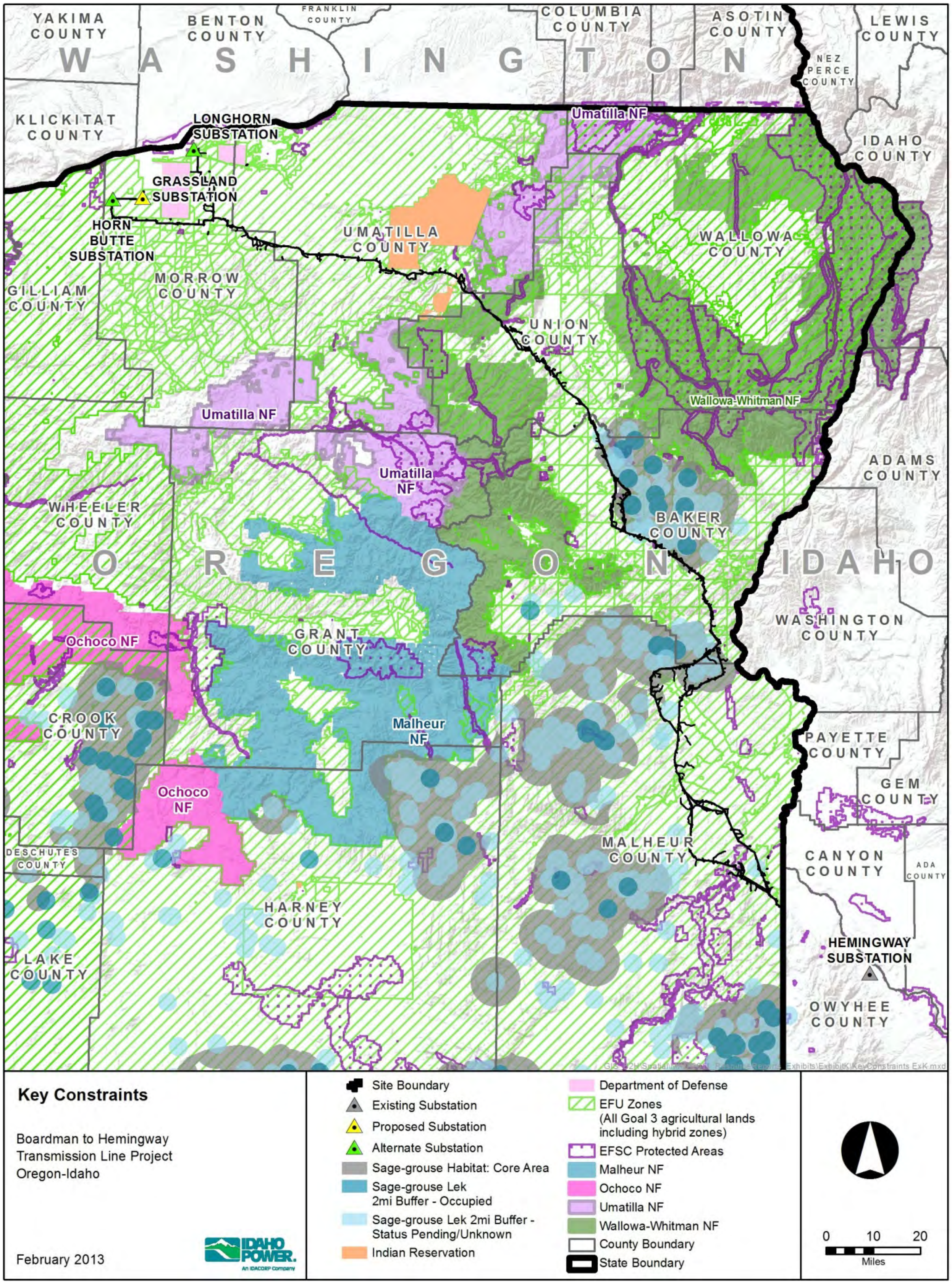

Figure X-3. Key Constraints

Legal constraints render it extremely difficult to re-route the line to eliminate exceedances.

There are many siting constraints that are imposed on the Project and which require the inclusion of the Proposed Corridor and alternate corridor segments in IPC's Application for Site Certificate. These constraints include the following:

- Federal land management agency requirements, including the federal land management plans governing many of the federal lands in the study 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 ODFW'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, wildlife refuges and certain federally-designated areas, such as areas of critical environmental concern, wilderness areas, wild and scenic rivers, Bureau of Land Management 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 Attachment B-1, Siting Study [August 2010] and Attachment B-2, Siting Study Supplement [June 2012]).[17]

Times, Quantity and Quality of Noise

The language of the ODEQ Noise Rules allowing for an exception provides that the Department (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 be dependent 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 seasonal 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, the IPC requests that the Council issue an exception to the ODEQ Noise Rules based on the infrequency of generation of corona noise.

3.4.2.5 The Project Qualifies for a Variance from the ODEQ Noise Rules

Alternatively, even if EFSC determines that the Project should not be granted an exception for potential exceedances as "infrequent events," IPC requests that EFSC grant the Project a variance exempting it from strict compliance with the ambient antidegradation standard in the ODEQ Noise Rules. Under OAR 340-035-0100(1) set forth below, the ODEQ Noise Rules define a number of circumstances in which it may be appropriate to grant a variance to a specific noise source:

[17] In the siting studies, the term "route" is used in instead of "corridor." The use of the term route in those studies should be considered synonymous with "corridor" for the purposes of this Exhibit.

> **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.

Under this rule and the authority set forth at ORS 467.060, the Environmental Quality Commission may grant variances from the requirements of the noise standard if the Commission finds that strict compliance with the rule or standard is “inappropriate” for one of four reasons:

1. Because of conditions beyond the control of the noise source; or
2. Because of special circumstances which would render strict compliance impracticable due to special physical conditions or cause; or
3. Because strict compliance would result in substantial curtailment or closing down of a business, plant, or operation; or
4. Because no other alternative facility or method of handling is yet available.

IPC requests that EFSC consider granting the Project a variance from compliance with the ODEQ Noise Rules on the basis that, for the reasons explained below, special circumstances render strict compliance unreasonable and likely to make permitting the Project impossible and because the Project is necessary at the location proposed to provide a public service.

As discussed previously, there are no mitigation methods available to prevent corona noise occurring on a 500-kV transmission line during foul weather conditions; thus, the only cure for an exceedance at a particular NSR is to re-route the line away from the NSR. Unfortunately, IPC’s analysis reveals that such re-routing is not possible. Given the complex siting constraints, the Project cannot be simply 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.”[18] As discussed in Exhibit N, the Project is critical component of IPC’s least cost 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 BPA’s transmission facilities.[19] A determination that the

[18] 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, September 4, 1974.

[19] “Building out proposed transmission lines such as the Boardman to Hemingway and Cross-Cascades would ease the burden on the Bonneville system, create more diverse access to Oregon's renewable energy potential, and help Oregon utilities meet the state's greenhouse emissions reductions goals.” Draft 10-Year Energy Action Plan at 27 (June 5, 2012).

Project could not be permitted would deprive the region and its citizens of a critical energy infrastructure for many years into the future.[20]

Conclusion

Accordingly, for the reasons explained previously, the Council should grant the Project a variance from the antidegradation standard of the ODEQ Noise Rules.

3.4.3 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.

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

- Construction operations will be scheduled to occur within daylight hours from Monday through Sunday unless otherwise restricted.
- Construction site and access road speed limits will be established and enforced during the construction period.
- Electrically powered equipment will be used instead of pneumatic or internal combustion powered equipment where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas will be located as far as practicable from noise-sensitive receptors.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, will be for safety warning purposes only.
- Construction noise will be controlled to the extent practical to minimize disturbances to NSRs in the vicinity. All noise-producing construction equipment and vehicles using internal combustion engines will be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specification. Mobile or fixed "package" equipment (e.g., arc-welders, air compressors) will be equipped with shrouds and noise control features that are readily available for that type of equipment.
- To minimize operation noise impacts, the Project has been sited as far away from NSRs as possible and in consideration of other routing constraints.
- The Project will use corona-free components, and proper construction and conductor handling techniques will be used to reduce the generation of corona.
- Transformer and reactor installations or upgrades will be designed and specified as appropriate to meet Project design goals and compliance with OAR Chapter 340, Division 35.
- All construction noise complaints will be logged within 48 hours of issuance. The construction supervisor will have the responsibility and authority to receive and resolve noise complaints. IPC will establish a procedure prior to the start of construction on how to handle and resolve construction noise related complaints.

[20] Moreover, such a result would frustrate Oregon's broader energy policy goals, including ORS 469.010 (referenced above), and Governor Kitzhaber's Draft 10-Year Energy Action Plan. This Action Plan describes Oregon's energy infrastructure and transmission as "outdated and inadequate" and a barrier to development of renewable energy in Oregon.

- All operational noise complaints will be dealt with as described in Section 3.4.4. In the event that a complaint related to operational noise is investigated and validated, IPC will coordinate with ODOE and/or the landowner in order to come to an agreement on how to mitigate noise.

3.4.4 Monitoring

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

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

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

3.4.5 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.

For the reasons described below, IPC requests that ODOE revise the Project Order to specify that strict application of OAR 345-021-0010(1)(x)(E) should not apply to the Project, and instead require IPC to provide a list of the names and addresses of all NSRs within **one-half mile** of the Site Boundary from the transmission line and any related and supporting facilities. Alternatively, IPC requests that EFSC issue an order waiving application of OAR 345-021-0010(1)(x)(E) in this case.

At the time the Project Order was issued, OAR 345-021-0010(1)(x)(E) required applicants to provide a list of names and addresses of all owners of NSRs within one-half mile of the Site Boundary. Consistent with this requirement, the Project Order designated the analysis area for Exhibit X at one-half mile of the Site Boundary, and further required IPC to provide a list of NSRs within one-half mile from the Site Boundary.

Since the Project Order was issued, EFSC opened a rulemaking docket. Among the proposed revisions was a change to OAR 345-021-0010(1)(x)(E) requiring the project proponent to provide a list of NSRs within one mile (as opposed to one-half mile) of the proposed Site Boundary. Along with several other commenters, IPC objected to the proposed change. Specifically, IPC explained that for a linear project, the identification of all NSRs within one mile of the Site Boundary would prove unduly burdensome, and that further, the proposed change was not tied to any expected impacts to the NSRs beyond one-half mile from the Site Boundary.

Ultimately the Council adopted the proposed rule. However, in recommending the adoption of the proposed rule, the Hearings Officer's Report specifically noted the concerns registered by IPC and others, and in response, noted several processes by which the rule could be waived or modified where appropriate. In particular, the Hearings Officer noted that (1) ODOE could specify in the Project Order that OAR 345-021-0010(1)(x)(E) does not apply to a particular facility under review; (2) ODOE could modify the provisions of the rule to a particular facility under review; or (3) the project proponent could request a waiver of application requirements under OAR 345-021-0000(5). See, *Hearing Officer's Report* Energy Facility Siting Rules Chapter 345, Divisions 1, 11, 15, 20, 21, 22, 23, 24, 26 and 27 at 19-20 (May 8, 2012).

In this case, ODOE should revise the Project Order to specifically relieve IPC of the obligation of identifying NSRs beyond one-half mile from the Site Boundary.

First, the results of IPC's investigation demonstrate that operational noise from the Project will not impact NSRs beyond the Operational Noise Analysis Area (see Section 3.4.1.2). On this point, it is important that construction noise is exempted from ODEQ Noise Rules.

Second, the identification of NSRs along a nearly 300-mile transmission line is a costly and time-consuming exercise. IPC has already gone through this process to identify NSRs within one-half mile of the Site Boundary. Given that NSRs past one-half mile of the Site Boundary will not be impacted by operational noise from the Project, it would make no sense to require IPC to go through the process yet a second time.

For these reasons, IPC requests that ODOE revise the Project Order to make clear that IPC needs to provide a list of only those NSRs within one-half mile from the Site Boundary. Alternatively, IPC requests that EFSC issue an order waiving the application of OAR 345-021-0010(1)(x)(E) in this case.

Accordingly, 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 Site Boundary as defined by the final Project Order requirements for the Exhibit X acoustic assessment.

4.0 CONCLUSIONS

Exhibit X presents substantial evidence to support a finding by the Council that the Project will comply with the ODEQ Noise Rules at all NSRs, by demonstrated compliance, an exception, or a variance.

5.0 SUBMITTAL AND APPROVAL COMPLIANCE MATRICES

Table X-11 provides cross references between Exhibit submittal requirements of OAR 345-021-0010 and where discussion can be found in this Exhibit.

Table X-11. Submittal Requirements Matrix

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.	Section 3.4.1, Attachment X-5
(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.	Section 3.2, Section 3.3, 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.	Section 3.4.3
(D) Any measures the applicant proposes to monitor noise generated by operation of the facility.	Section 3.4.4
(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	Section 3.4.5, Attachment X-6
Project Order Section VI (x) Comments	
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.	Attachment X-1
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.	Attachment X-3
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) 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.	Section 3.4.1, Attachment X-5

Table X-11. Submittal Requirements Matrix (continued)

Requirement	Location
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.	Section 3.4.1, Attachment X-5
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 conditions. All reference data and its source shall be provided in the application materials	Section 3.4.1
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	Section 3.4.1
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	Section 3.4.3

6.0 RESPONSE TO COMMENTS FROM REVIEWING AGENCIES AND THE PUBLIC

There are no comments to date from reviewing agencies and the public.

7.0 REFERENCES

Beranek, L. 1988. Noise and Vibration Control. Institute of Noise Control Engineering, Washington, DC.

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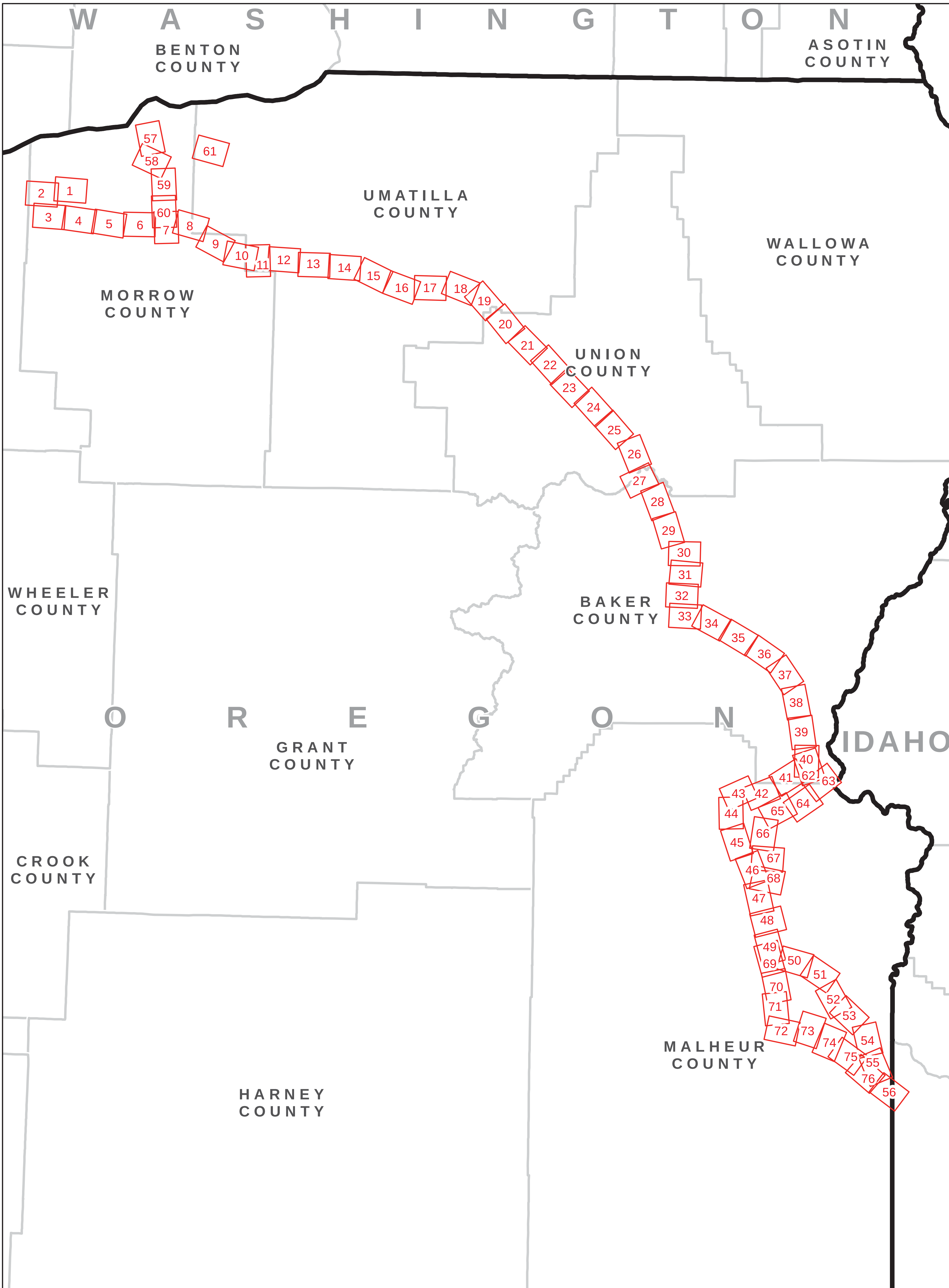
ATTACHMENT X-1
AERIAL MAPS SHOWING NOISE SENSITIVE RECEPTORS



Attachment X-1
Noise Sensitive Receptors
Map Sheet Overview

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Map Sheet
State Boundary
County Boundary

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Miles

Attachment X-1
Noise Sensitive Receptors

Map 1 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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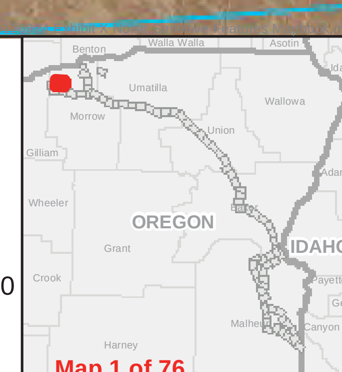
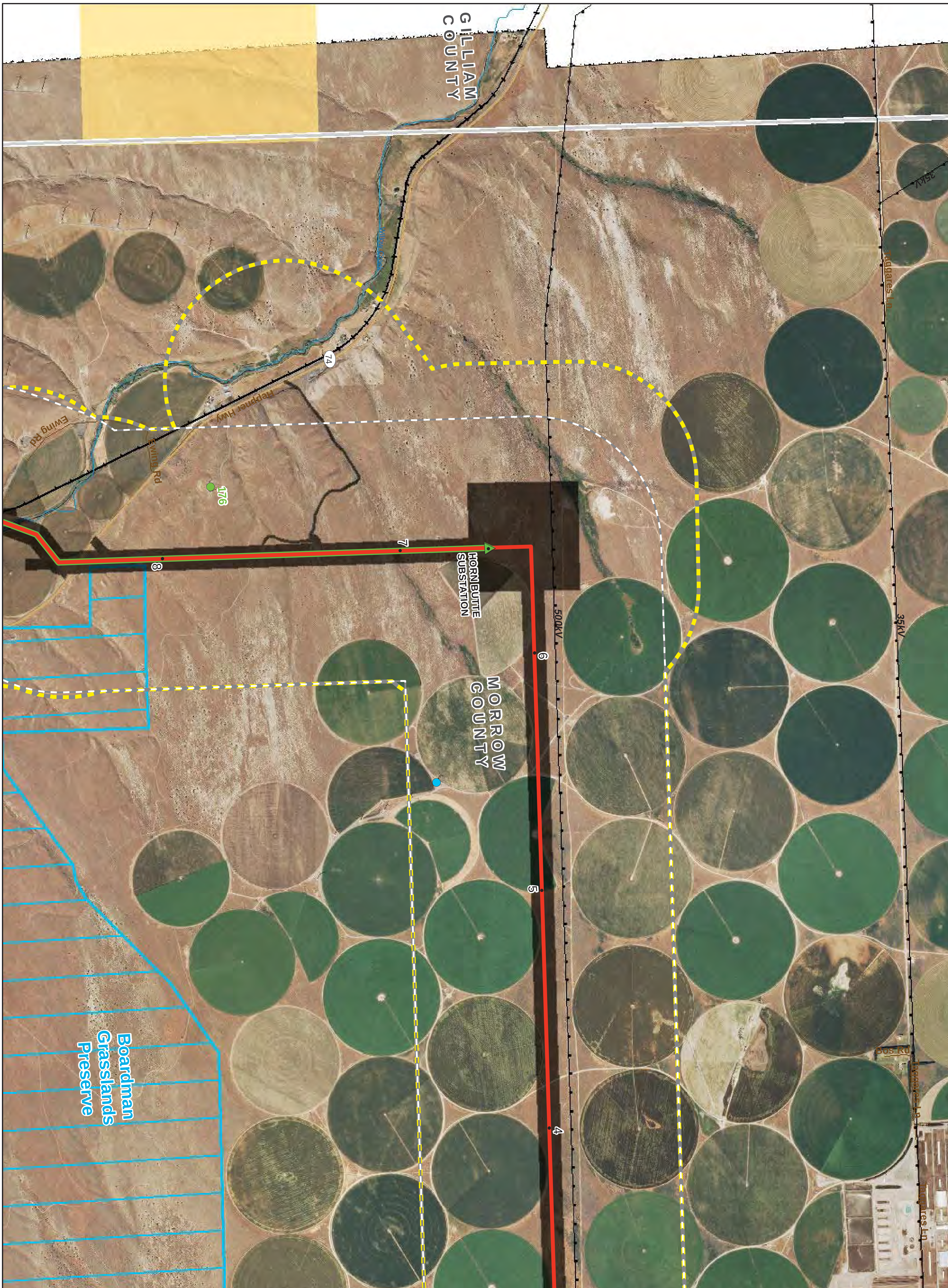
Feet





Attachment X-1
Noise Sensitive Receptors

Map 2 of 76
Proposed Route/Horn Butte Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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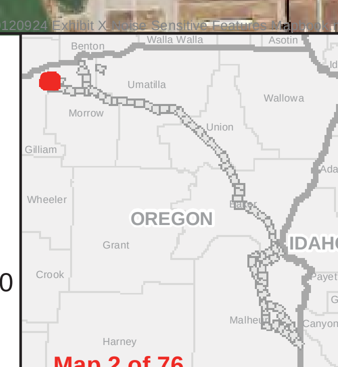

Attachment X-1
Noise Sensitive Receptors

Map 3 of 76
Proposed Route/Horn Butte Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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Feet

Attachment X-1
Noise Sensitive Receptors

Map 4 of 76
Proposed Route/Horn Butte Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER
An IDACORP Company

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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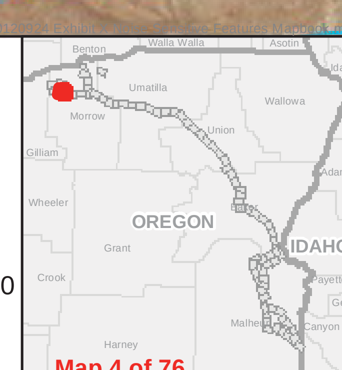

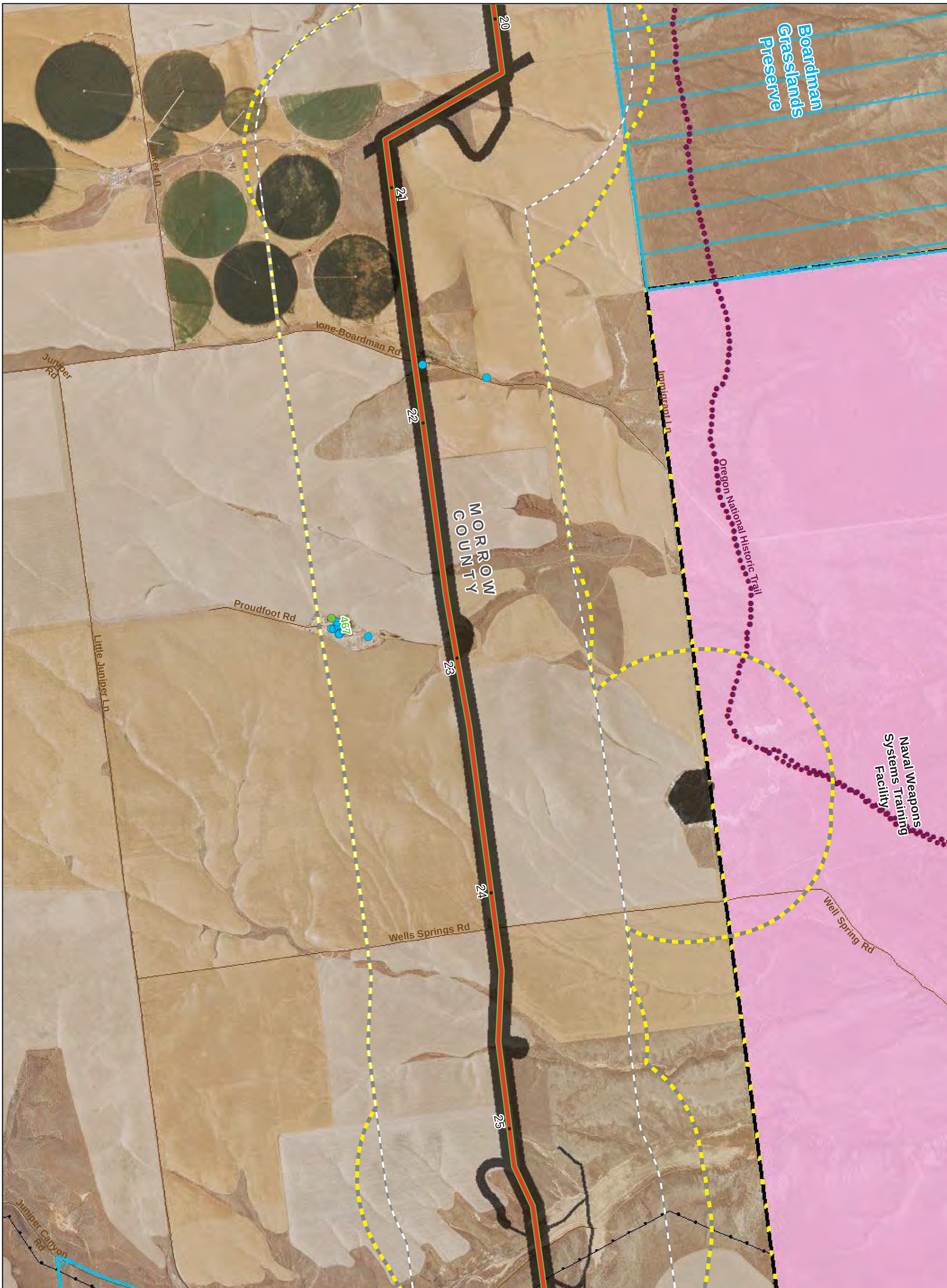

Attachment X-1
Noise Sensitive Receptors

Map 5 of 76
Proposed Route/Horn Butte Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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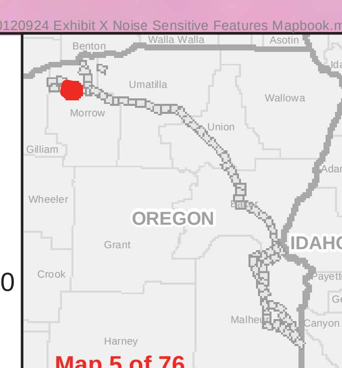

Attachment X-1
Noise Sensitive Receptors

Map 6 of 76
Proposed Route/Horn Butte Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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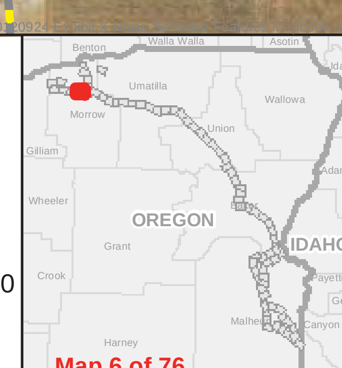

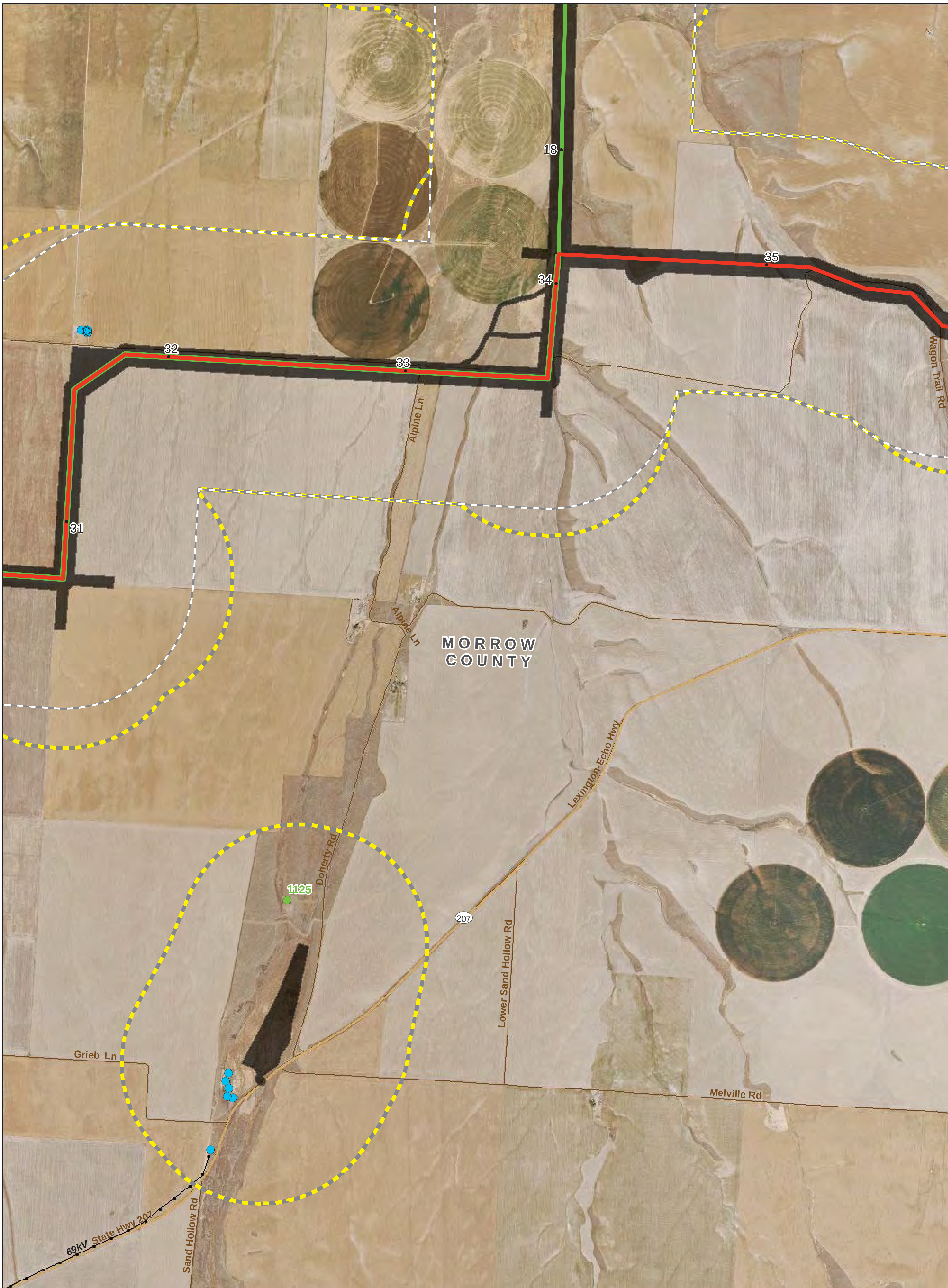

Attachment X-1
Noise Sensitive Receptors

Map 7 of 76
Proposed Route/Horn Butte Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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Feet

Attachment X-1
Noise Sensitive Receptors

Map 8 of 76

Proposed Route

Boardman to Hemingway Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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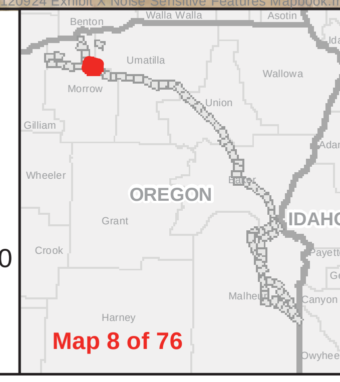

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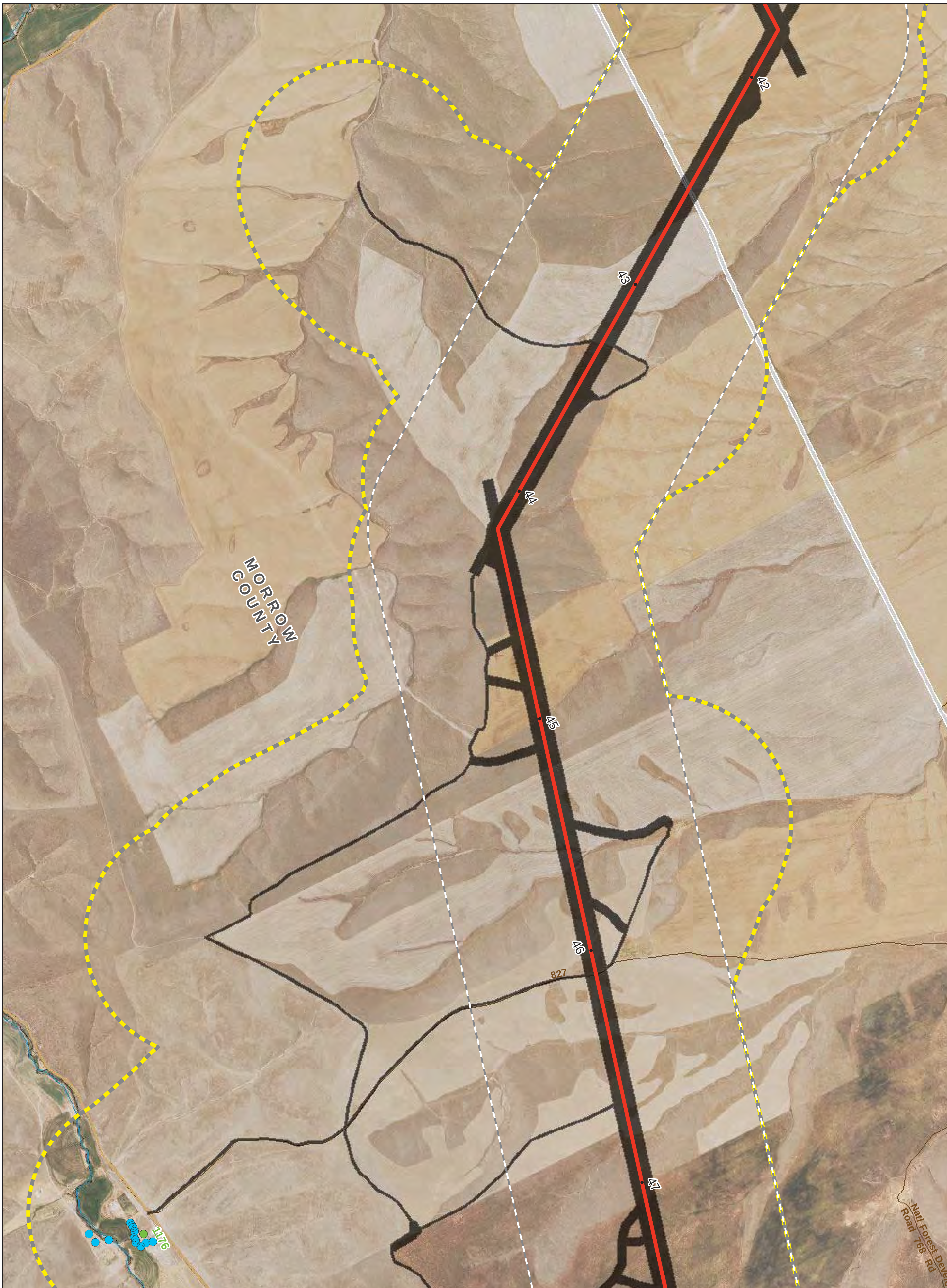

Attachment X-1
Noise Sensitive Receptors

Map 9 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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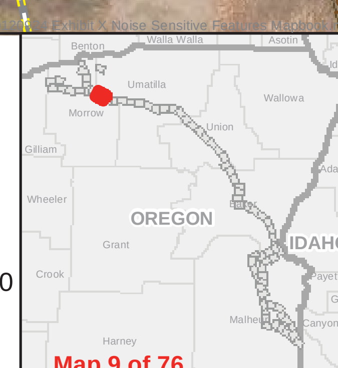

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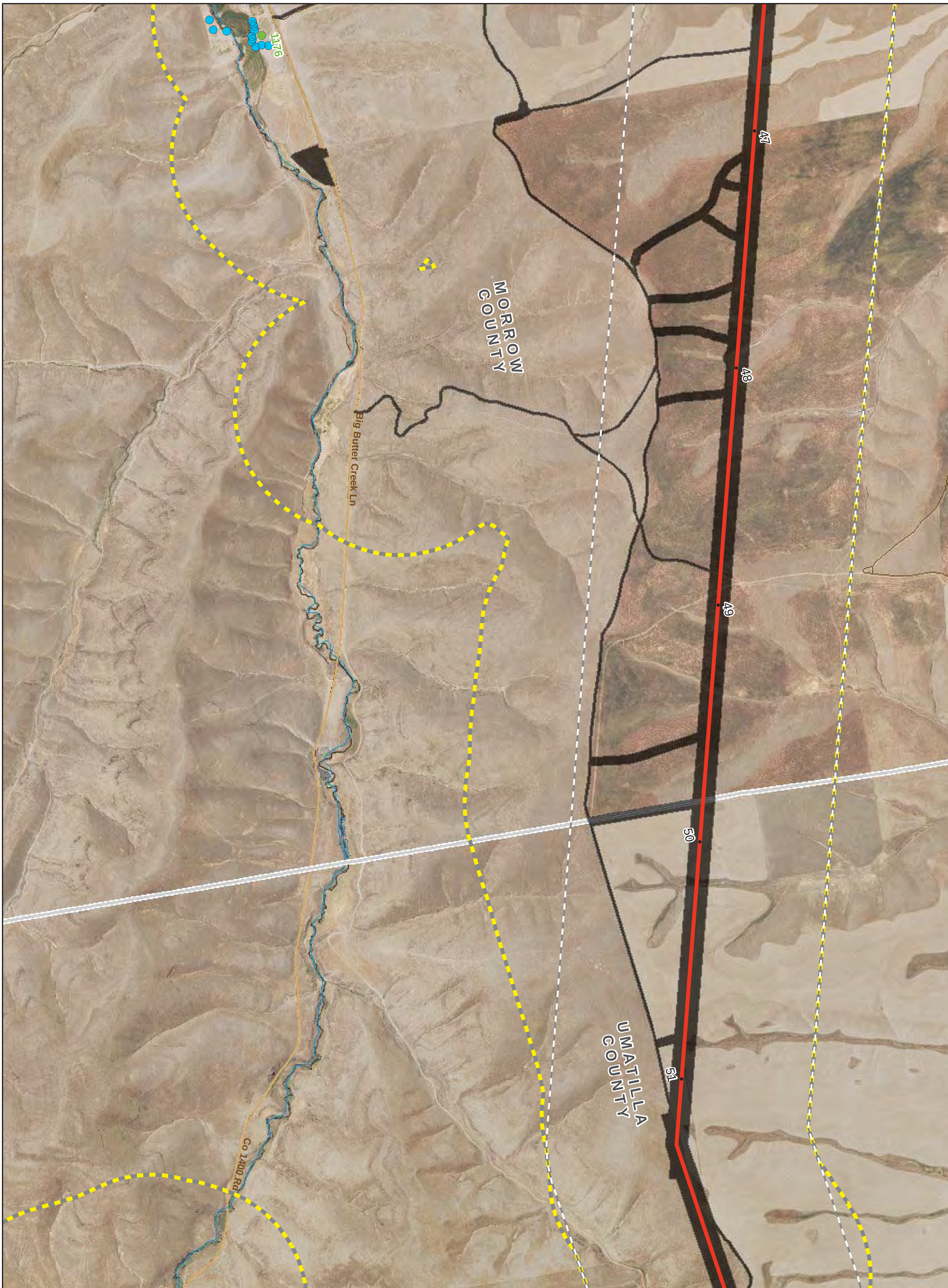

Attachment X-1
Noise Sensitive Receptors

Map 10 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary

Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary

Existing Transmission Line
Bureau of Land Management
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Department of Defense
Indian Reservation
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U.S. Fish and Wildlife Service
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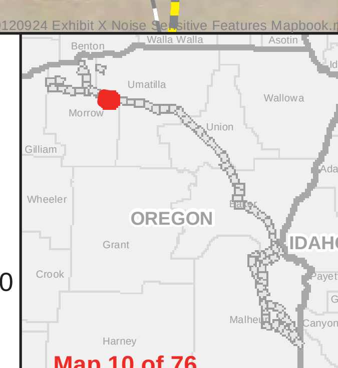

Attachment X-1
Noise Sensitive Receptors

Map 11 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary

Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary

Existing Transmission Line
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Department of Defense
Indian Reservation
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U.S. Fish and Wildlife Service
U.S. Forest Service

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OREGON
IDAHO
Map 11 of 76

Attachment X-1
Noise Sensitive Receptors

Map 12 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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Attachment X-1
Noise Sensitive Receptors

Map 13 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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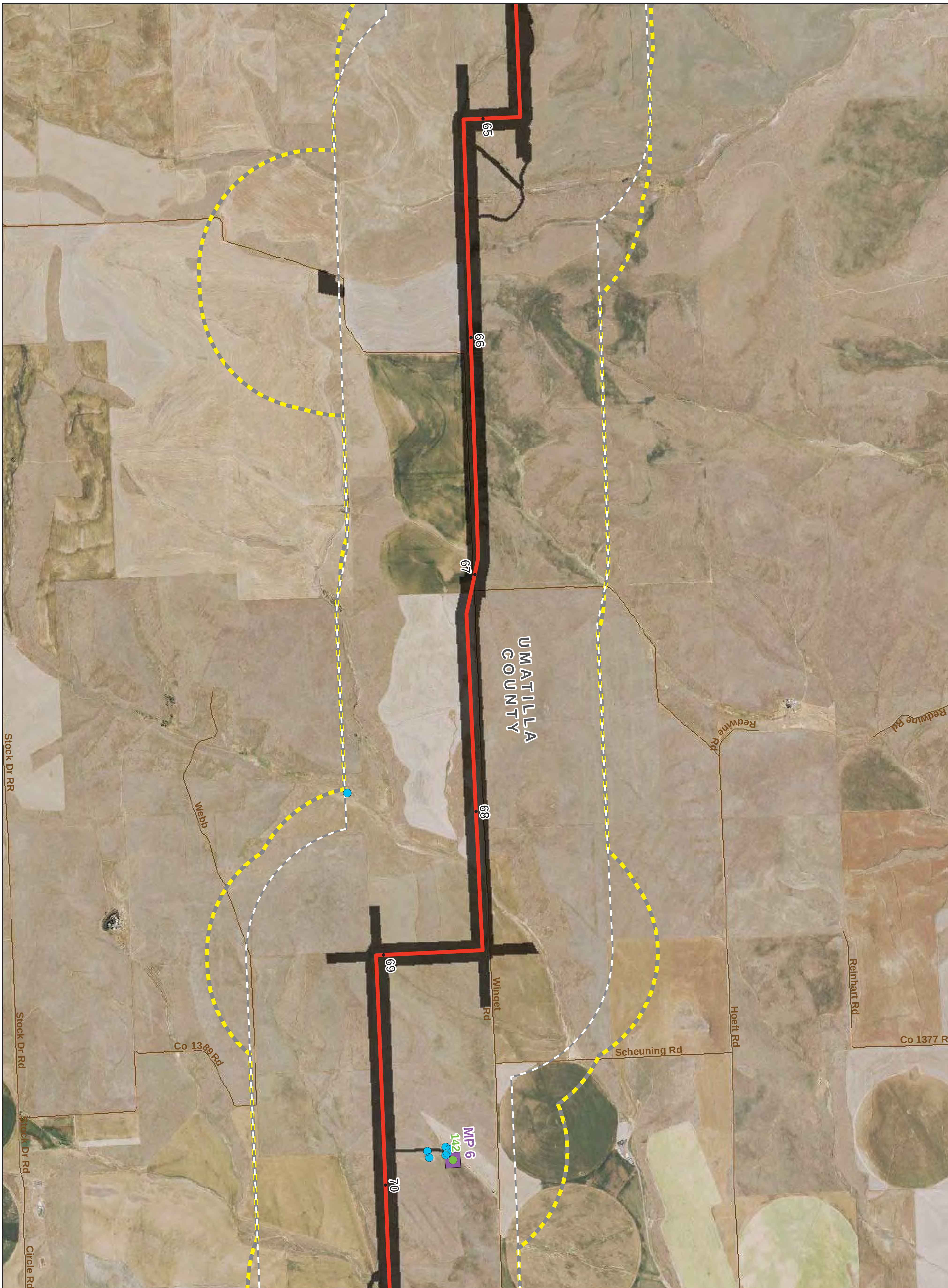

Attachment X-1
Noise Sensitive Receptors

Map 14 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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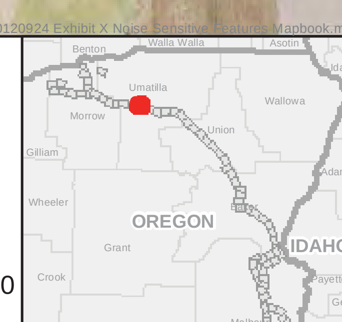

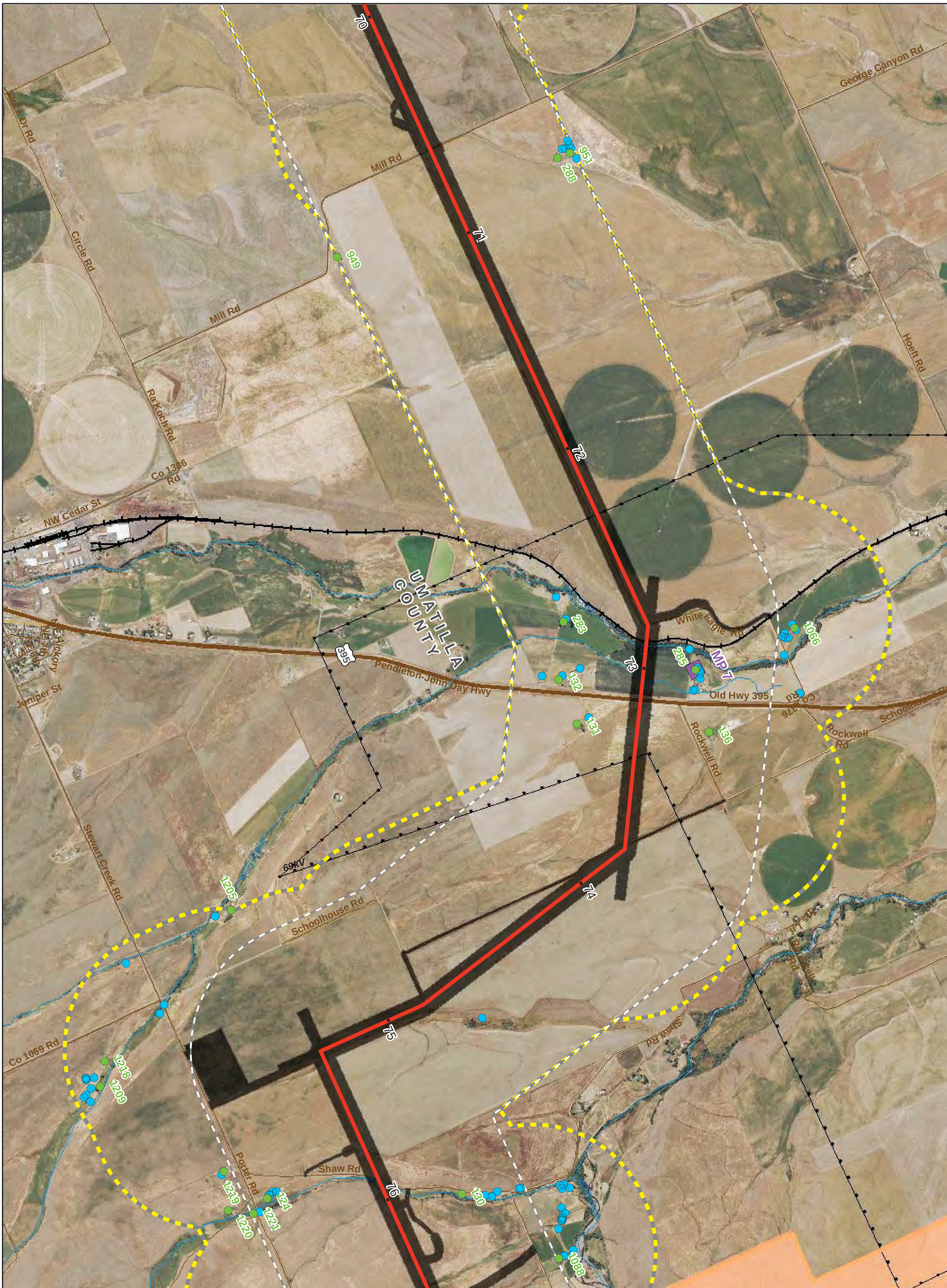

Attachment X-1
Noise Sensitive Receptors

Map 15 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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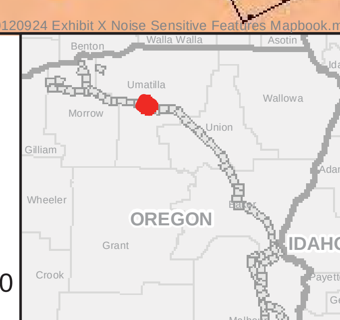
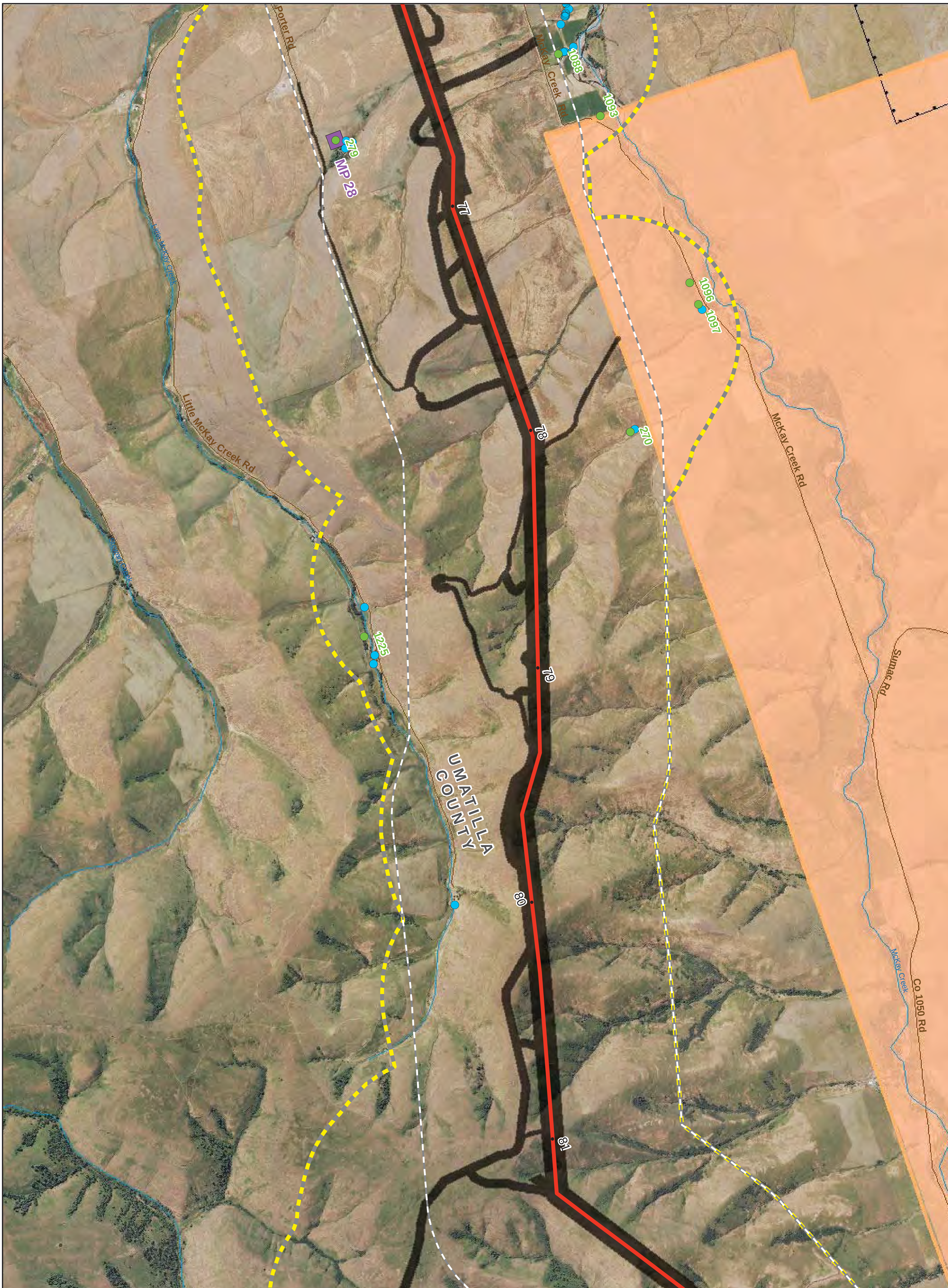


Map 15 of 76



Attachment X-1
Noise Sensitive Receptors

Map 16 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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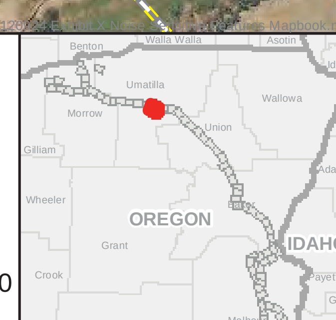
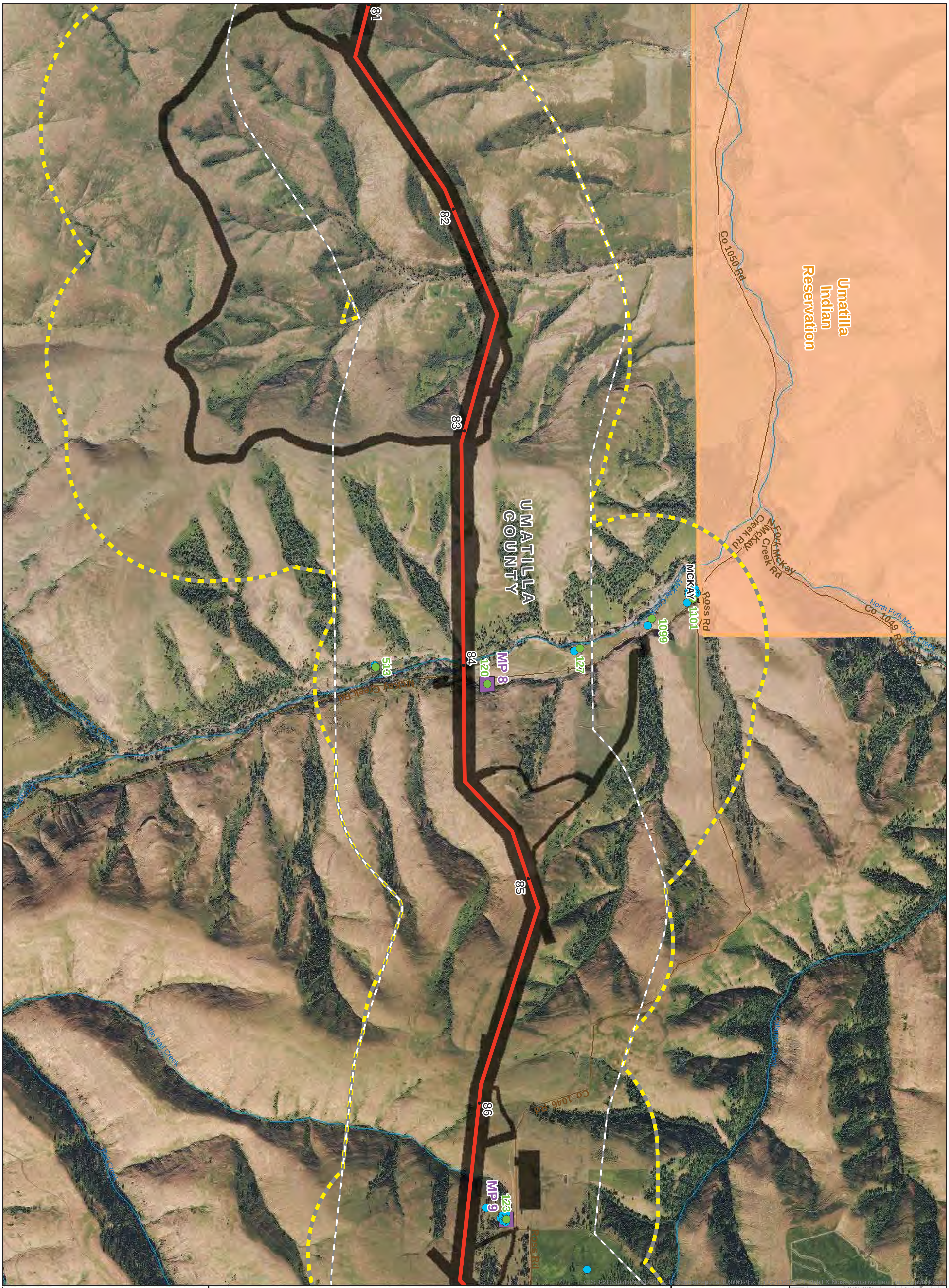


Map 16 of 76



Attachment X-1
Noise Sensitive Receptors

Map 17 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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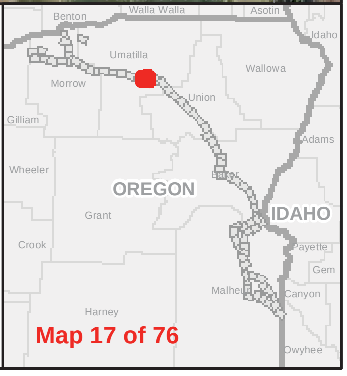

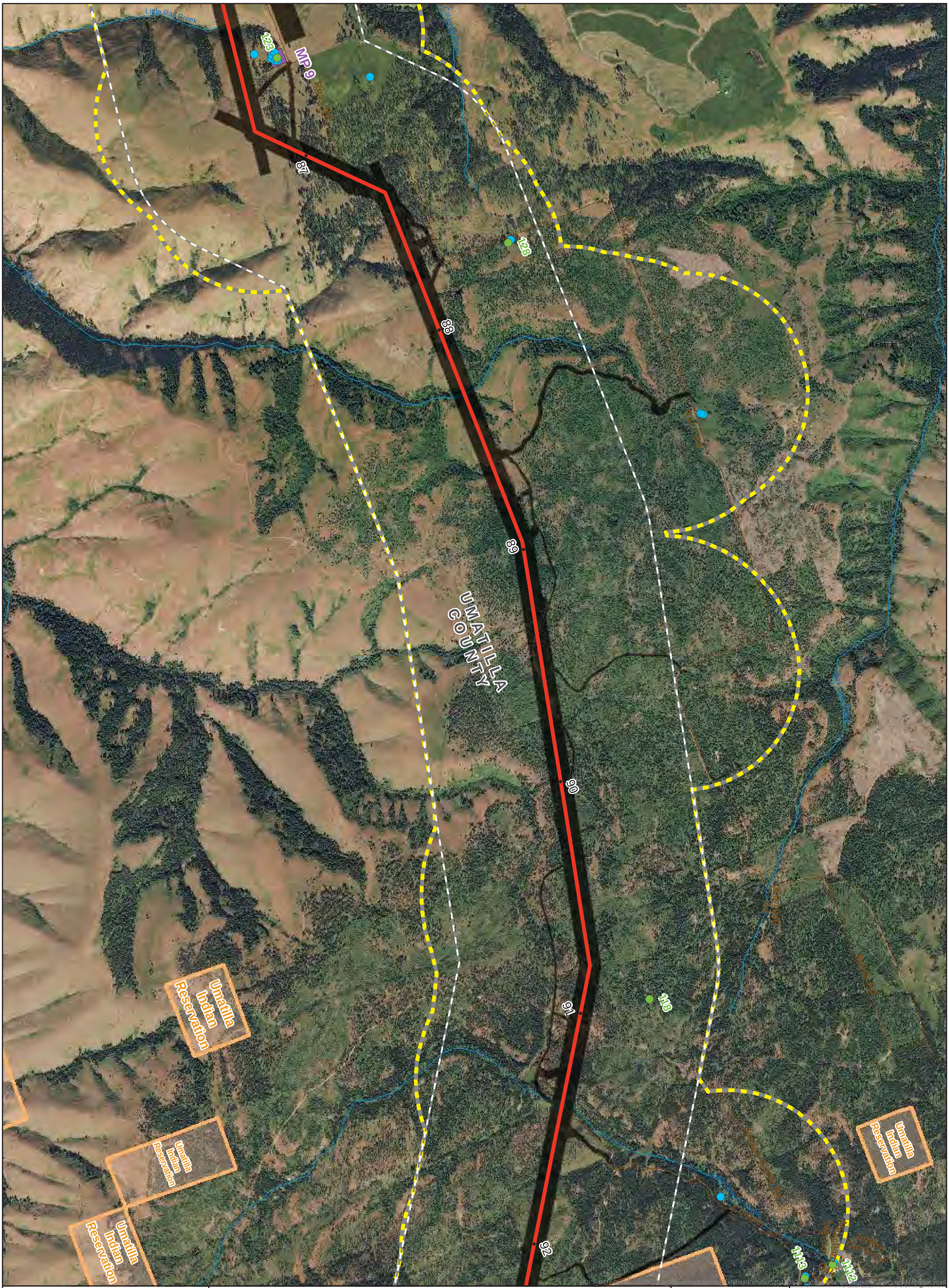

Attachment X-1
Noise Sensitive Receptors

Map 18 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER
An IDACORP Company

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
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- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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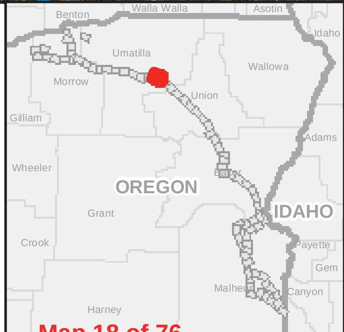

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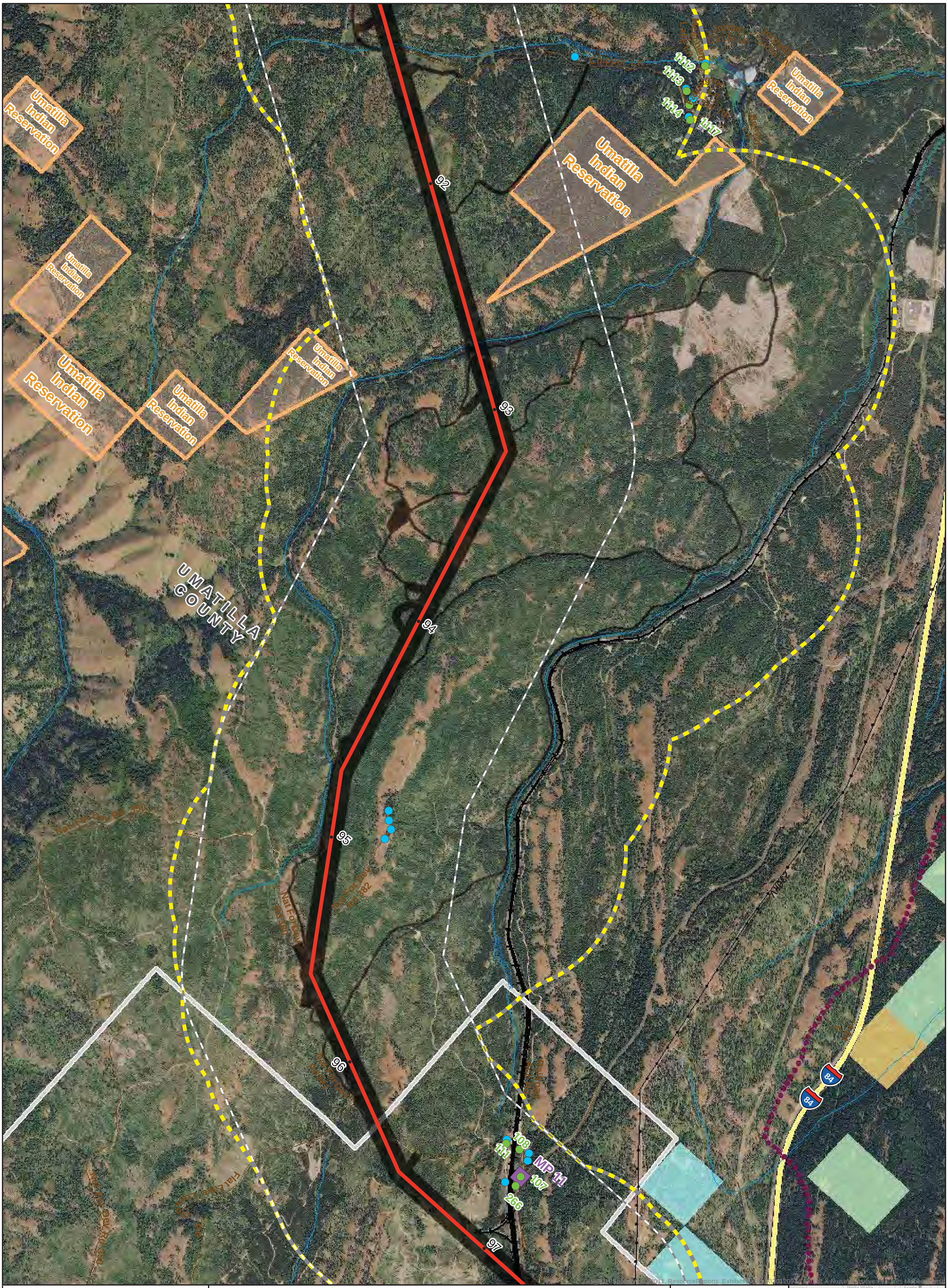

Attachment X-1
Noise Sensitive Receptors

Map 19 of 76
Proposed Route

Boardman to Hemingway Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
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Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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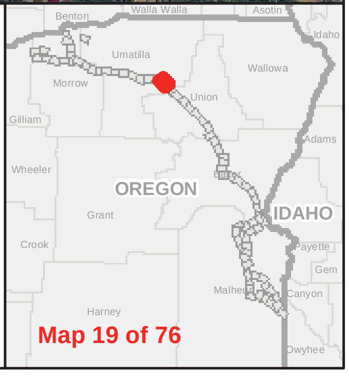
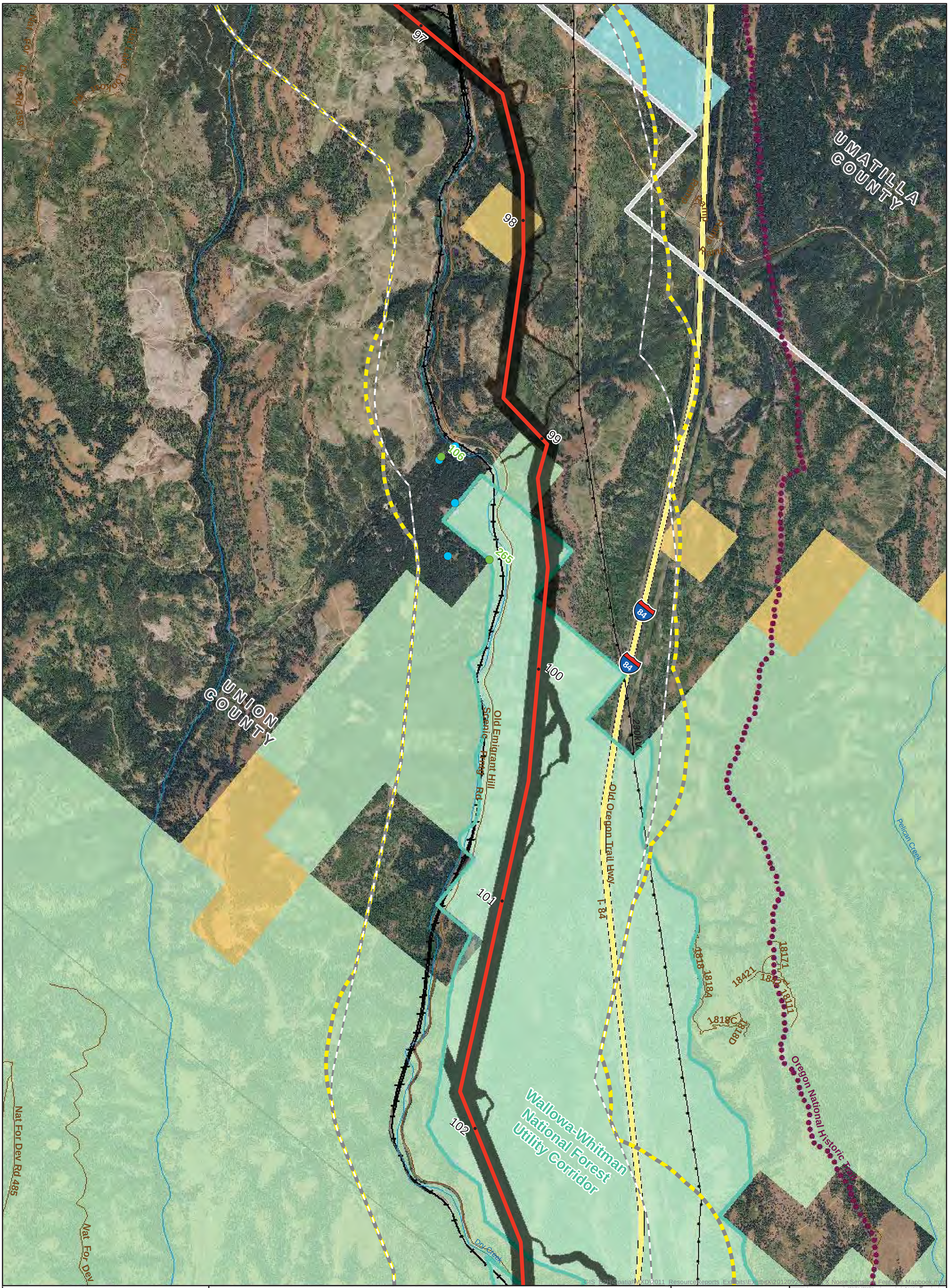
Feet





Attachment X-1
Noise Sensitive Receptors

Map 20 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
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- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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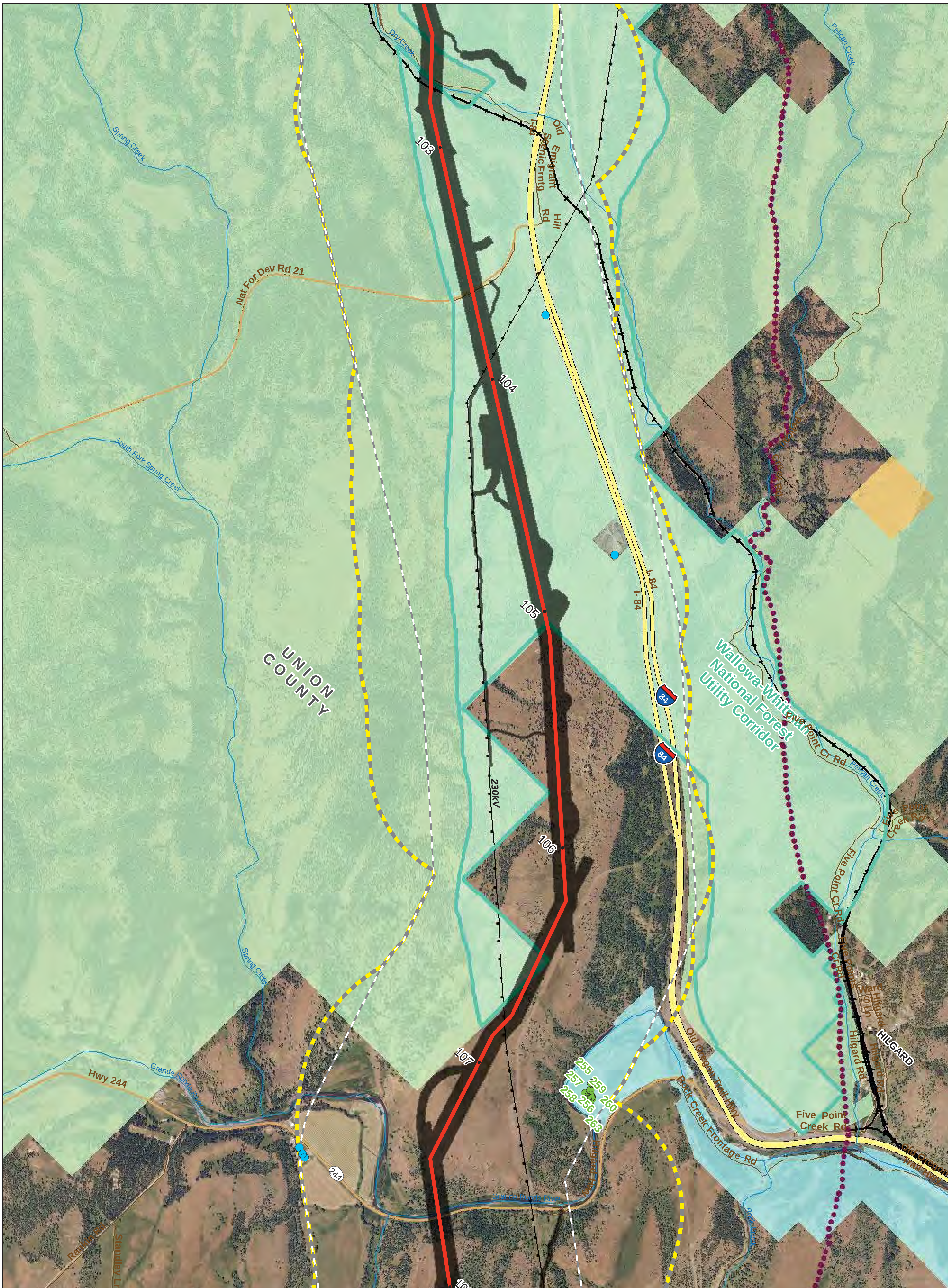
Feet

Map 20 of 76



Attachment X-1
Noise Sensitive Receptors

Map 21 of 76

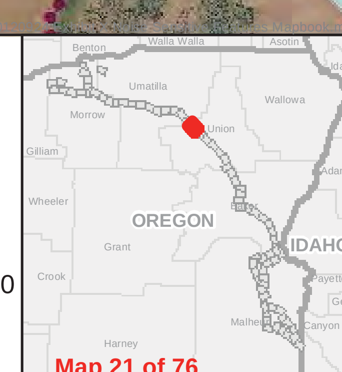
Proposed Route

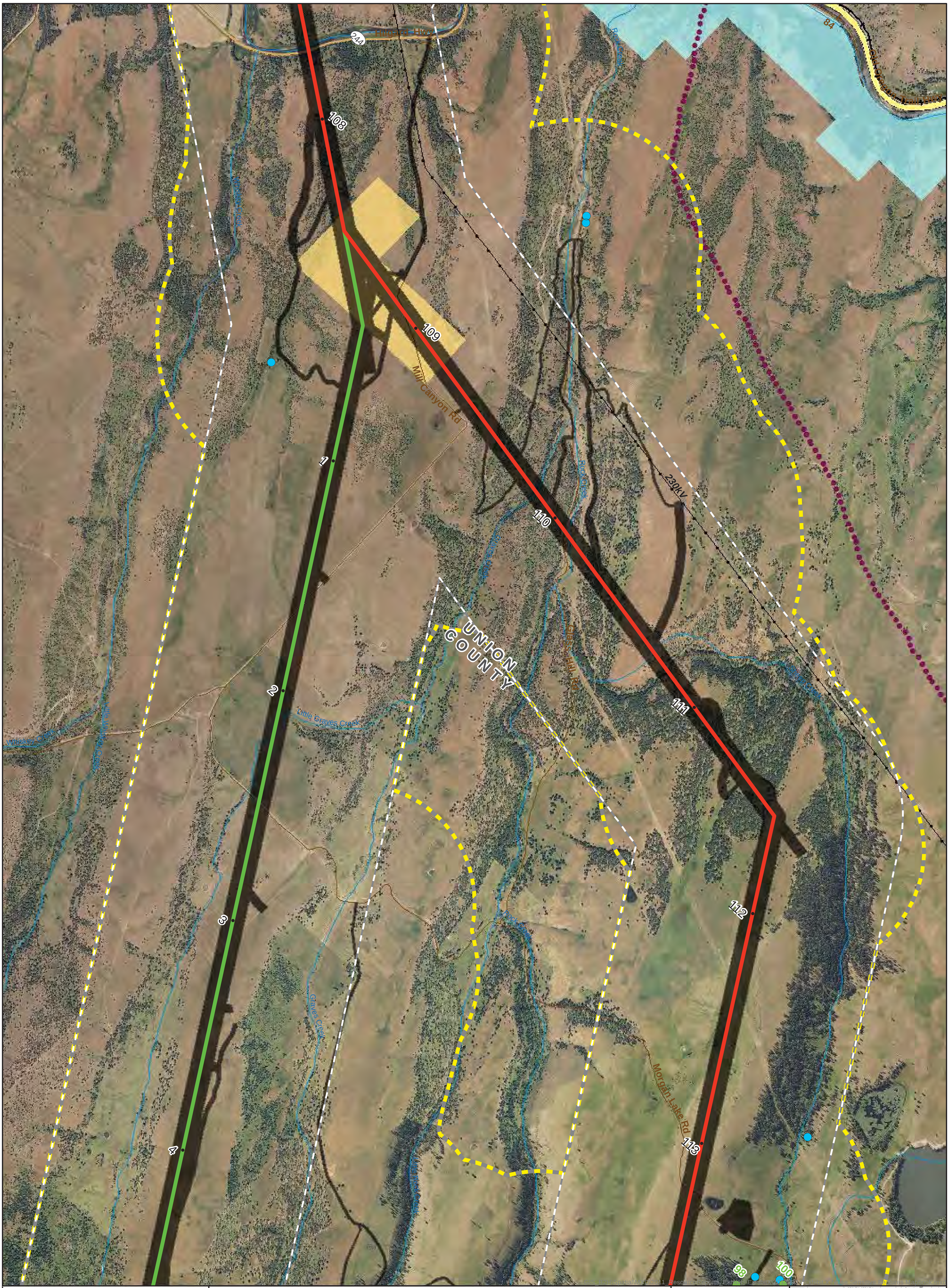
Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

0 1,000 2,000
Feet





Attachment X-1
Noise Sensitive Receptors

Map 22 of 76
Proposed Route/Glass Hill Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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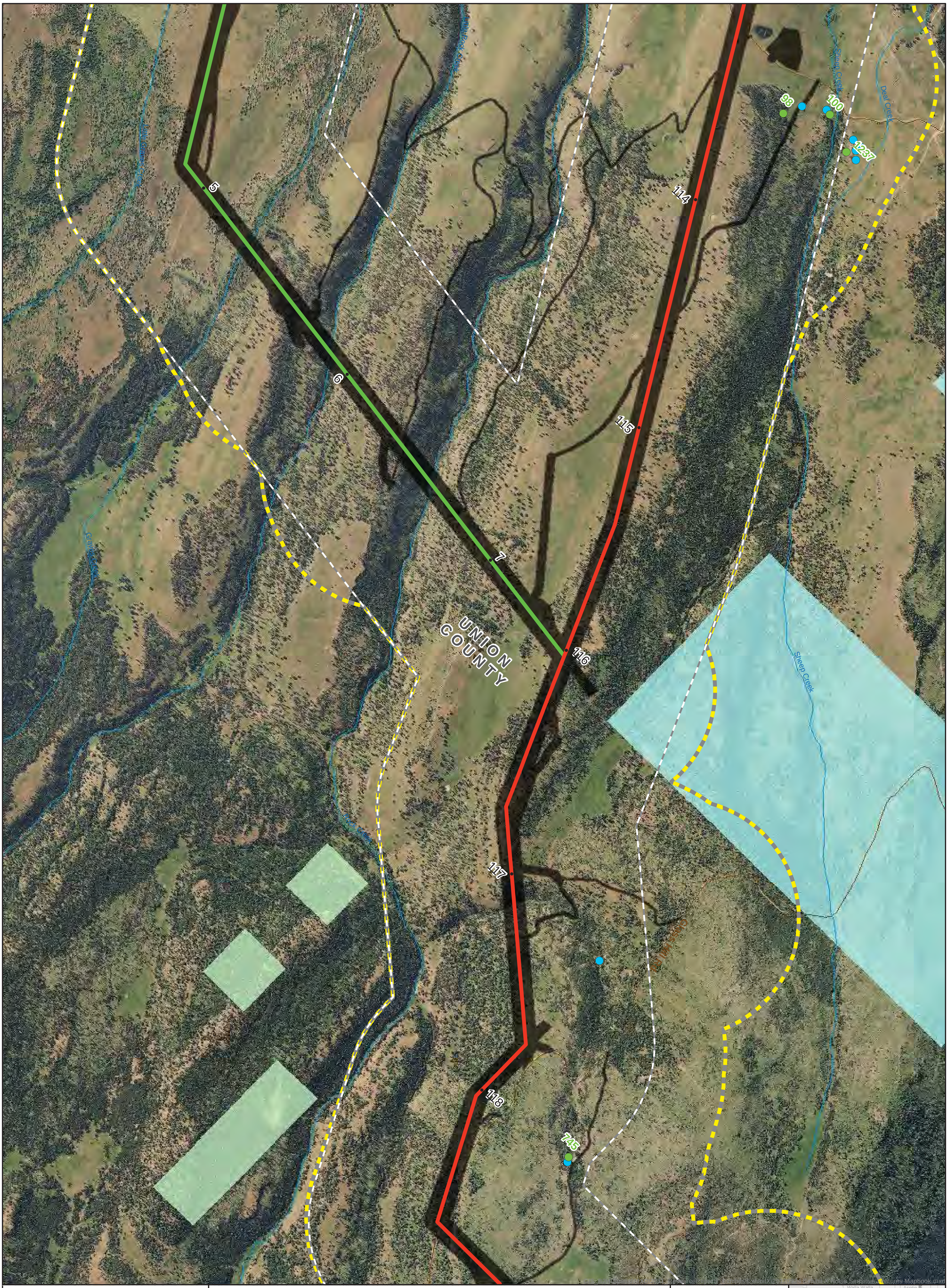
Feet



Attachment X-1
Noise Sensitive Receptors

Map 23 of 76
Proposed Route/Glass Hill Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER
An IDACORP Company

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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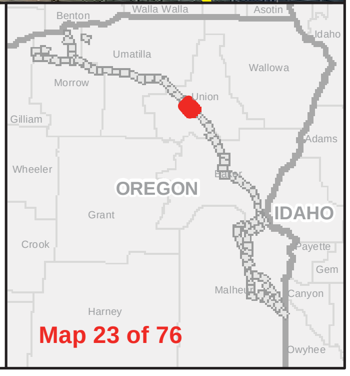
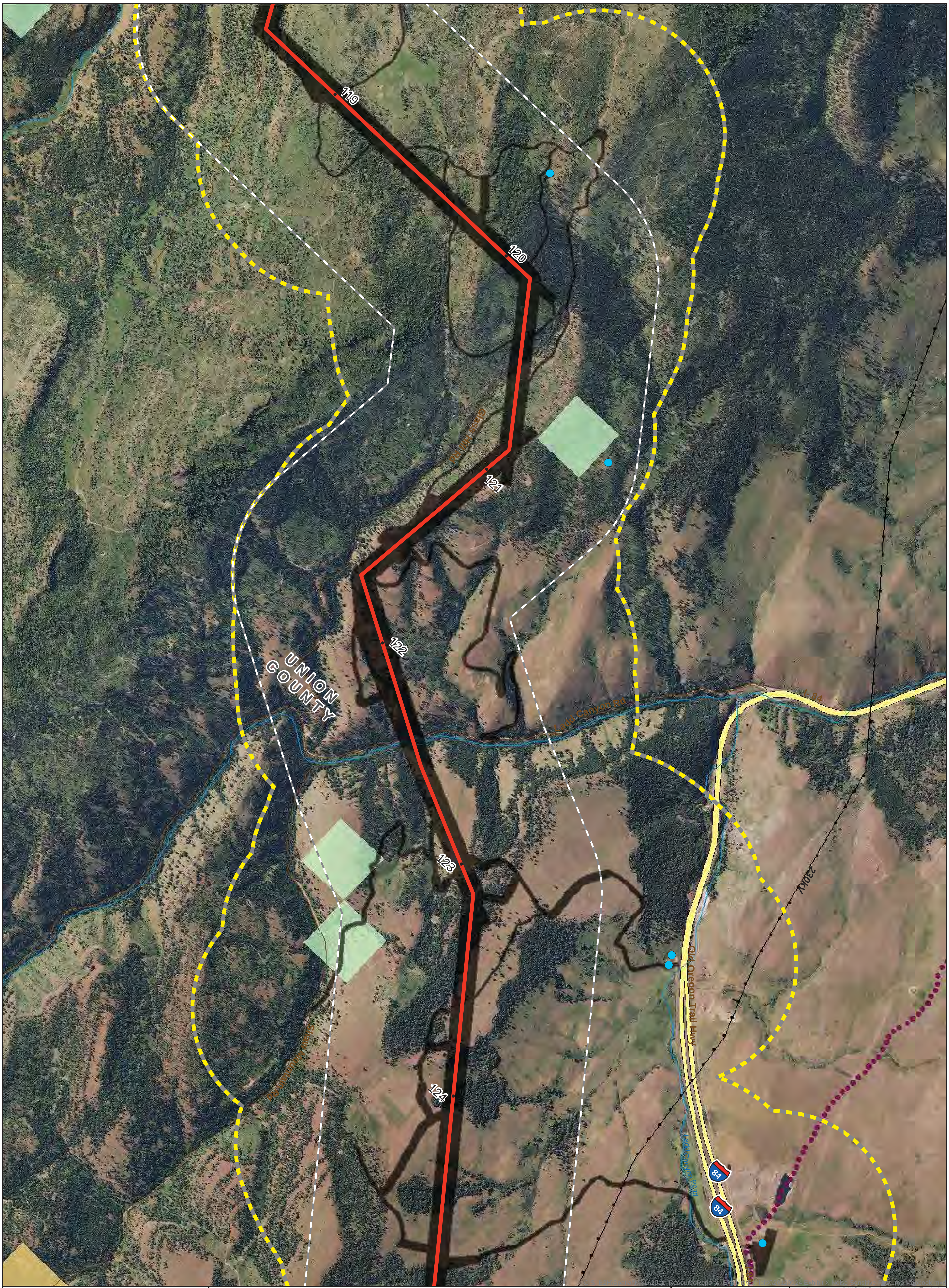
Feet





Attachment X-1
Noise Sensitive Receptors

Map 24 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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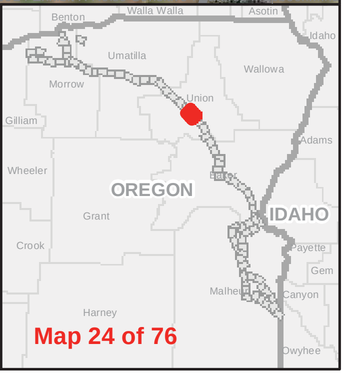
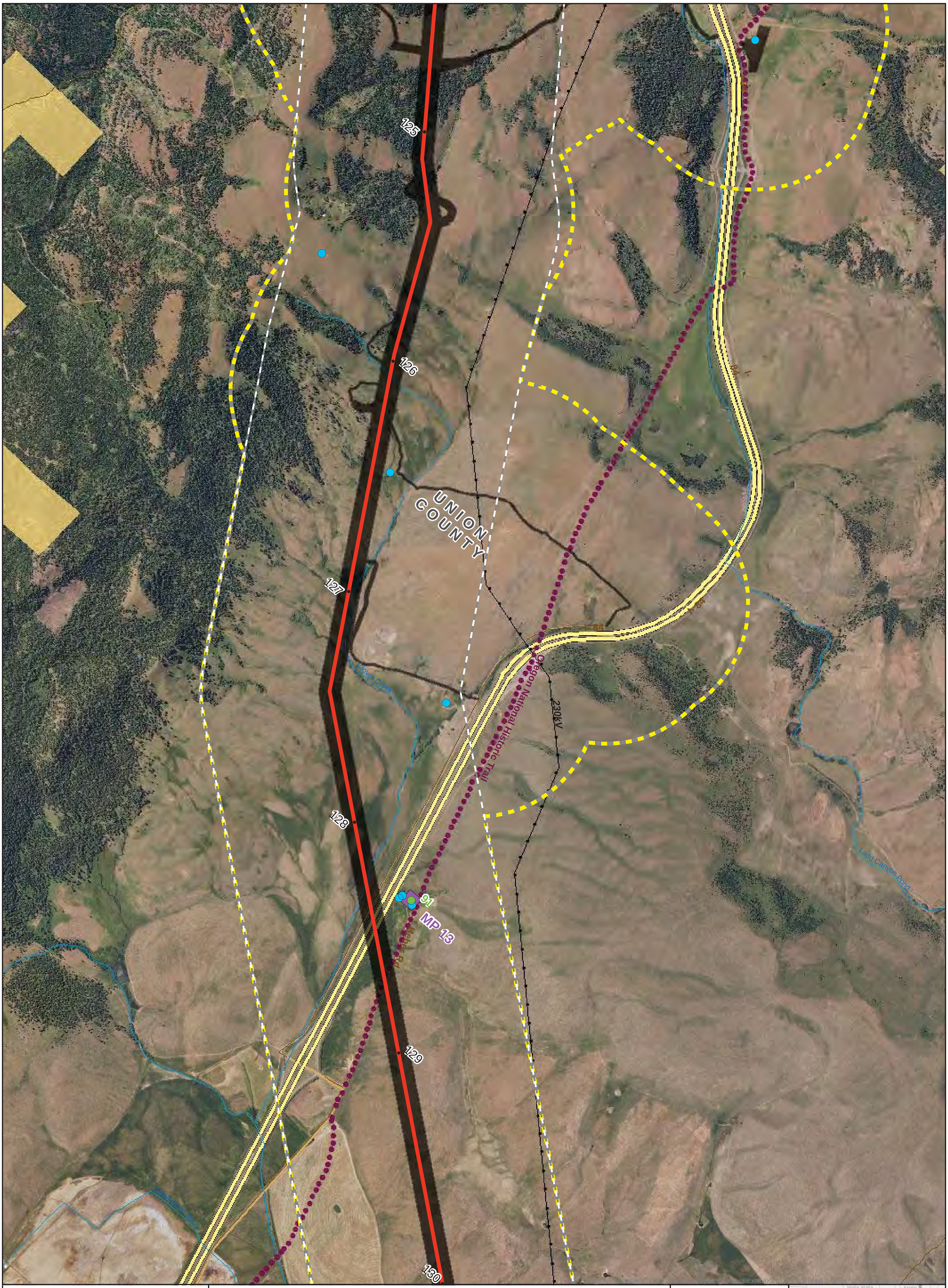
Feet



Map 24 of 76



Attachment X-1
Noise Sensitive Receptors

Map 25 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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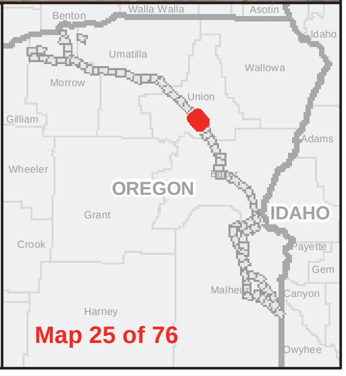
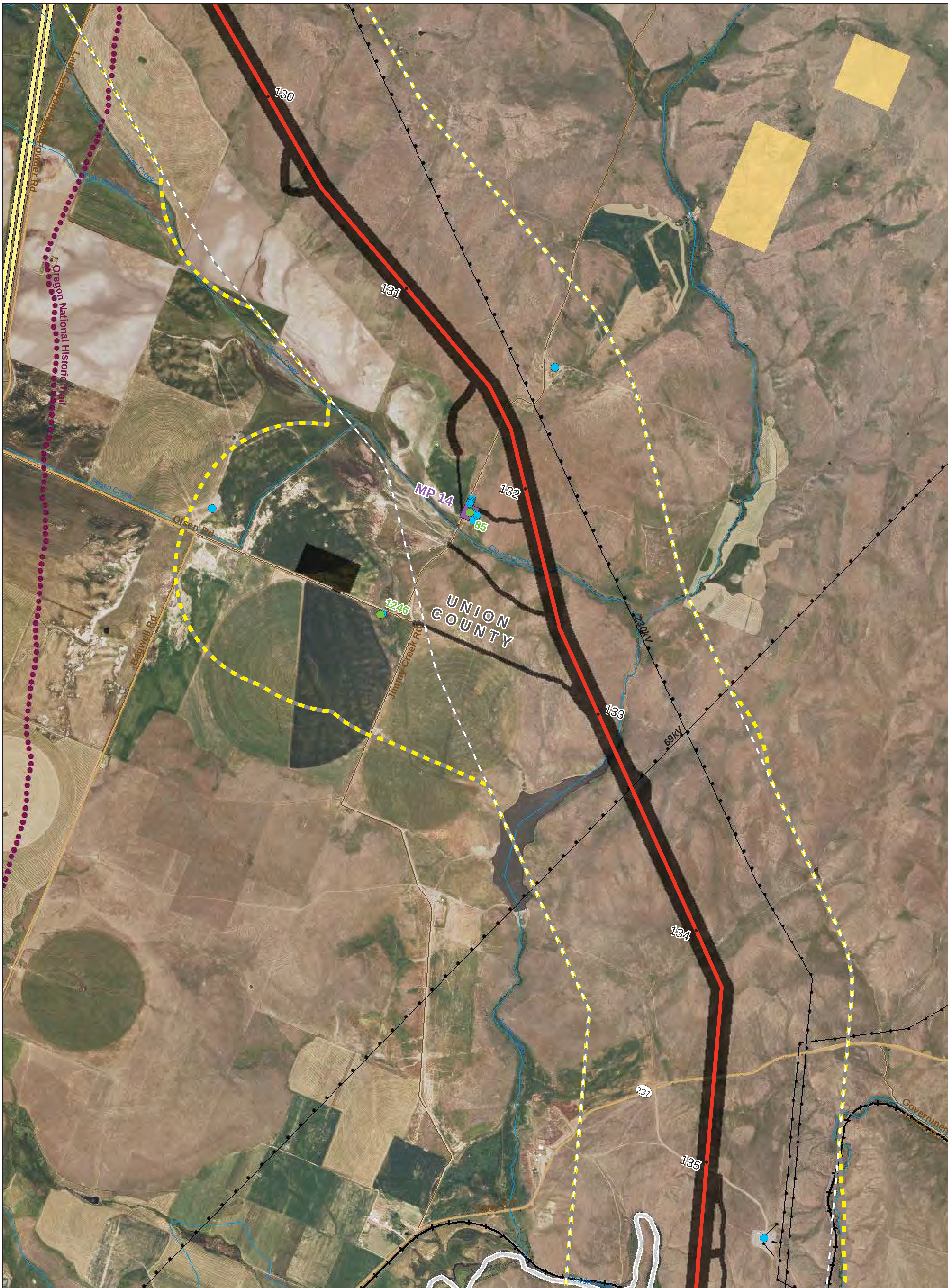
Feet





Attachment X-1
Noise Sensitive Receptors

Map 26 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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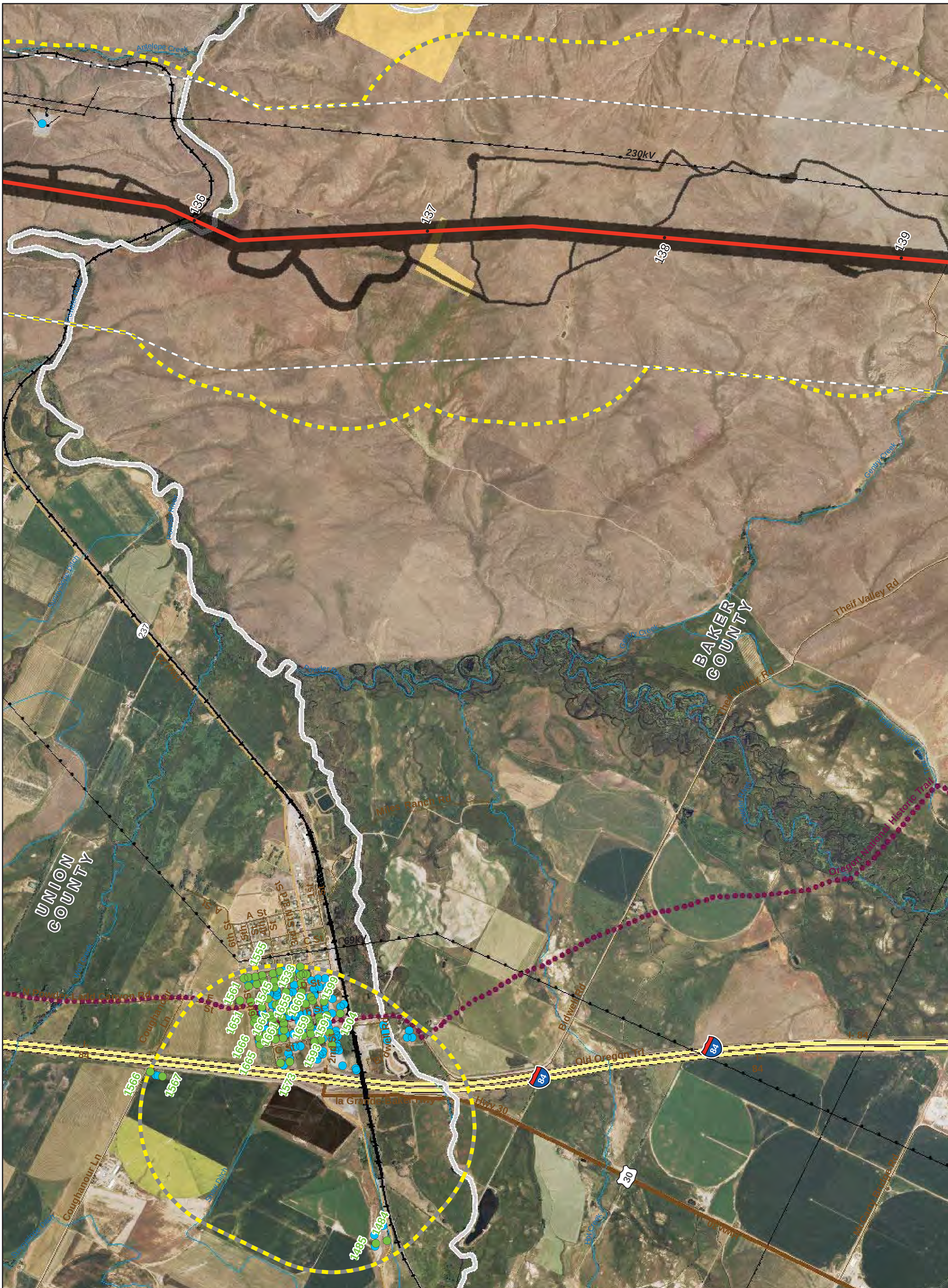
Feet



Attachment X-1
Noise Sensitive Receptors

Map 27 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

0 1,000 2,000
Feet

Map 27 of 76

Attachment X-1
Noise Sensitive Receptors

Map 28 of 76
Proposed Route

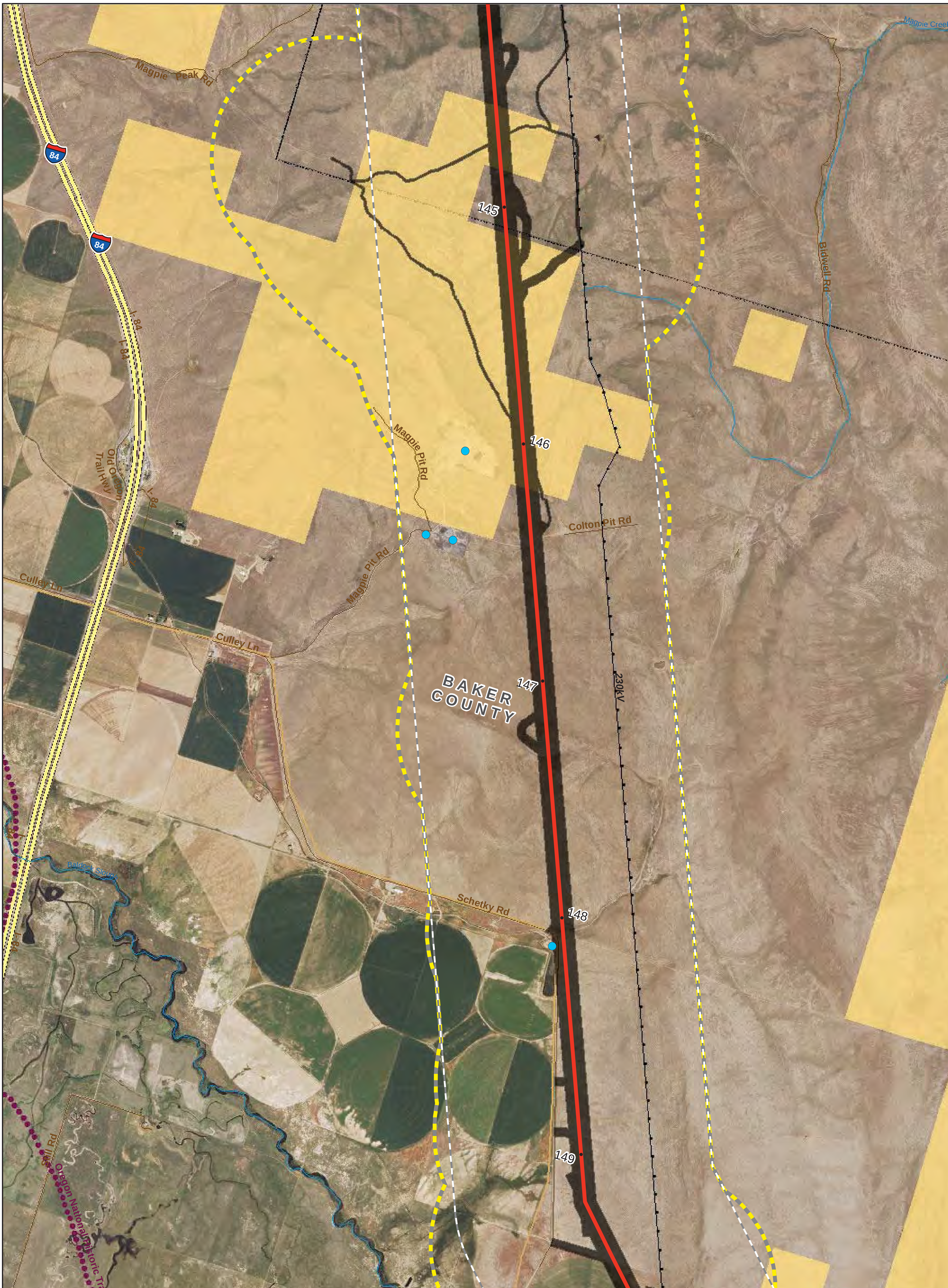
Boardman to Hemingway Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

0 1,000 2,000
Feet

OREGON
IDAHO
Map 28 of 76



Attachment X-1
Noise Sensitive Receptors

Map 29 of 76
Proposed Route/Flagstaff Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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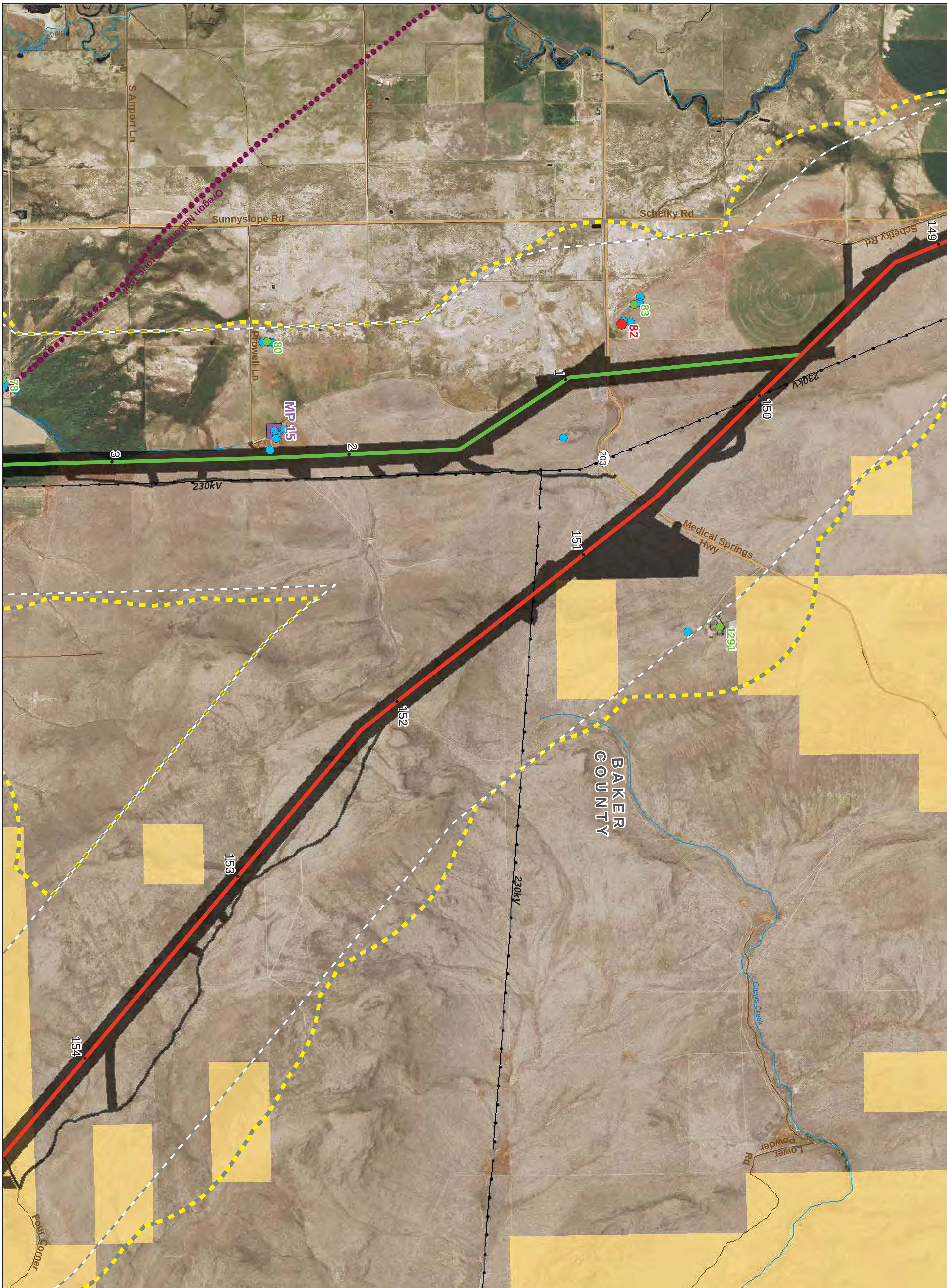
Feet

OREGON
IDAHO
Map 29 of 76



Attachment X-1
Noise Sensitive Receptors

Map 30 of 76

Proposed Route/Flagstaff Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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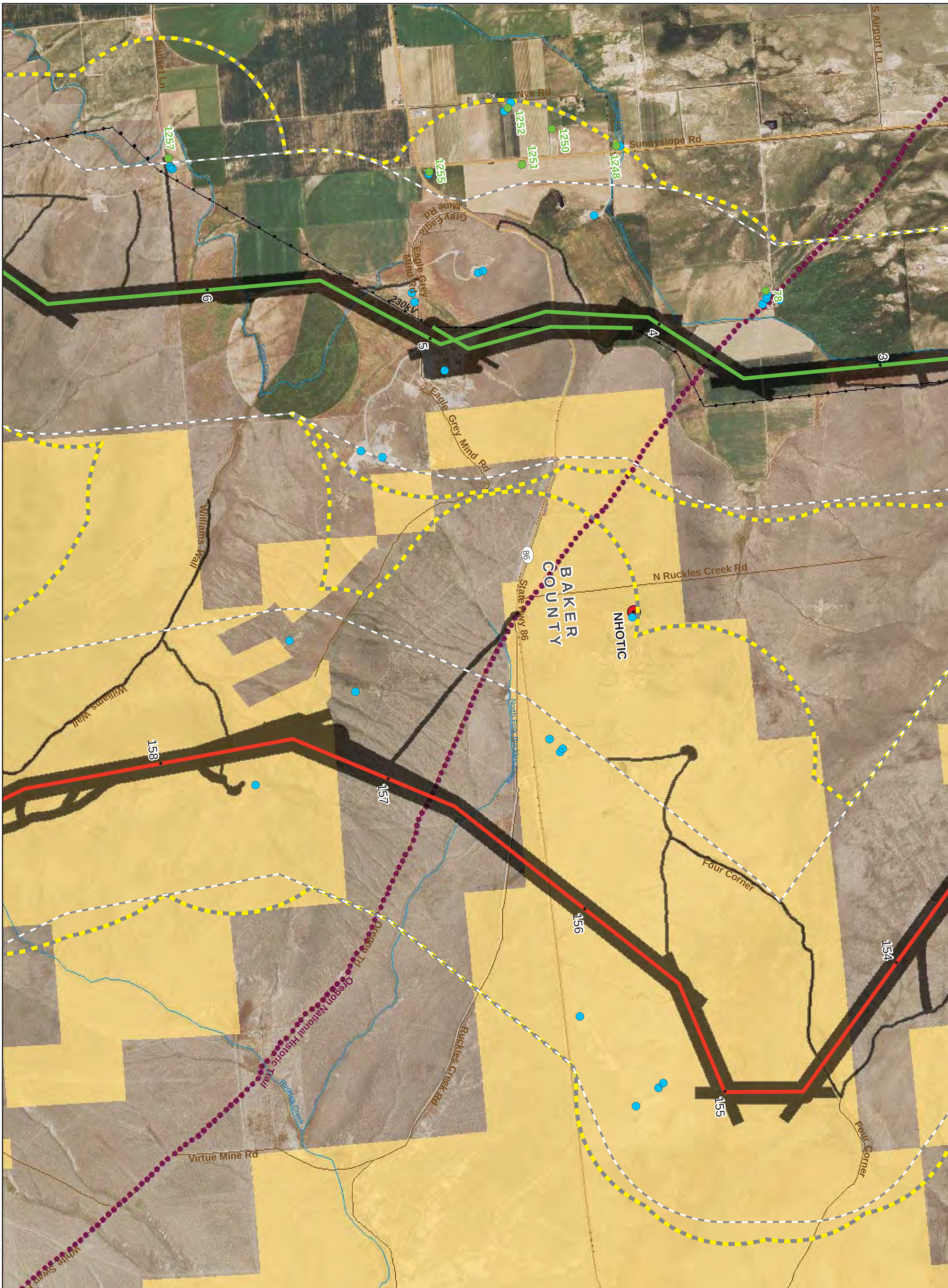
Feet

OREGON
IDAHO
Map 30 of 76



Attachment X-1
Noise Sensitive Receptors

Map 31 of 76
Proposed Route/Flagstaff Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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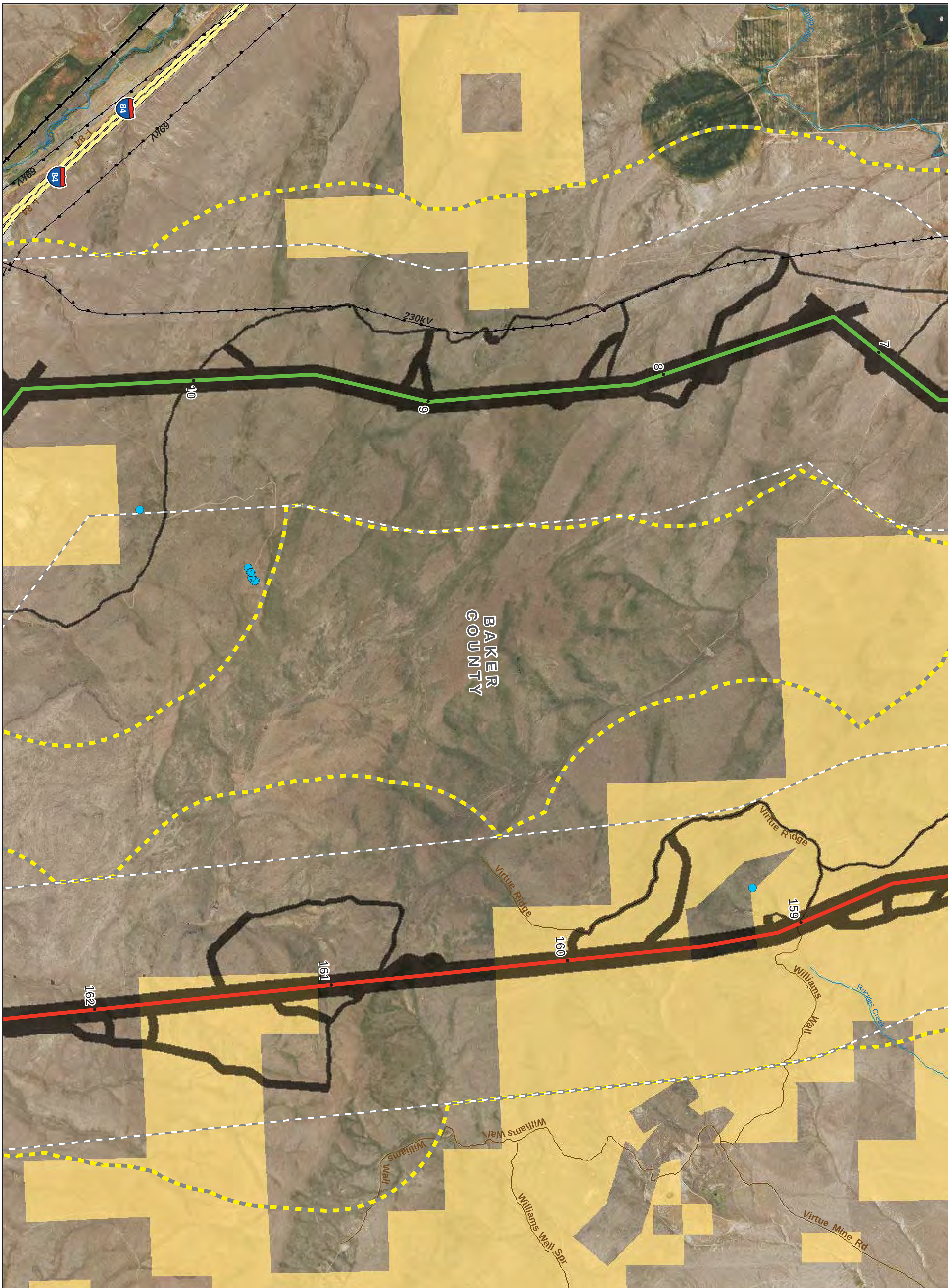
Feet

OREGON
IDAHO
Map 31 of 76



Attachment X-1
Noise Sensitive Receptors

Map 32 of 76
Proposed Route/Flagstaff Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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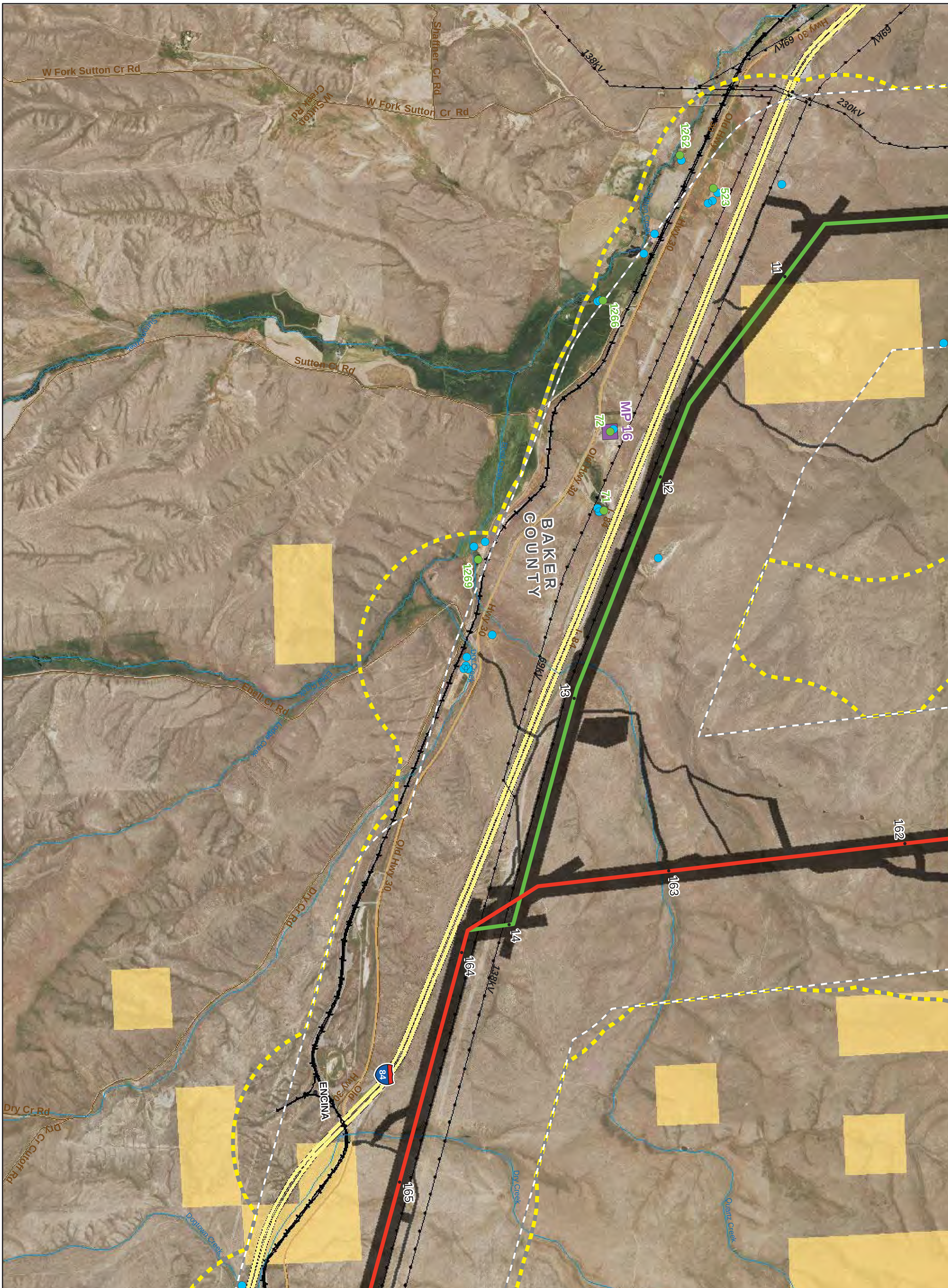
Feet



Attachment X-1
Noise Sensitive Receptors

Map 33 of 76

Proposed Route/Flagstaff Alternate

Boardman to Hemingway Transmission Line Project Oregon-Idaho

February 2013

IDAHO POWER. An IDACORP Company

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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Feet

OREGON

IDAHO

Map 33 of 76

Attachment X-1
Noise Sensitive Receptors

Map 34 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER
An IDACORP Company

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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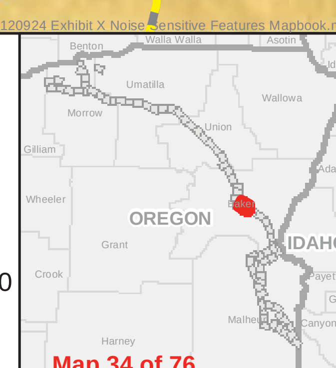
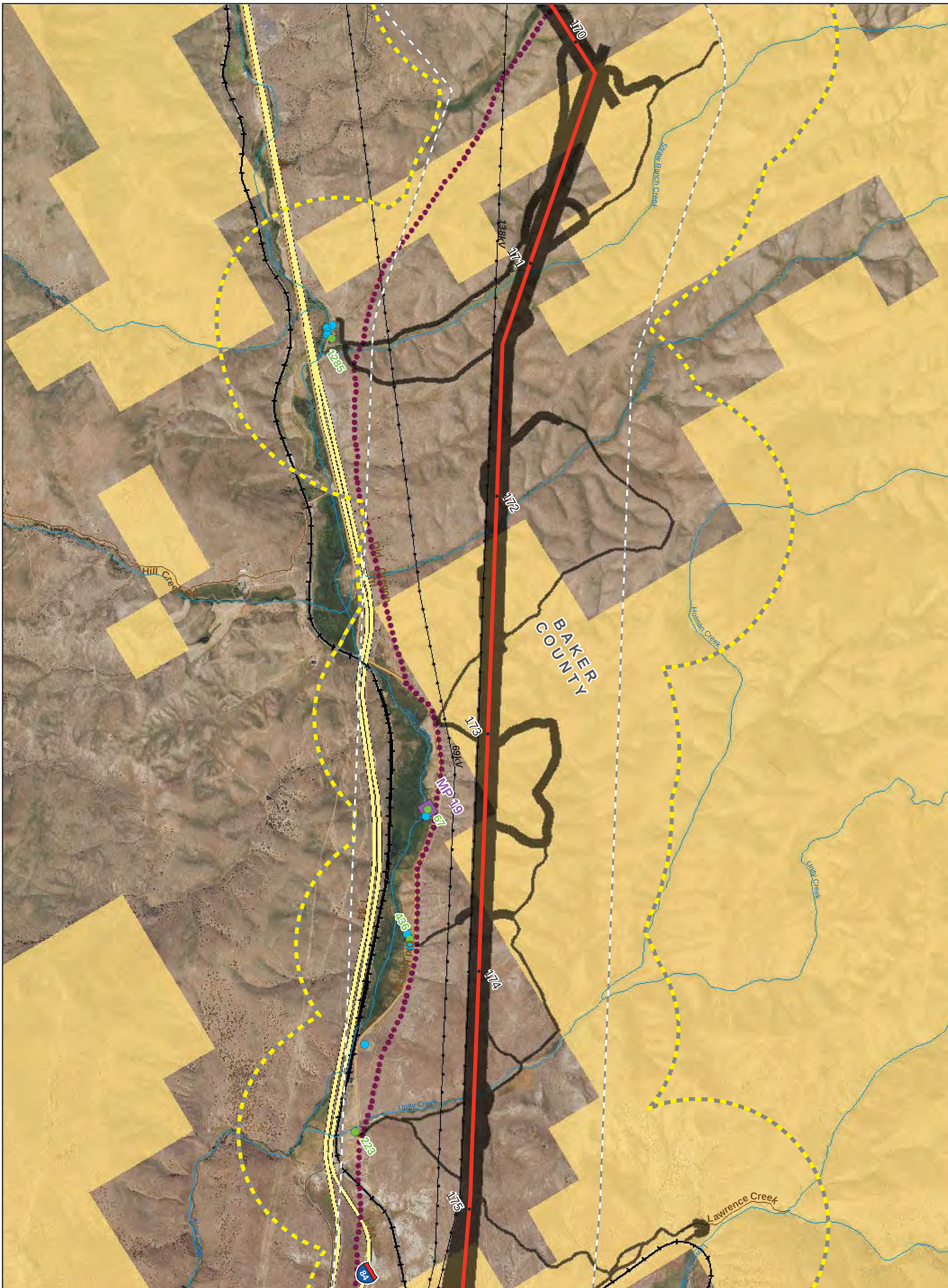
Feet





Attachment X-1
Noise Sensitive Receptors

Map 35 of 76

Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER. An IDACORP Company

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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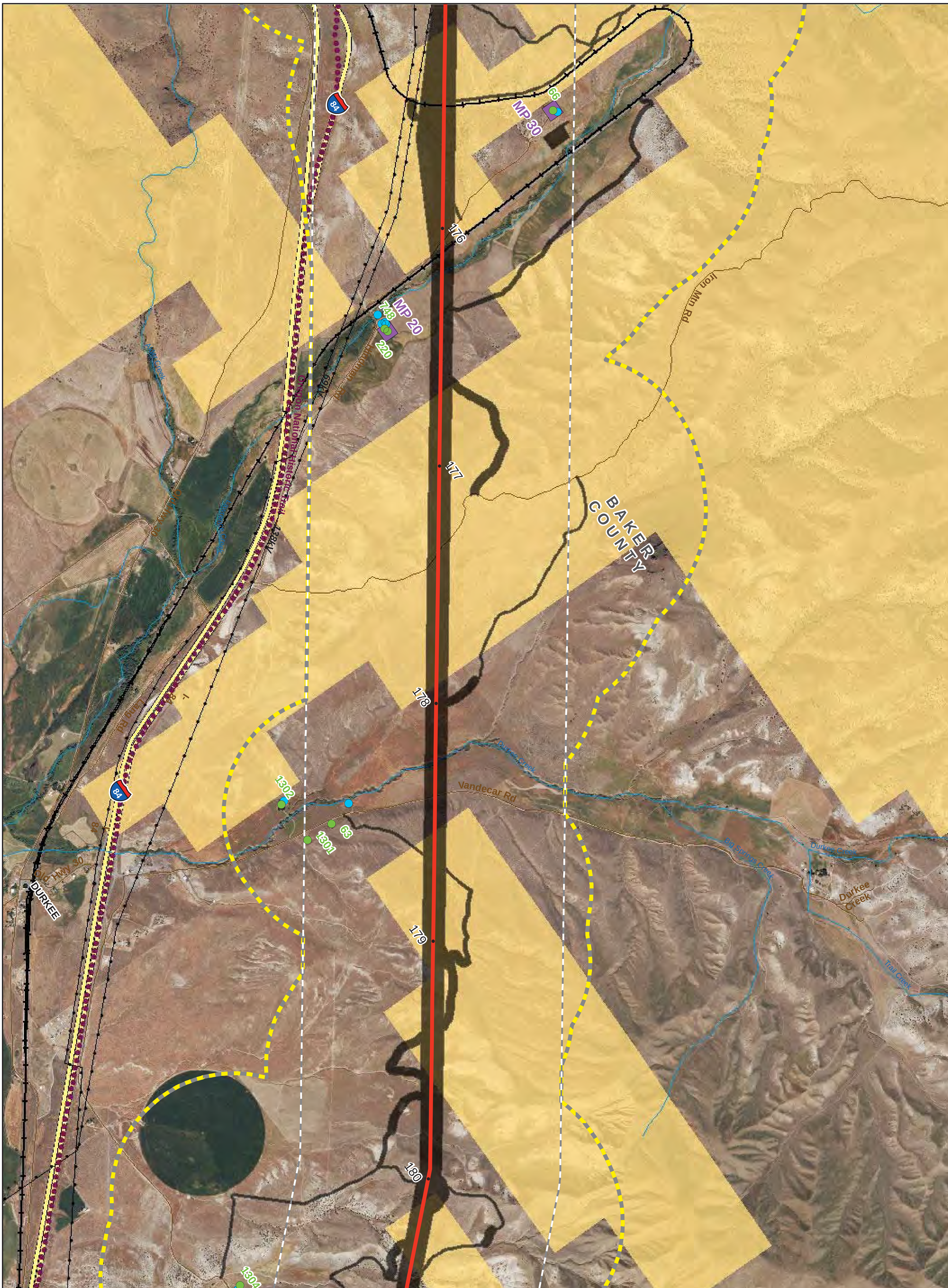
Feet

OREGON
IDAHO
Map 35 of 76



Attachment X-1
Noise Sensitive Receptors

Map 36 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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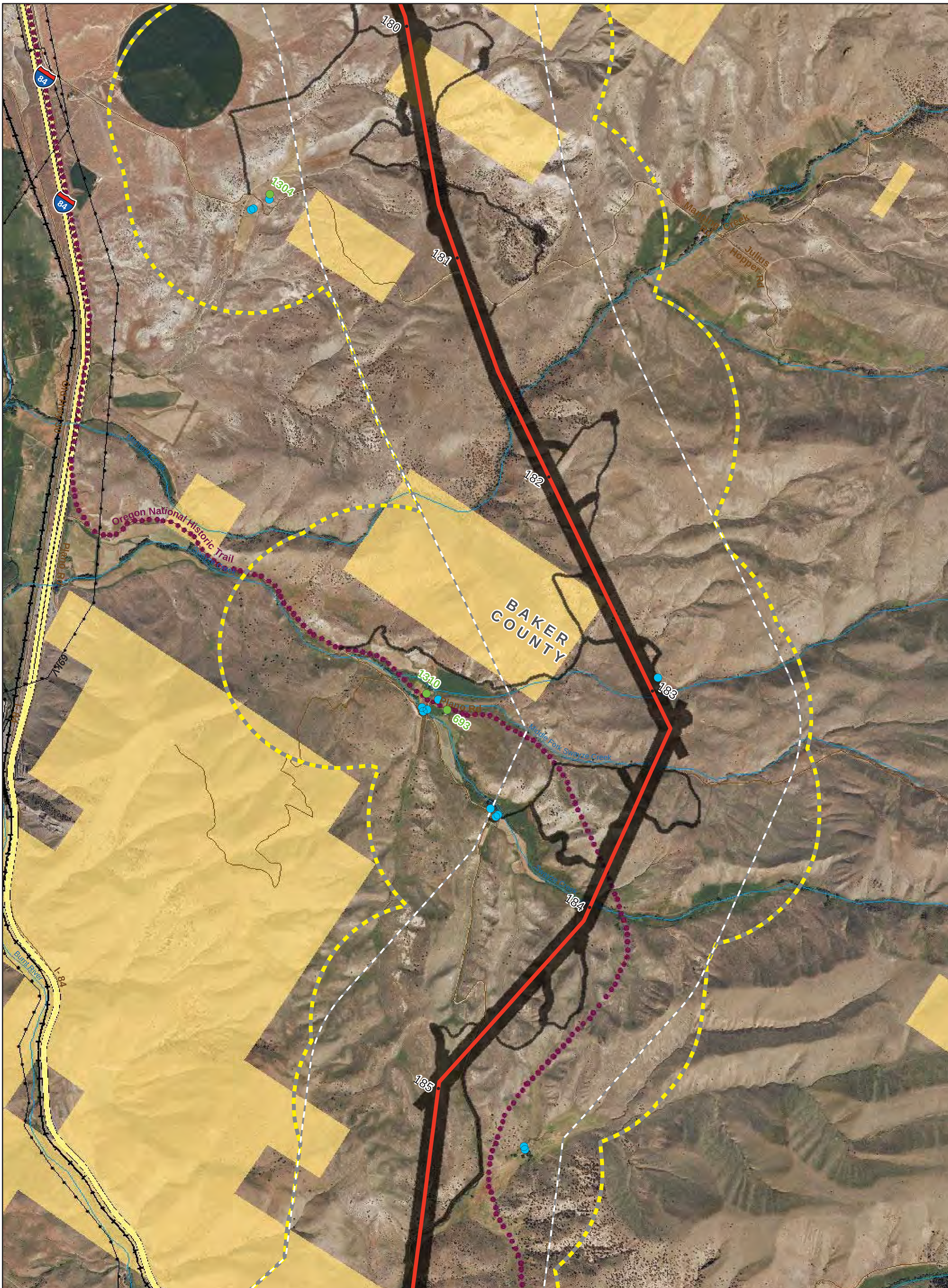
Feet

Map 36 of 76



Attachment X-1
Noise Sensitive Receptors

Map 37 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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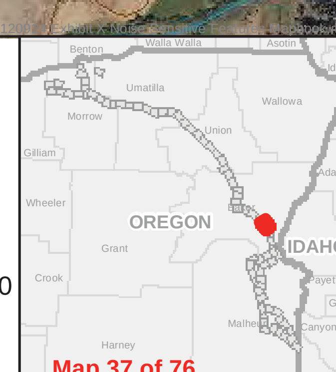
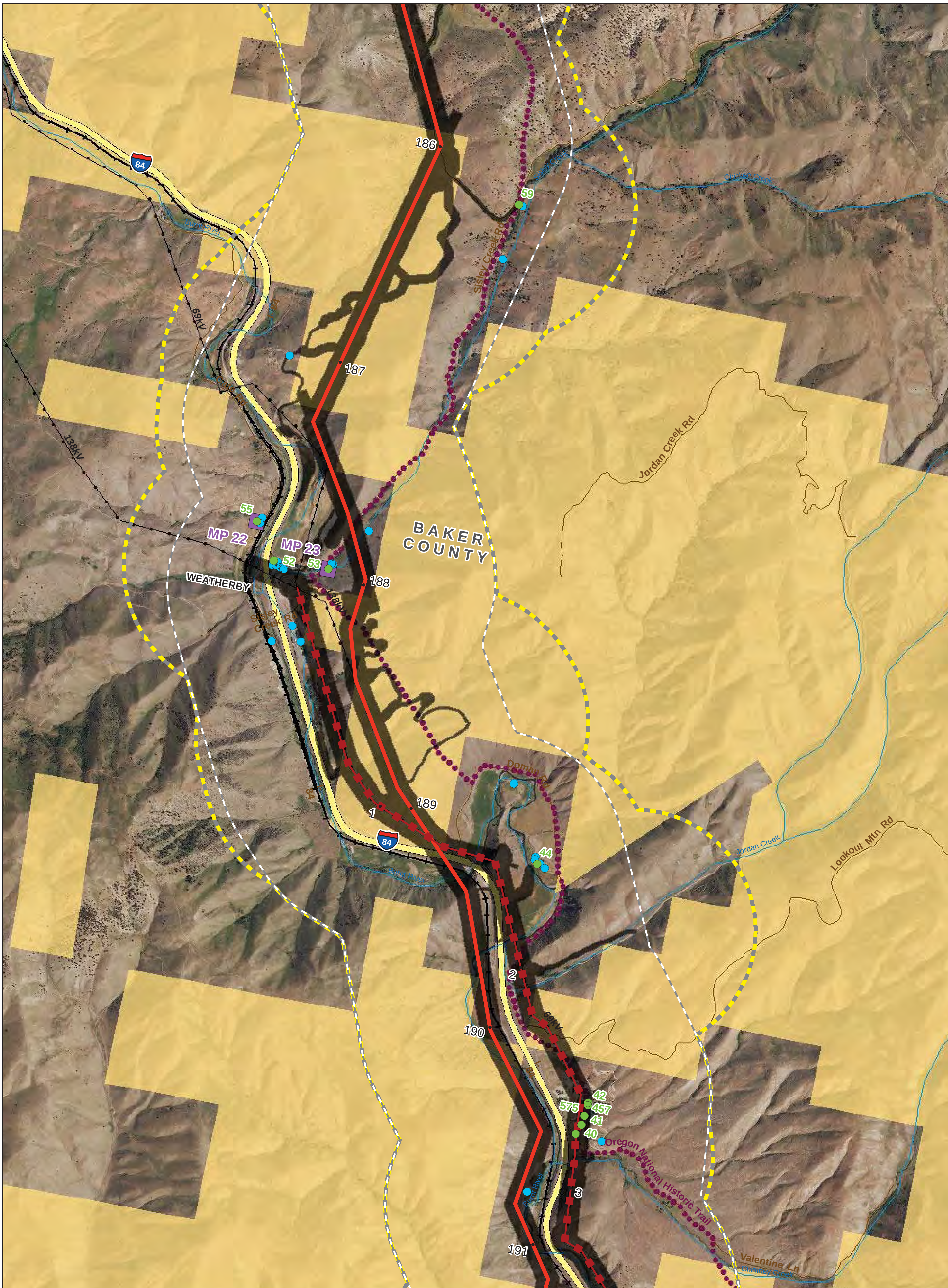
Feet





Attachment X-1
Noise Sensitive Receptors

Map 38 of 76
Proposed Route/Rebuild

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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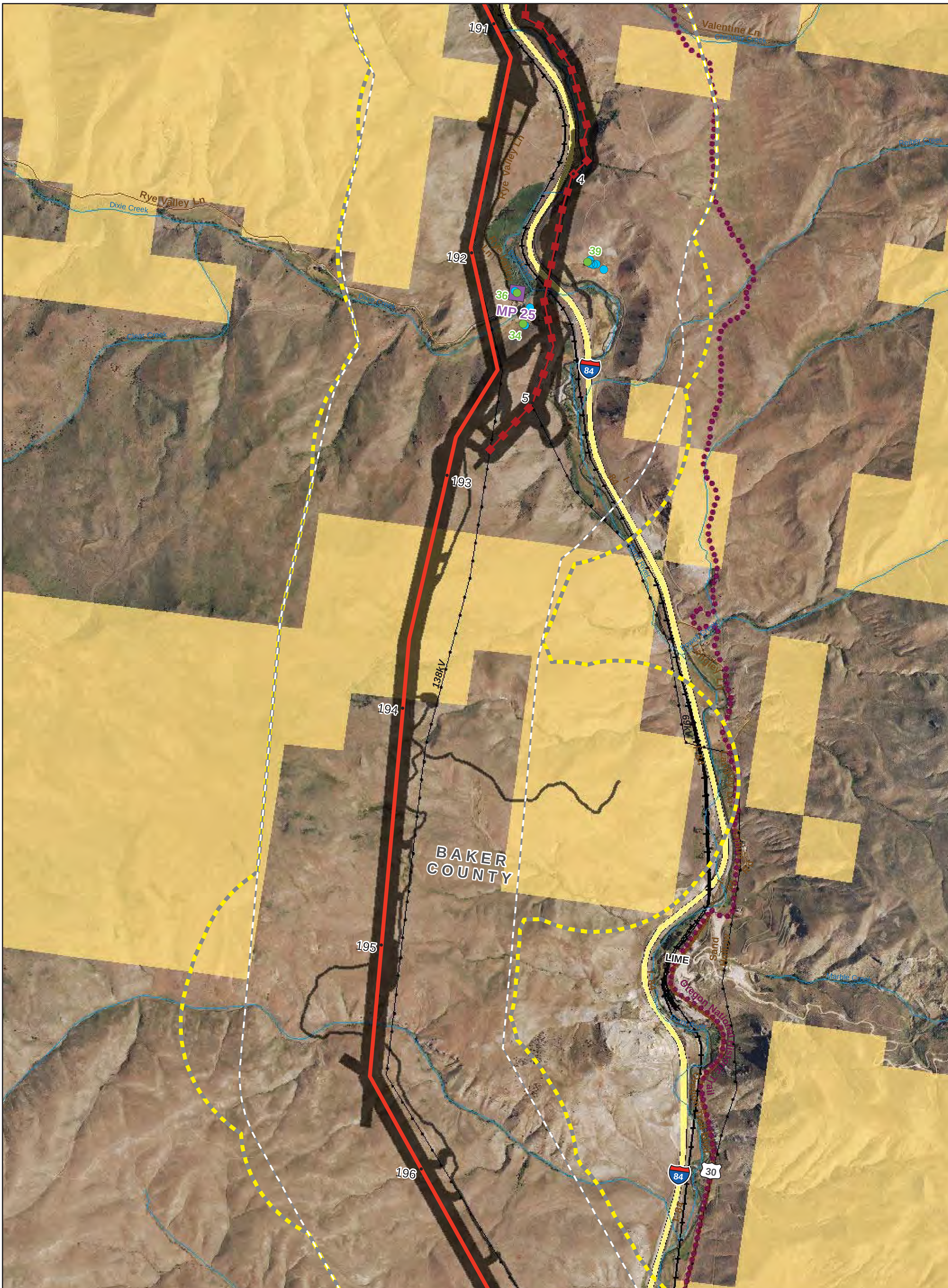
Feet



Attachment X-1
Noise Sensitive Receptors

Map 39 of 76
Proposed Route/Rebuild

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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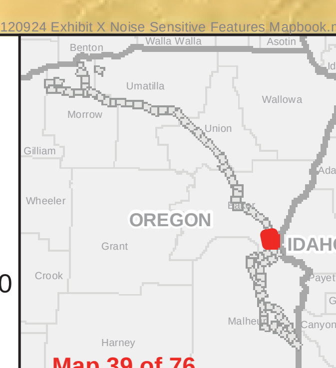
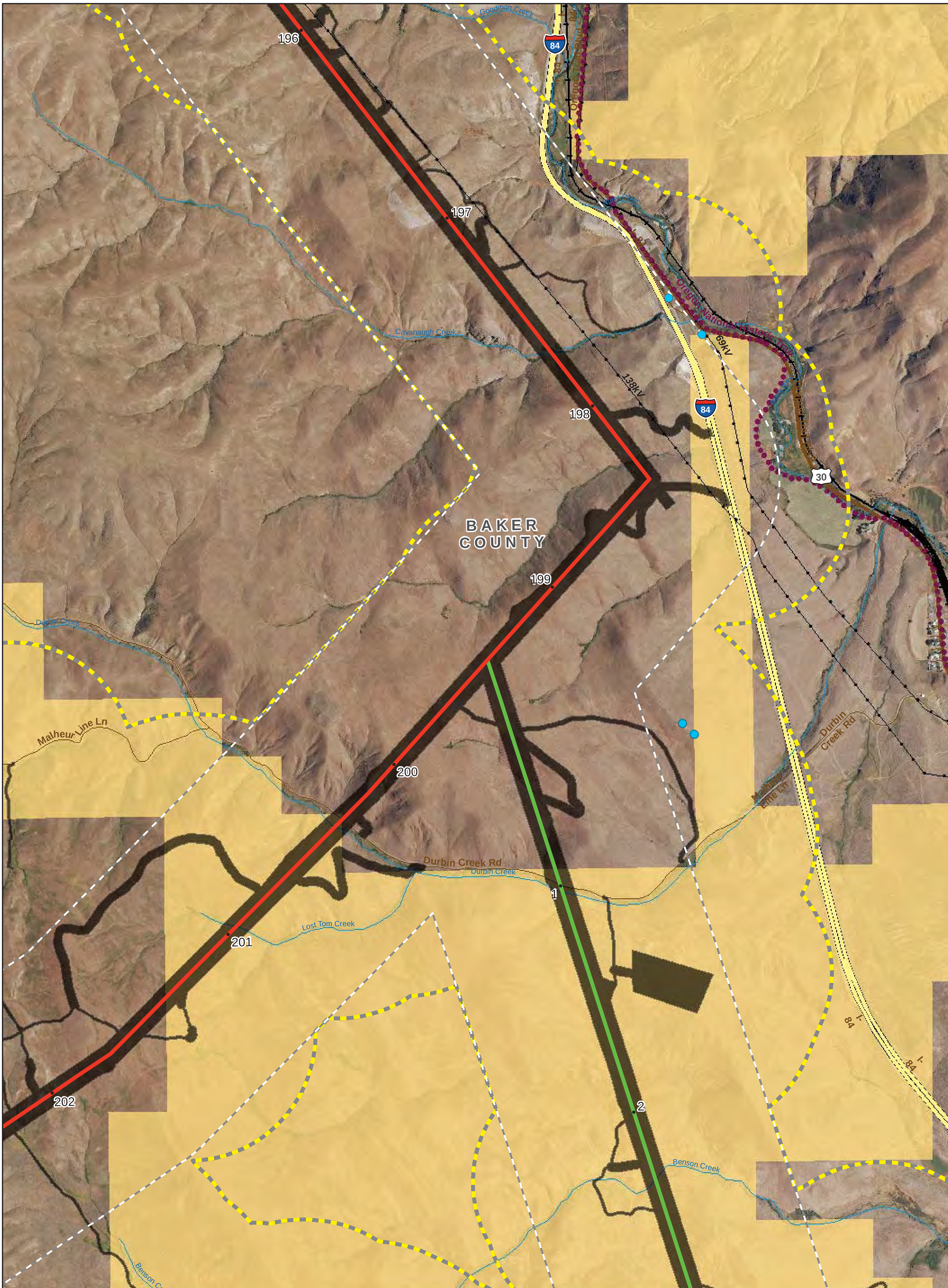
Feet



Map 39 of 76



Attachment X-1
Noise Sensitive Receptors

Map 40 of 76
Proposed Route

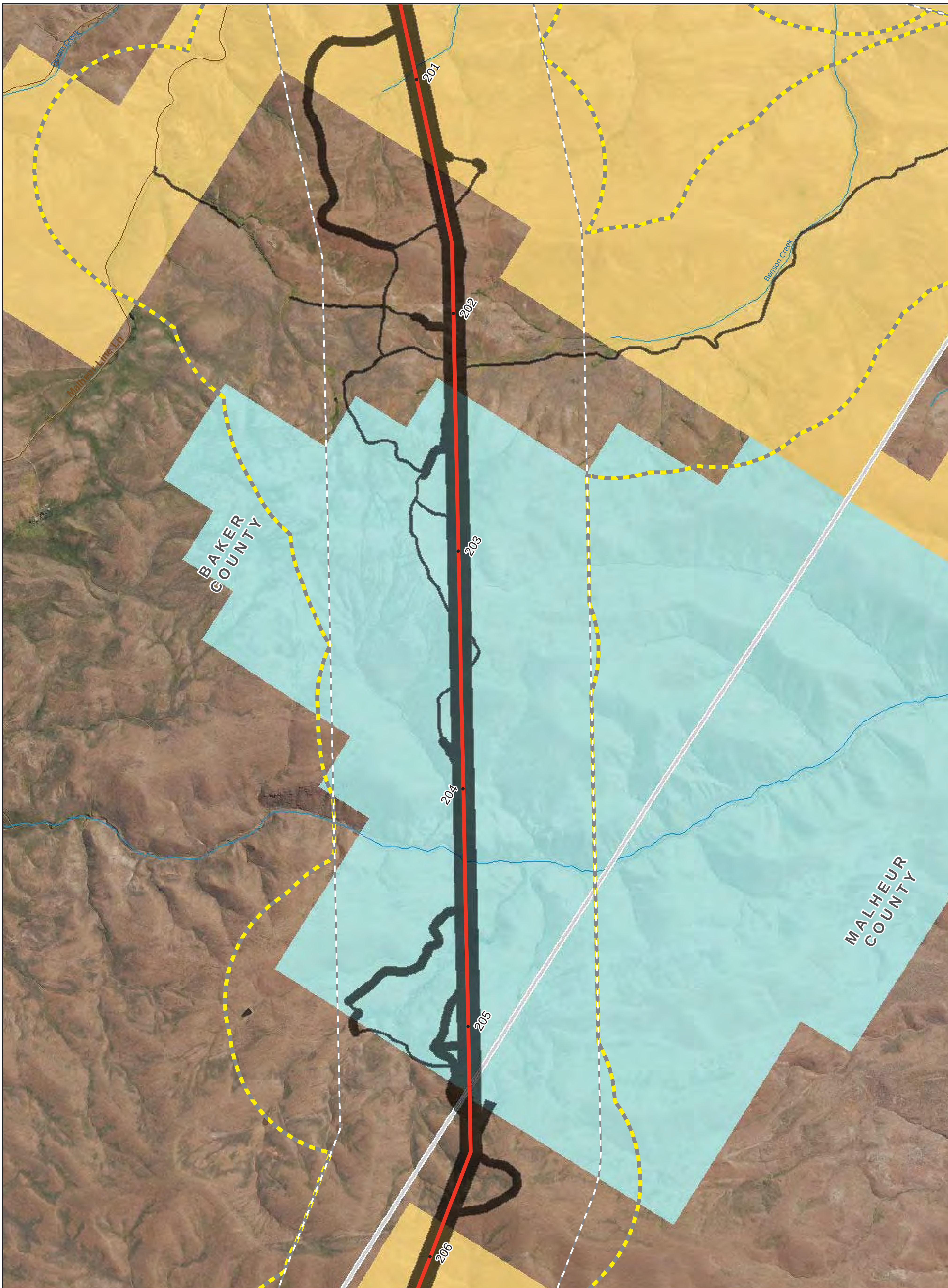
Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

0 1,000 2,000
Feet

OREGON
IDAHO
Map 40 of 76



Attachment X-1
Noise Sensitive Receptors

Map 41 of 76
Proposed Route

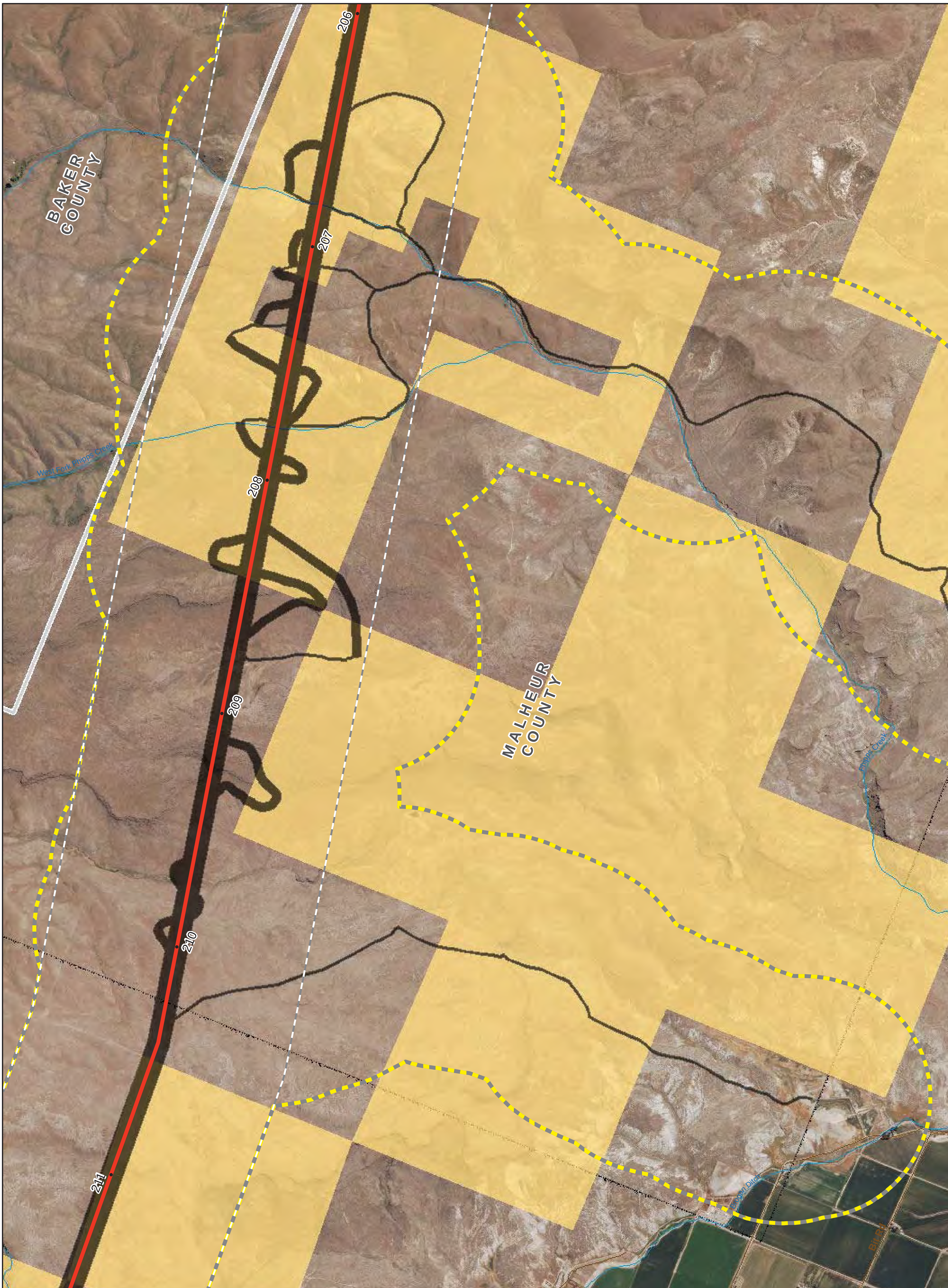
Boardman to Hemingway Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

0 1,000 2,000
Feet

OREGON
IDAHO
Map 41 of 76



Attachment X-1
Noise Sensitive Receptors

Map 42 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary

Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary

Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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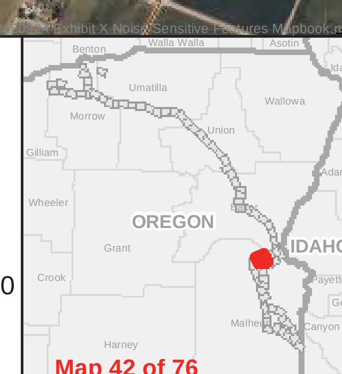
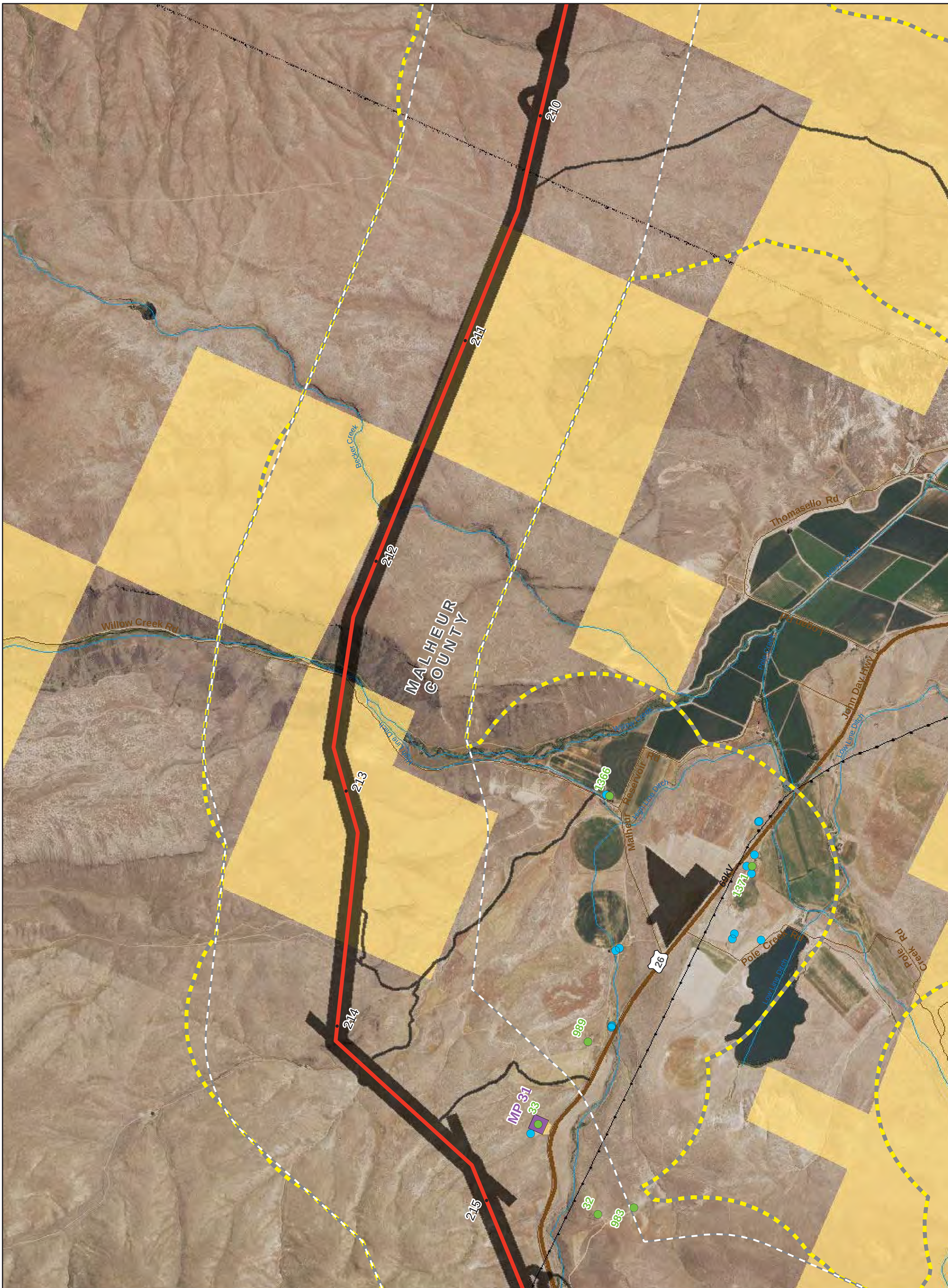
Feet





Attachment X-1
Noise Sensitive Receptors

Map 43 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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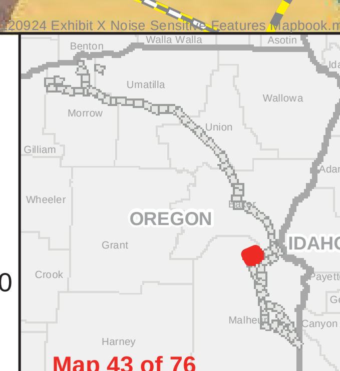

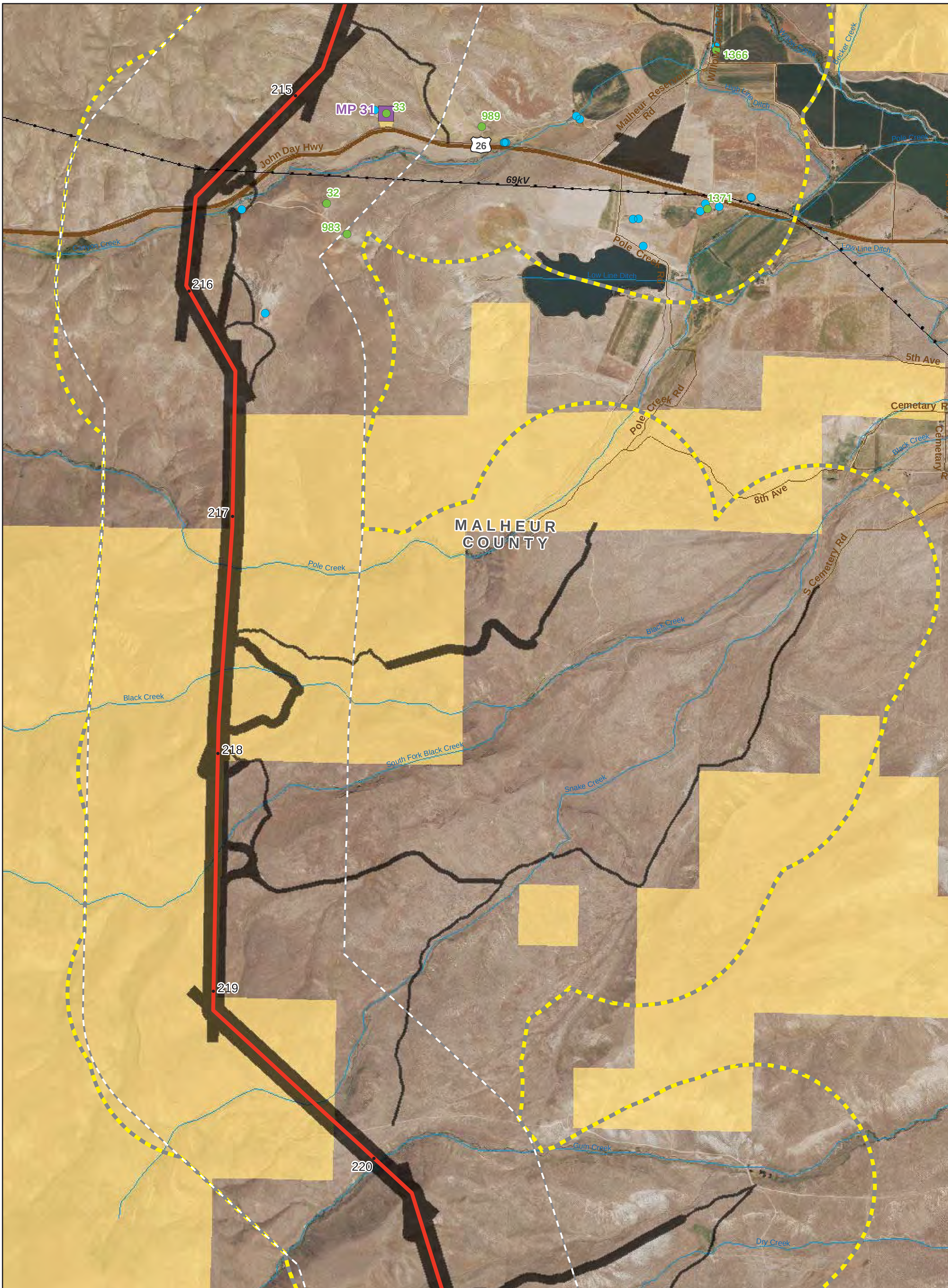

Attachment X-1
Noise Sensitive Receptors

Map 44 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary

Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary

Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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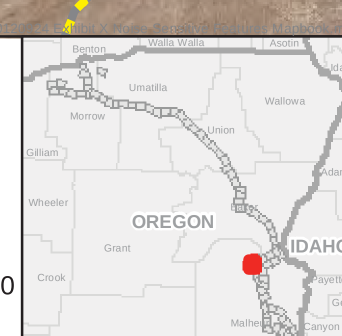
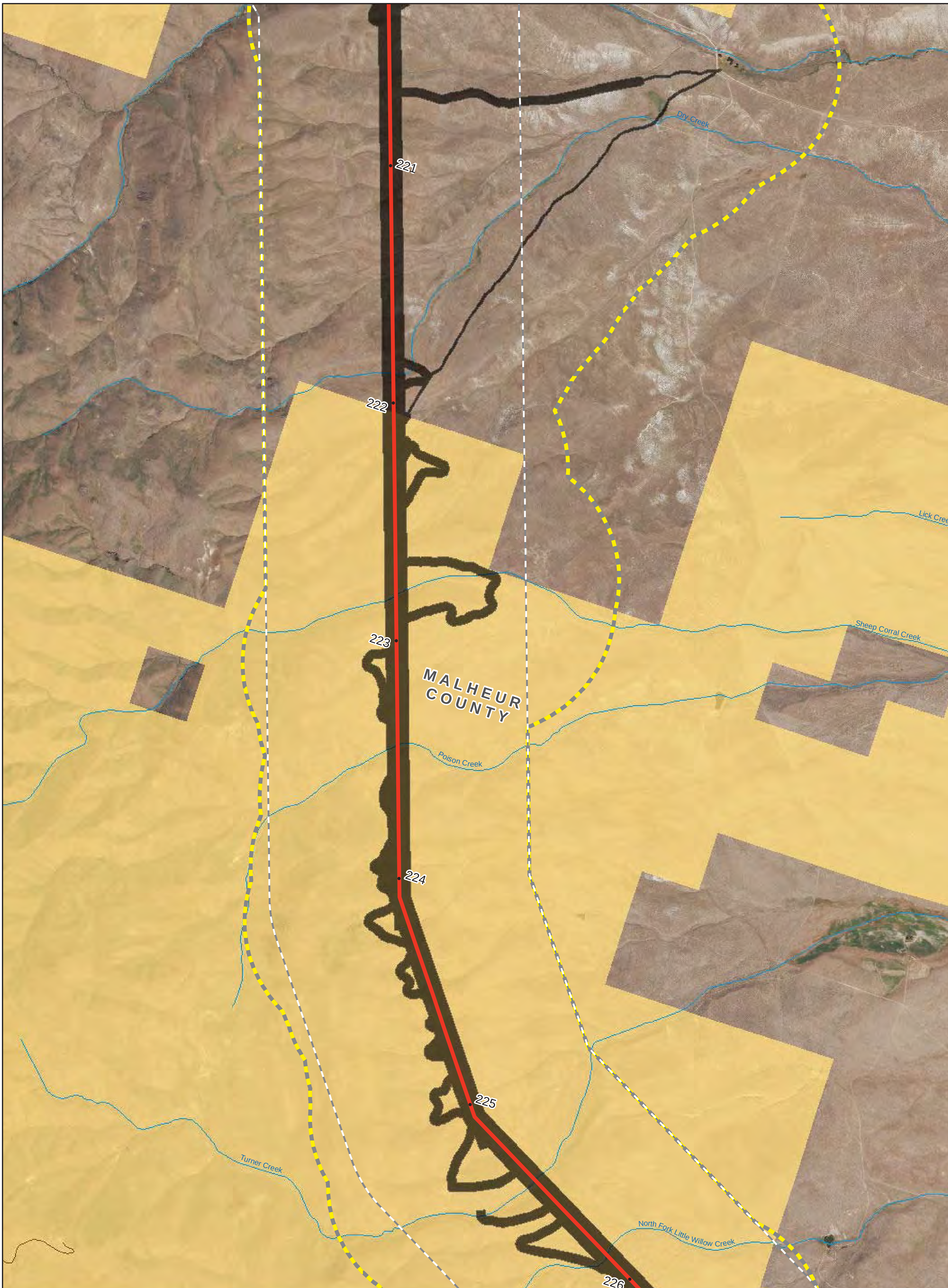
Feet



Map 44 of 76



Attachment X-1
Noise Sensitive Receptors

Map 45 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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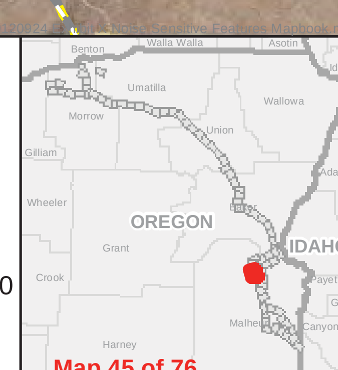
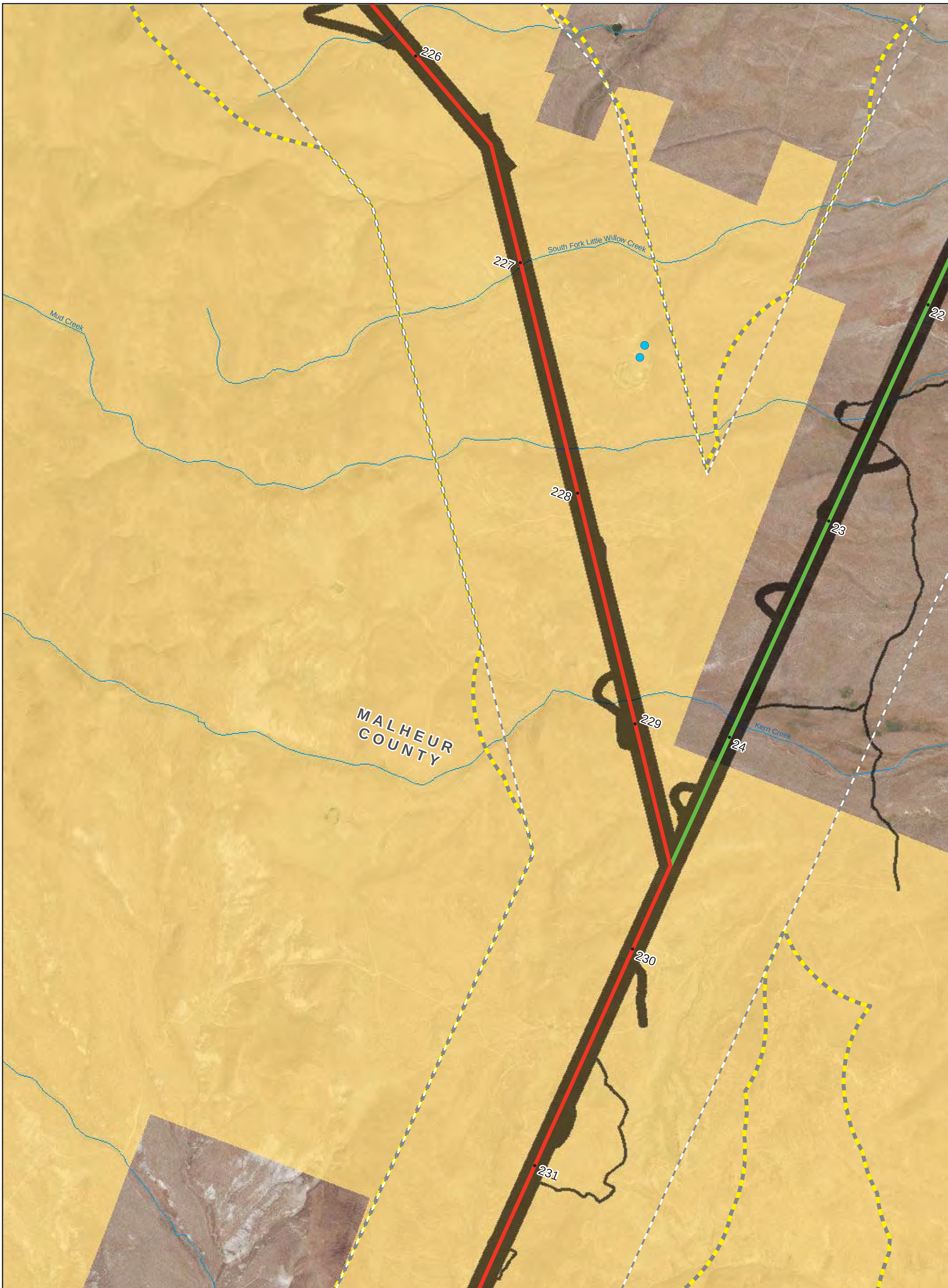
Feet





Attachment X-1
Noise Sensitive Receptors

Map 46 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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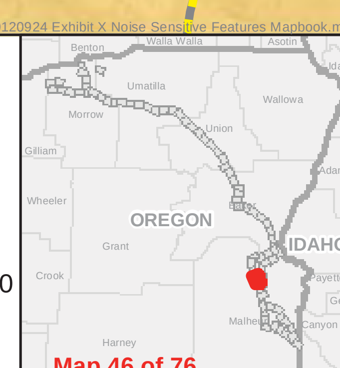
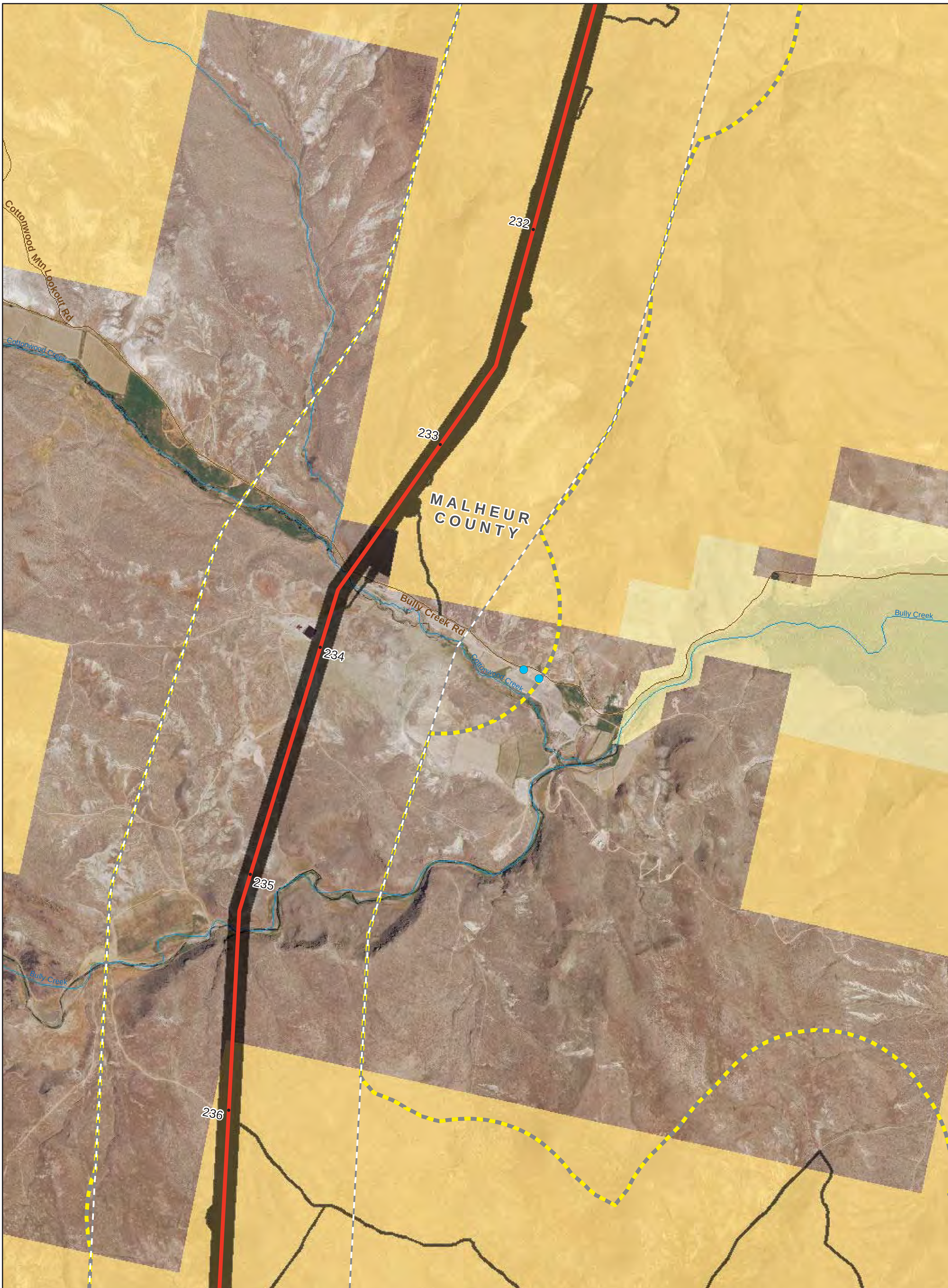


Map 46 of 76



Attachment X-1
Noise Sensitive Receptors

Map 47 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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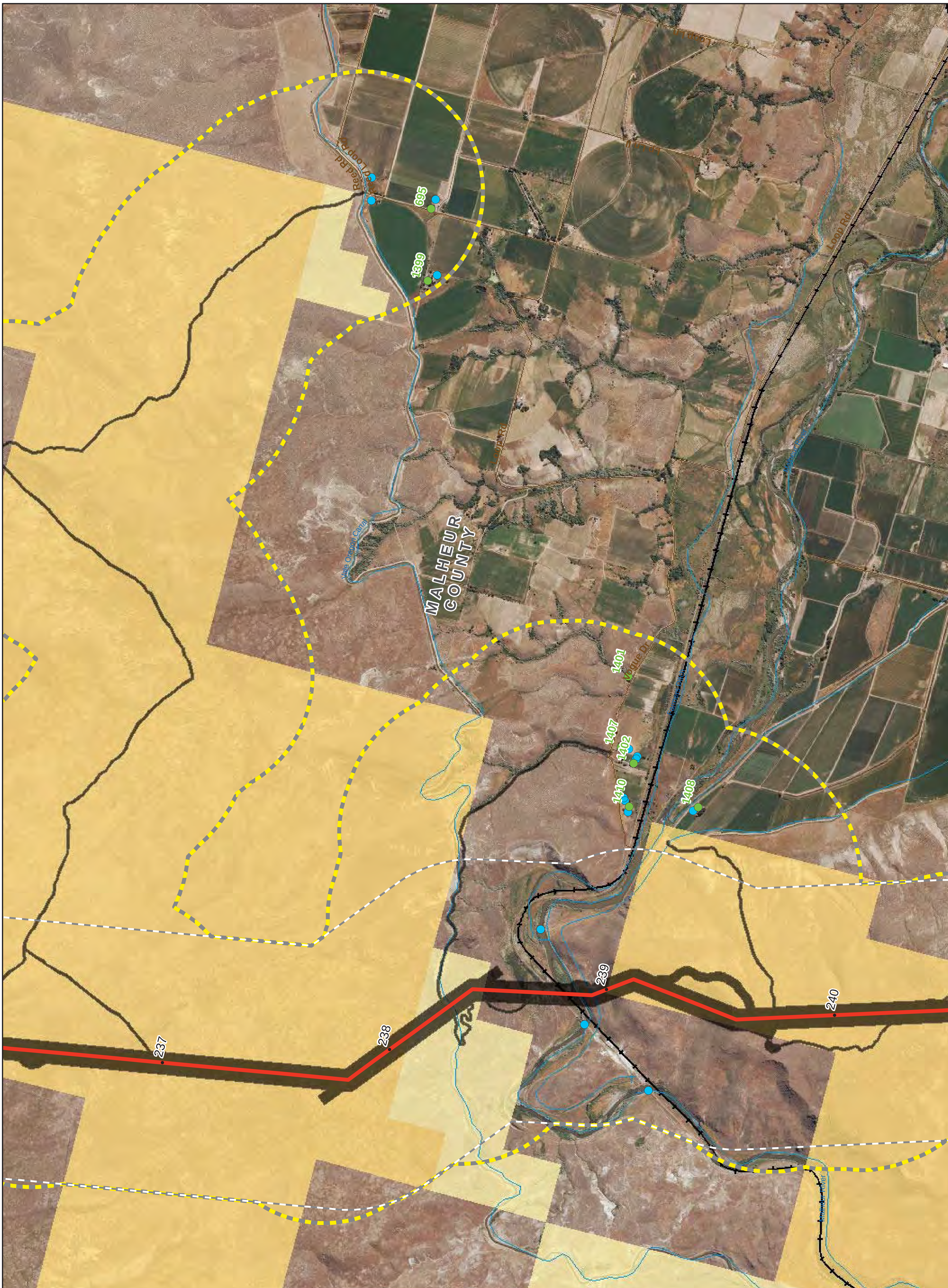
Feet

OREGON
IDAHO
Map 47 of 76



Attachment X-1
Noise Sensitive Receptors

Map 48 of 76
Proposed Route

Boardman to Hemingway Transmission Line Project Oregon-Idaho

February 2013

IDAHO POWER

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary

Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary

Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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Feet

OREGON
IDAHO
Map 48 of 76

Attachment X-1
Noise Sensitive Receptors

Map 49 of 76

Proposed Route/Double Mountain Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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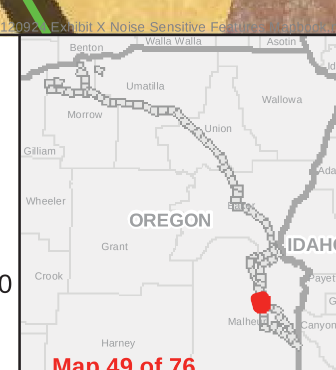
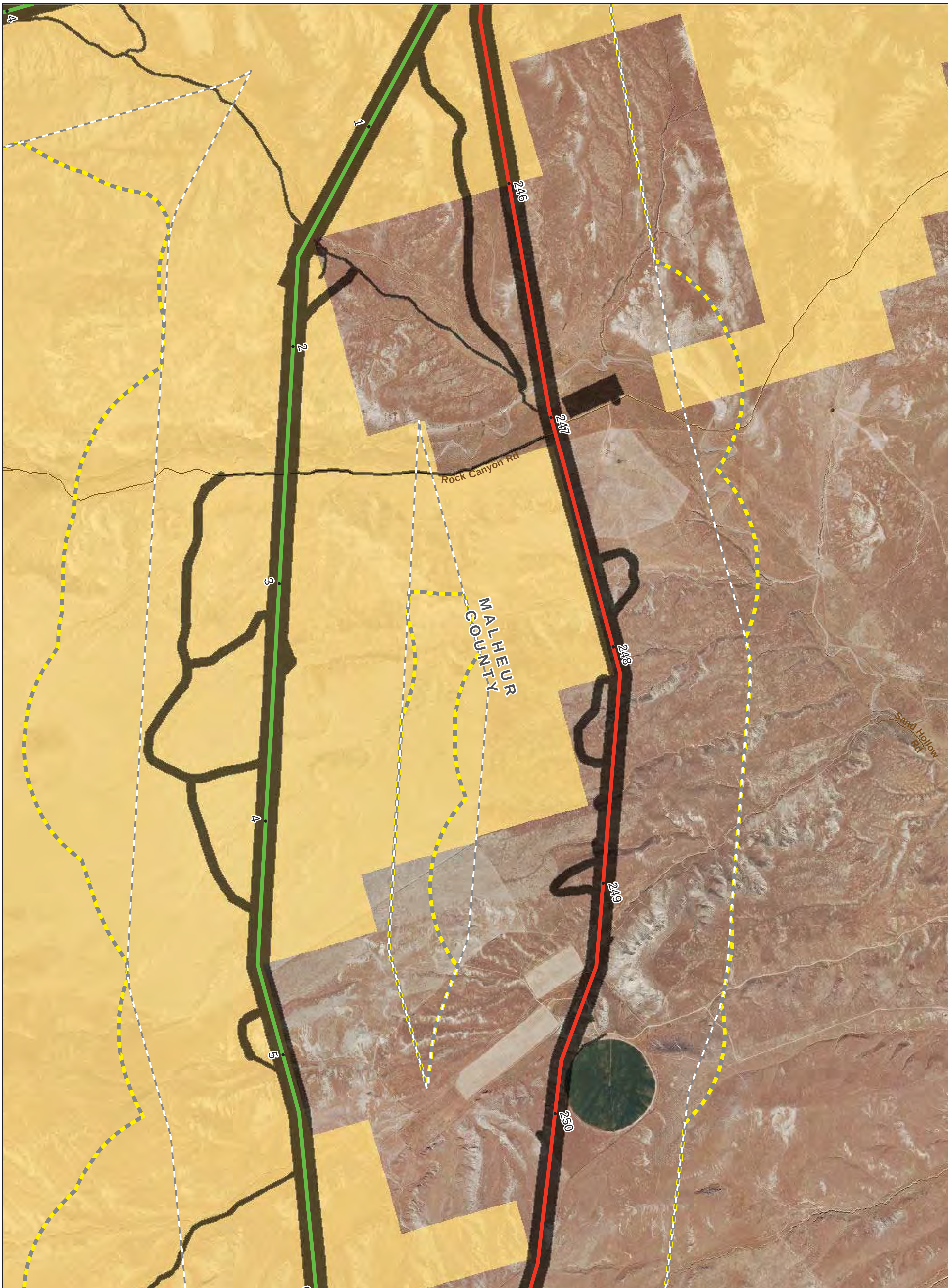
Feet





Attachment X-1
Noise Sensitive Receptors

Map 50 of 76
Proposed Route/Double Mountain Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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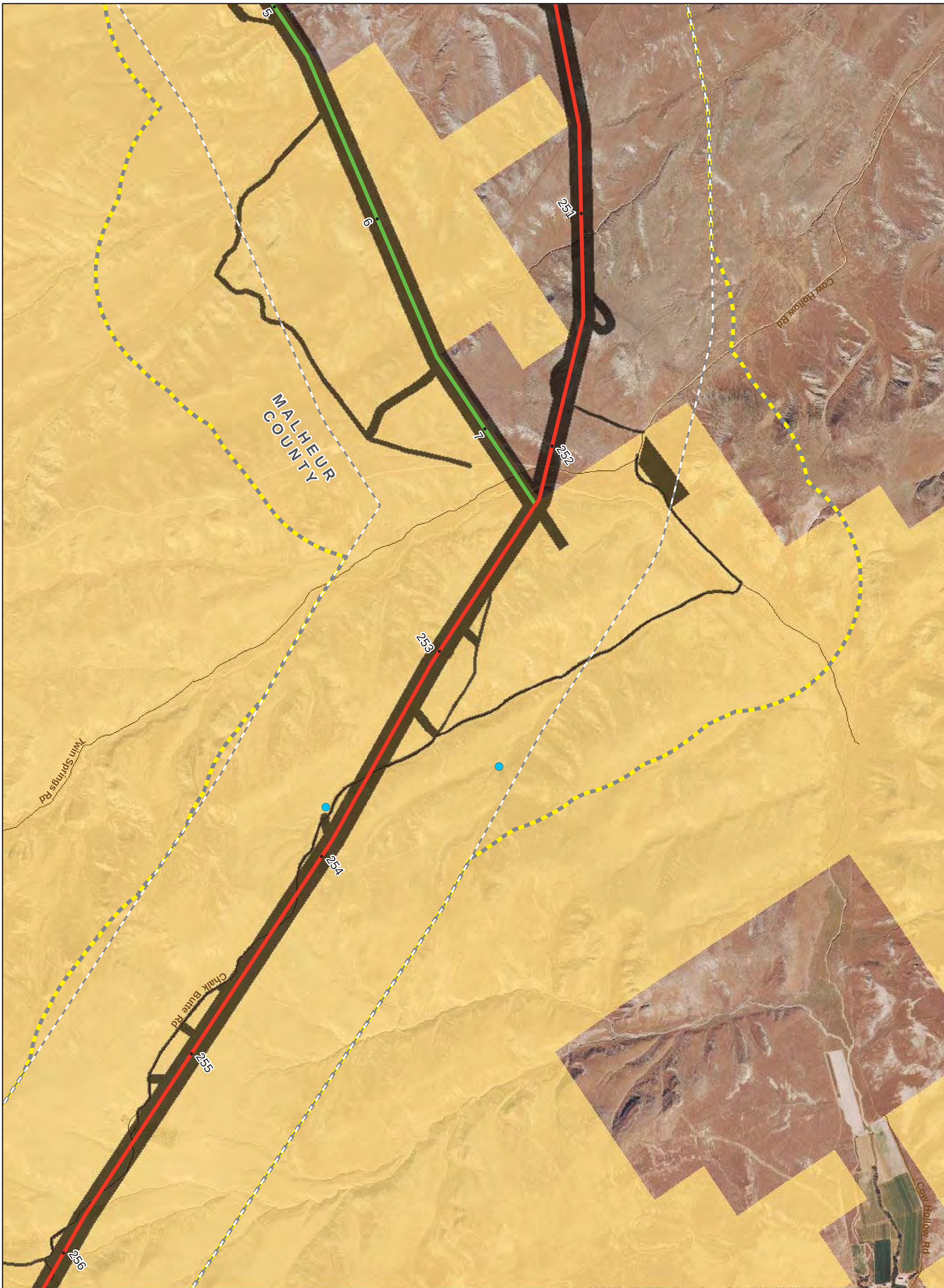

Attachment X-1
Noise Sensitive Receptors

Map 51 of 76

Proposed Route/Double Mountain Alternate

Boardman to Hemingway Transmission Line Project
Oregon-Idaho

February 2013

Sound Monitoring Position
Receptor with Noise Exceedance
Noise Sensitive Receptor
Non-Noise Sensitive Receptor
Analysis Area Boundary
Operational Noise Analysis Area Boundary
Site Boundary
Proposed Substation
Alternative Substation
Mile Marker
Proposed Rebuild
Proposed Corridor
Alternate Corridor
County Boundary
State Boundary
Existing Transmission Line
Bureau of Land Management
Bureau of Reclamation
Department of Defense
Indian Reservation
Private
State
U.S. Fish and Wildlife Service
U.S. Forest Service

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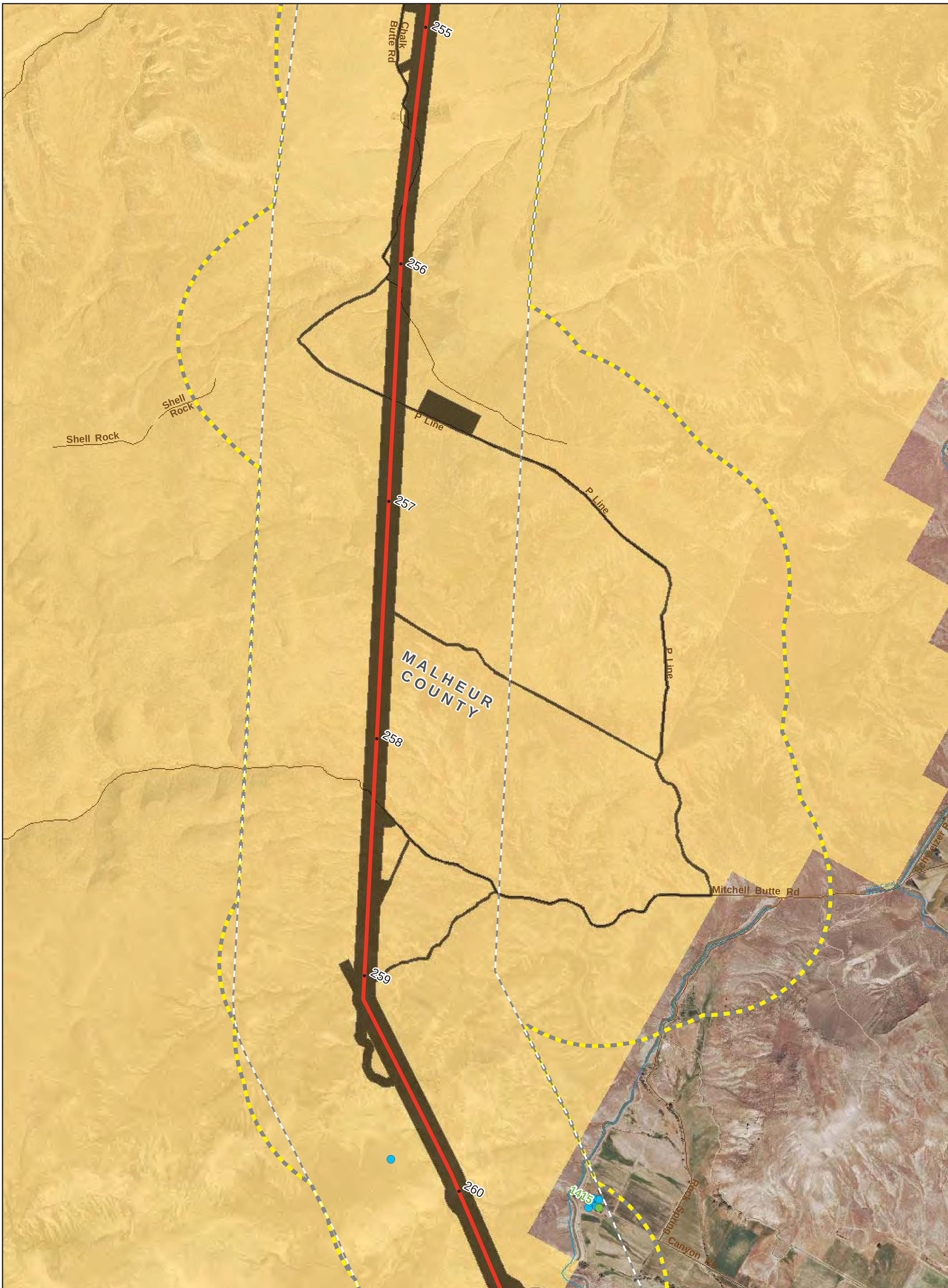
Feet

OREGON
IDAHO
Map 51 of 76



Attachment X-1
Noise Sensitive Receptors

Map 52 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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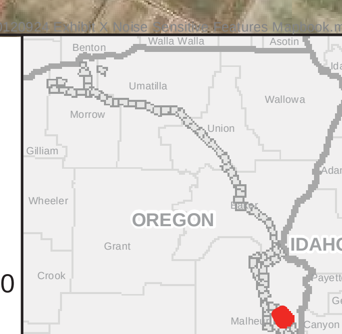
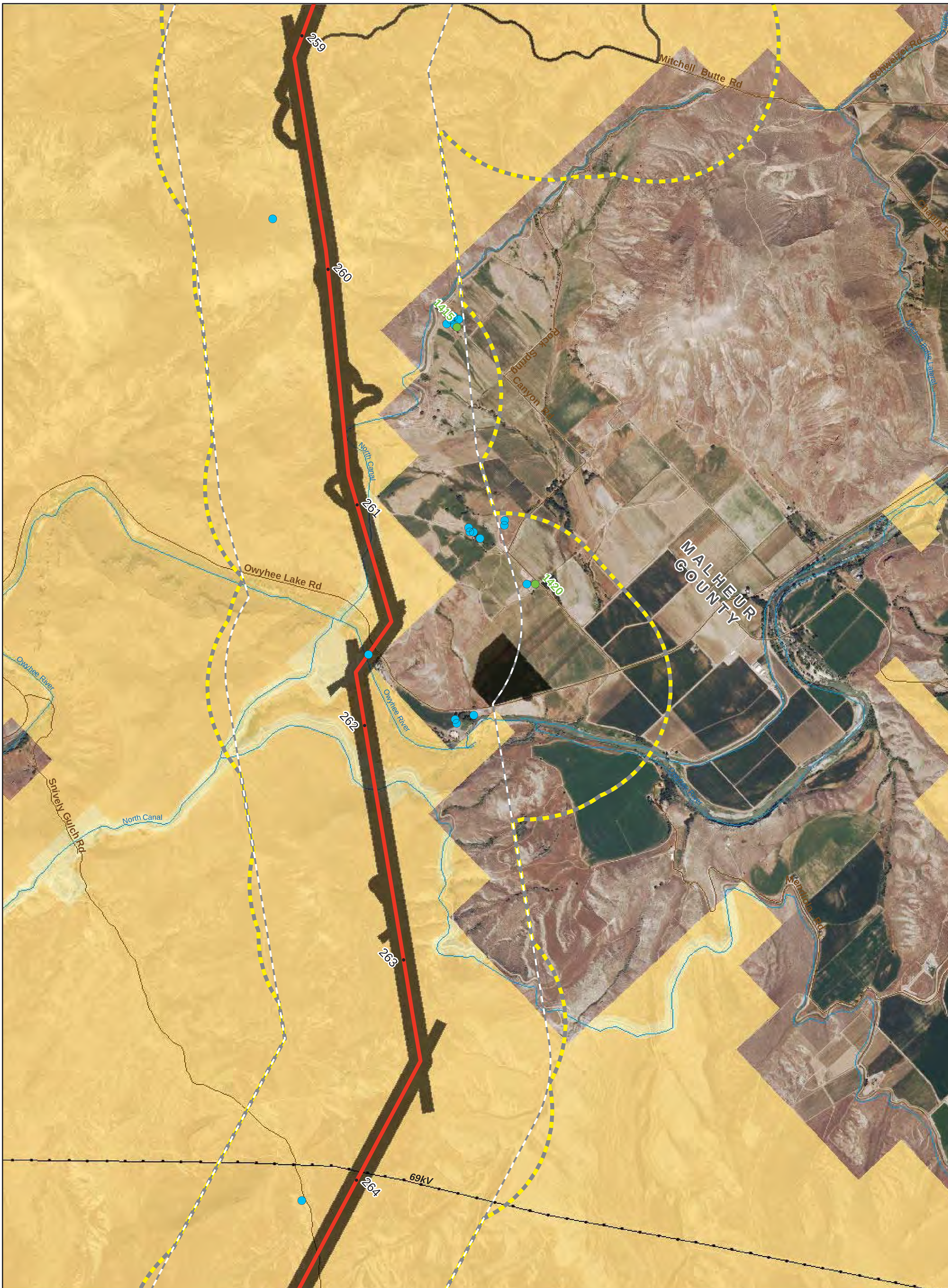


Map 52 of 76



Attachment X-1
Noise Sensitive Receptors

Map 53 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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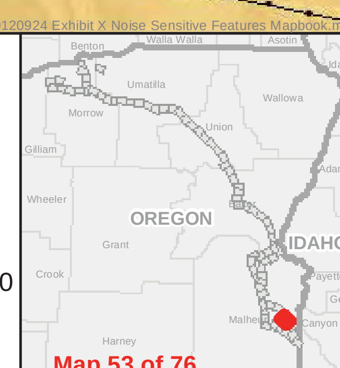
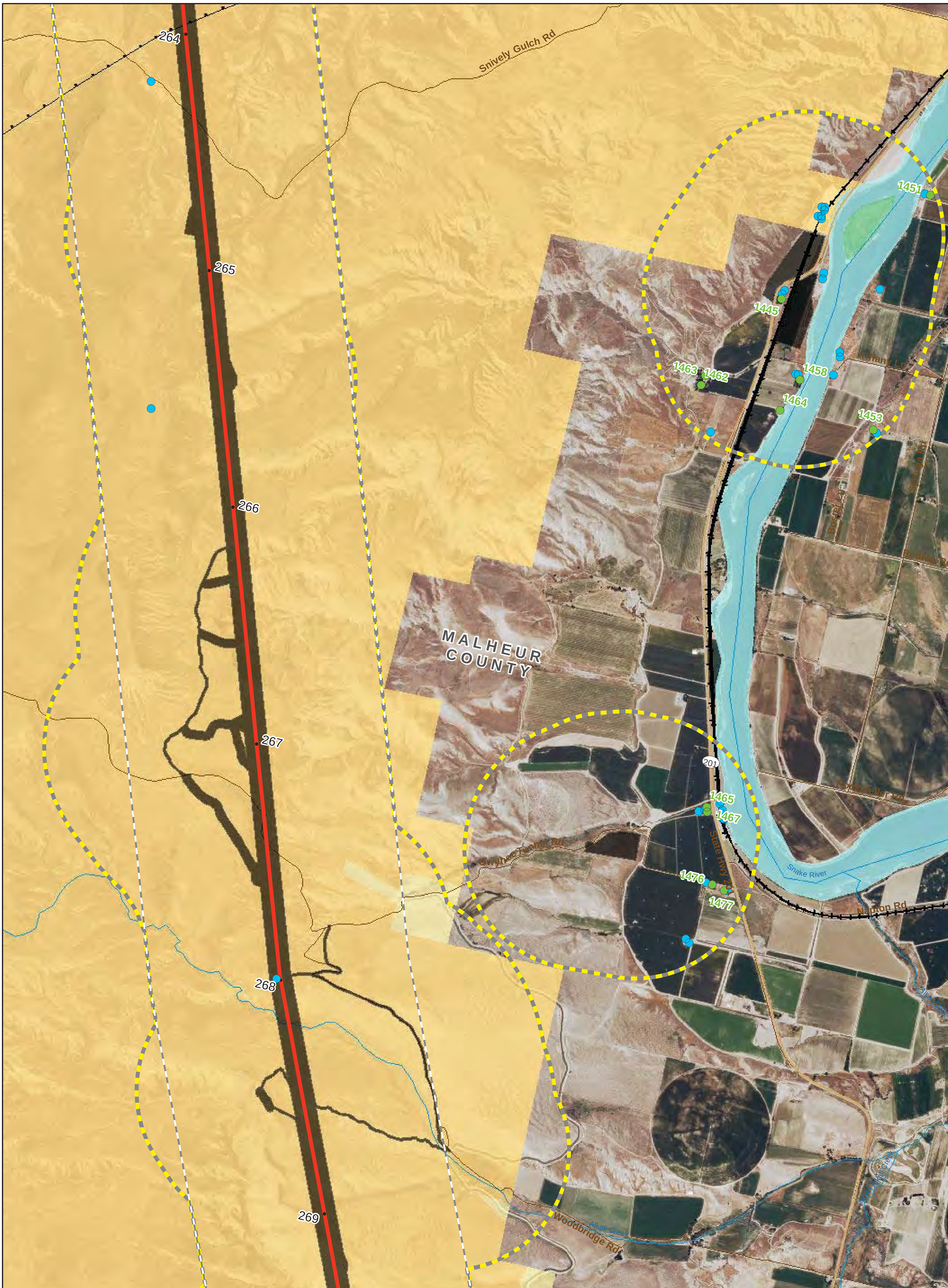


Map 53 of 76



Attachment X-1
Noise Sensitive Receptors

Map 54 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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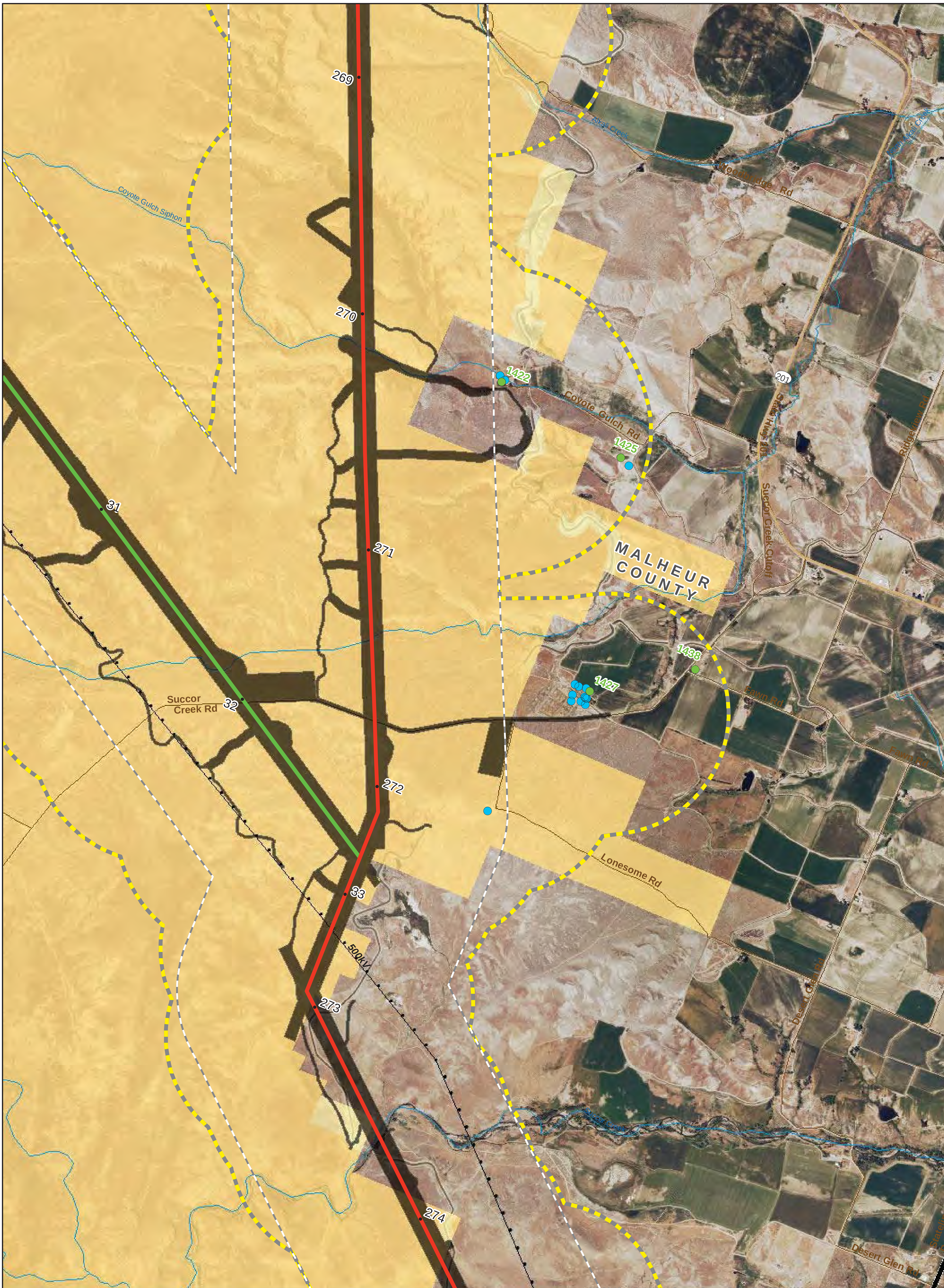
Feet

OREGON
IDAHO
Map 54 of 76



Attachment X-1
Noise Sensitive Receptors

Map 55 of 76
Proposed Route

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

IDAHO POWER
An IDACORP Company

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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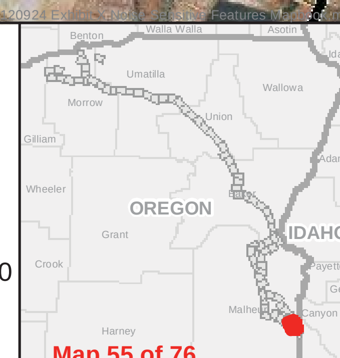
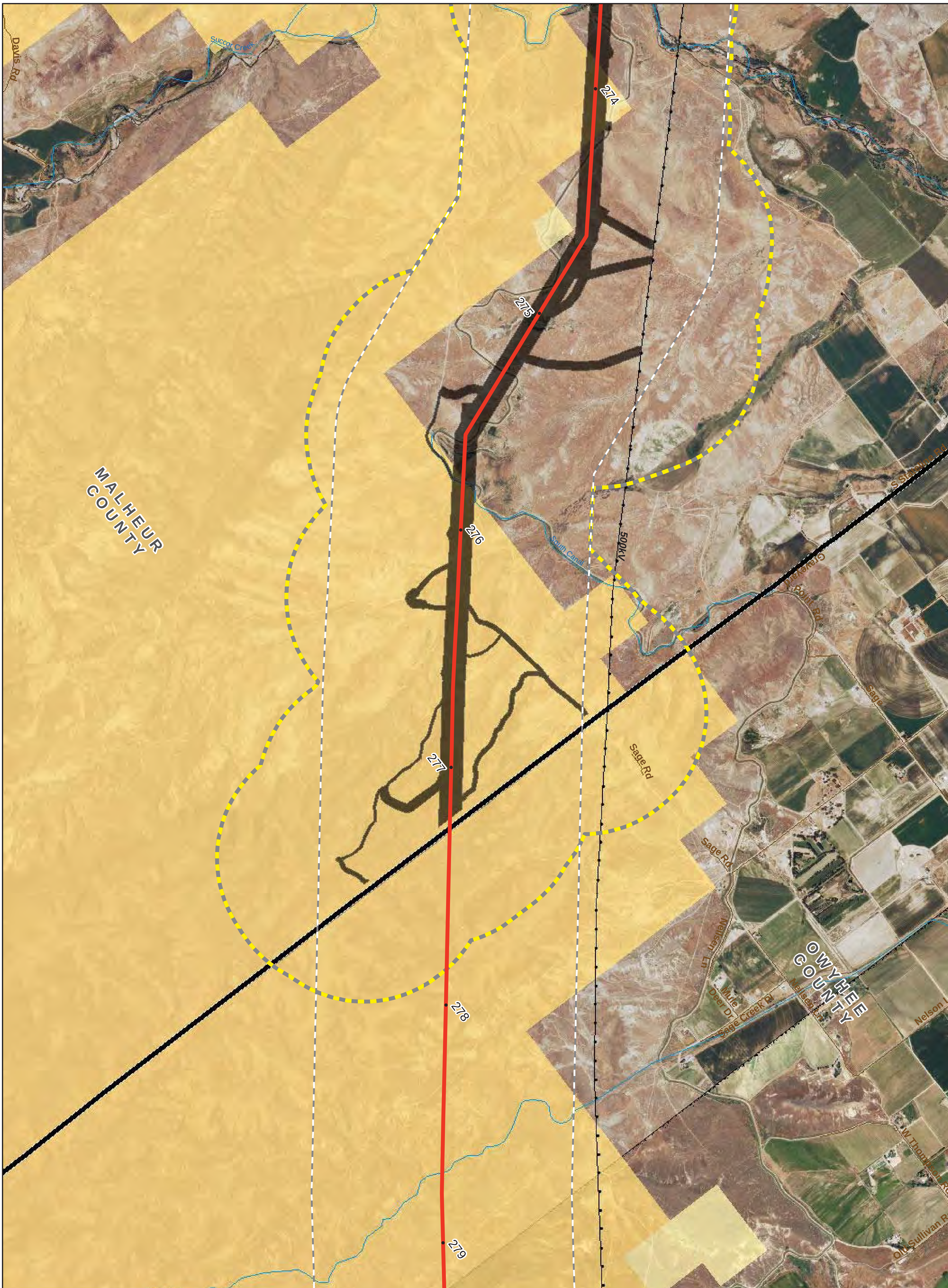
Feet





Attachment X-1
Noise Sensitive Receptors

Map 56 of 76
Proposed Route

Boardman to Hemingway Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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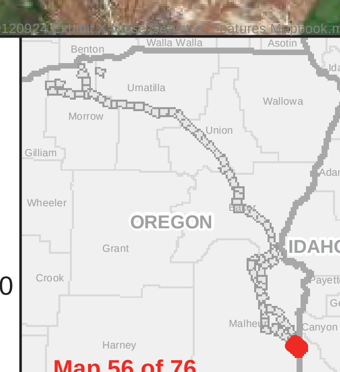

Attachment X-1
Noise Sensitive Receptors

Map 57 of 76
Longhorn Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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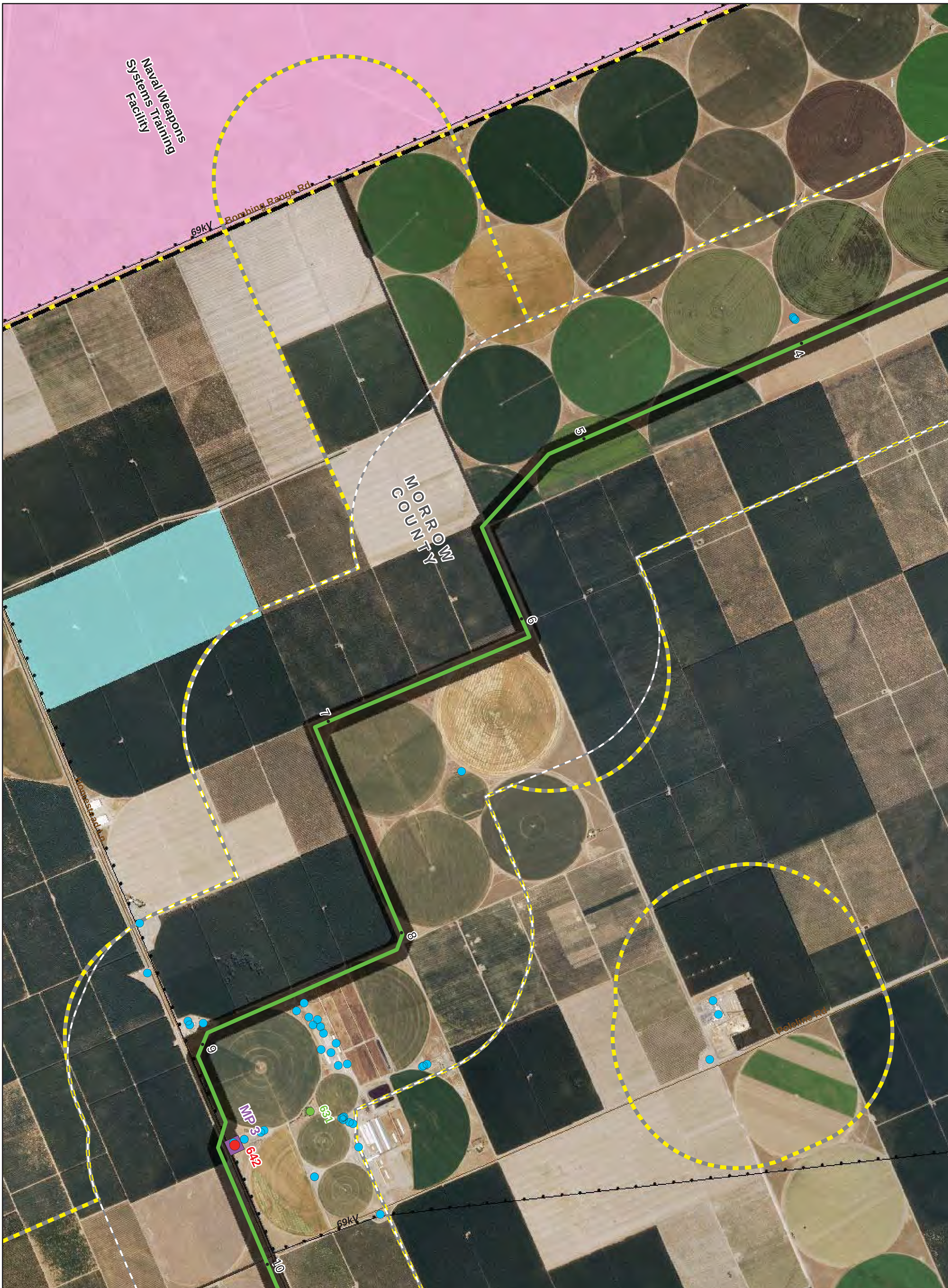
Feet

OREGON
IDAHO
Map 57 of 76



Attachment X-1
Noise Sensitive Receptors

Map 58 of 76
Longhorn Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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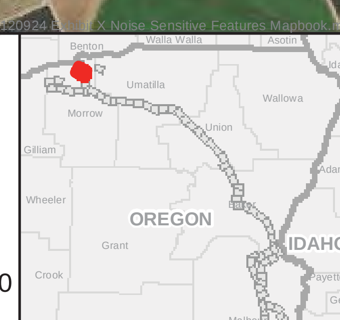
Feet



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Attachment X-1
Noise Sensitive Receptors

Map 59 of 76
Longhorn Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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Feet

OREGON
IDAHO
Map 59 of 76

Attachment X-1
Noise Sensitive Receptors

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Longhorn Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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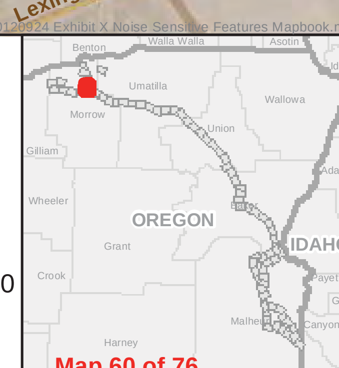
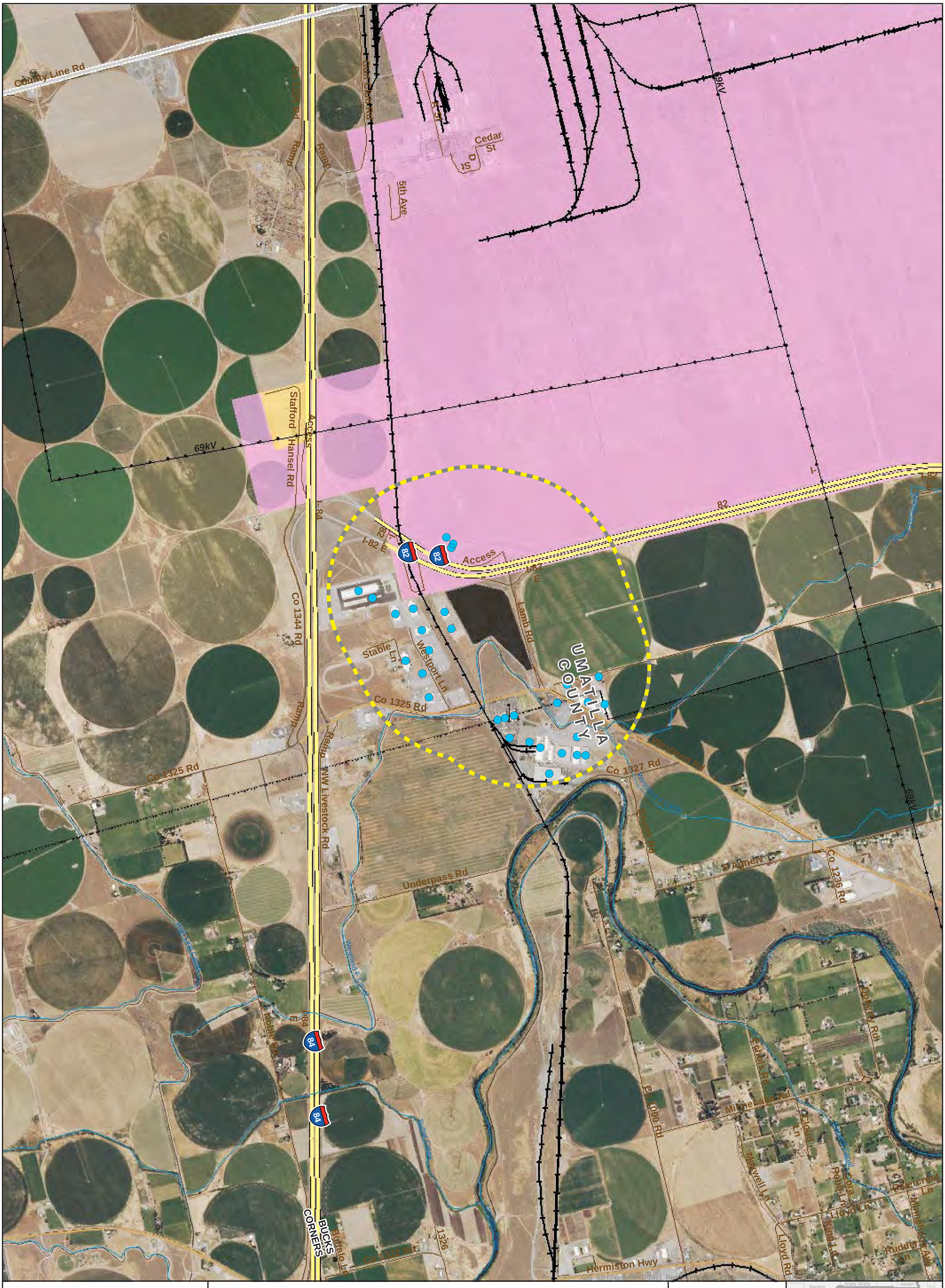


Map 60 of 76



Attachment X-1
Noise Sensitive Receptors

Map 61 of 76
Longhorn Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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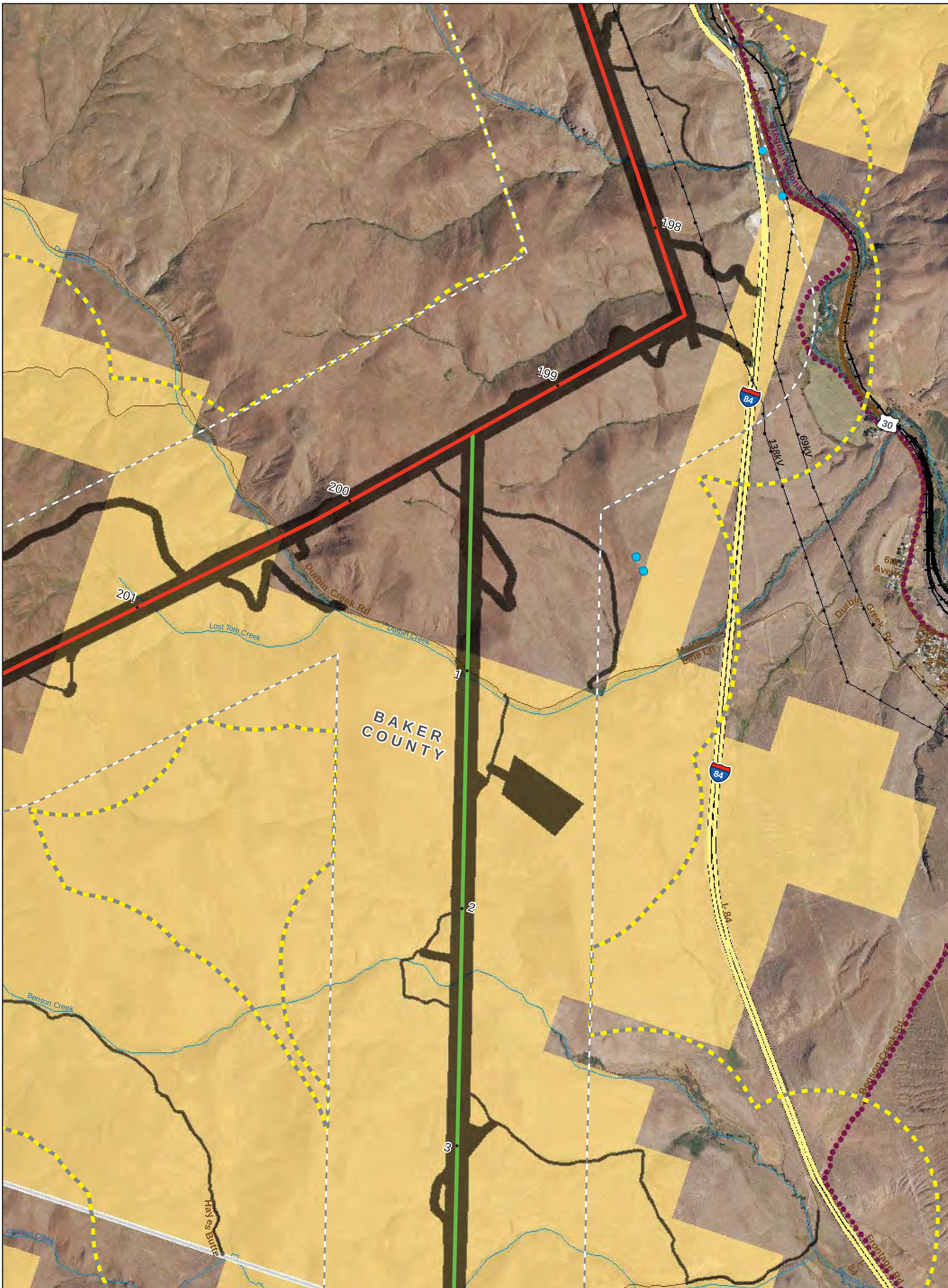
Feet

OREGON
IDAHO
Map 61 of 76



Attachment X-1
Noise Sensitive Receptors

Map 62 of 76
Willow Creek Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

IDAHO POWER

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Indian Reservation
- Private
- State
- U.S. Fish and Wildlife Service
- U.S. Forest Service

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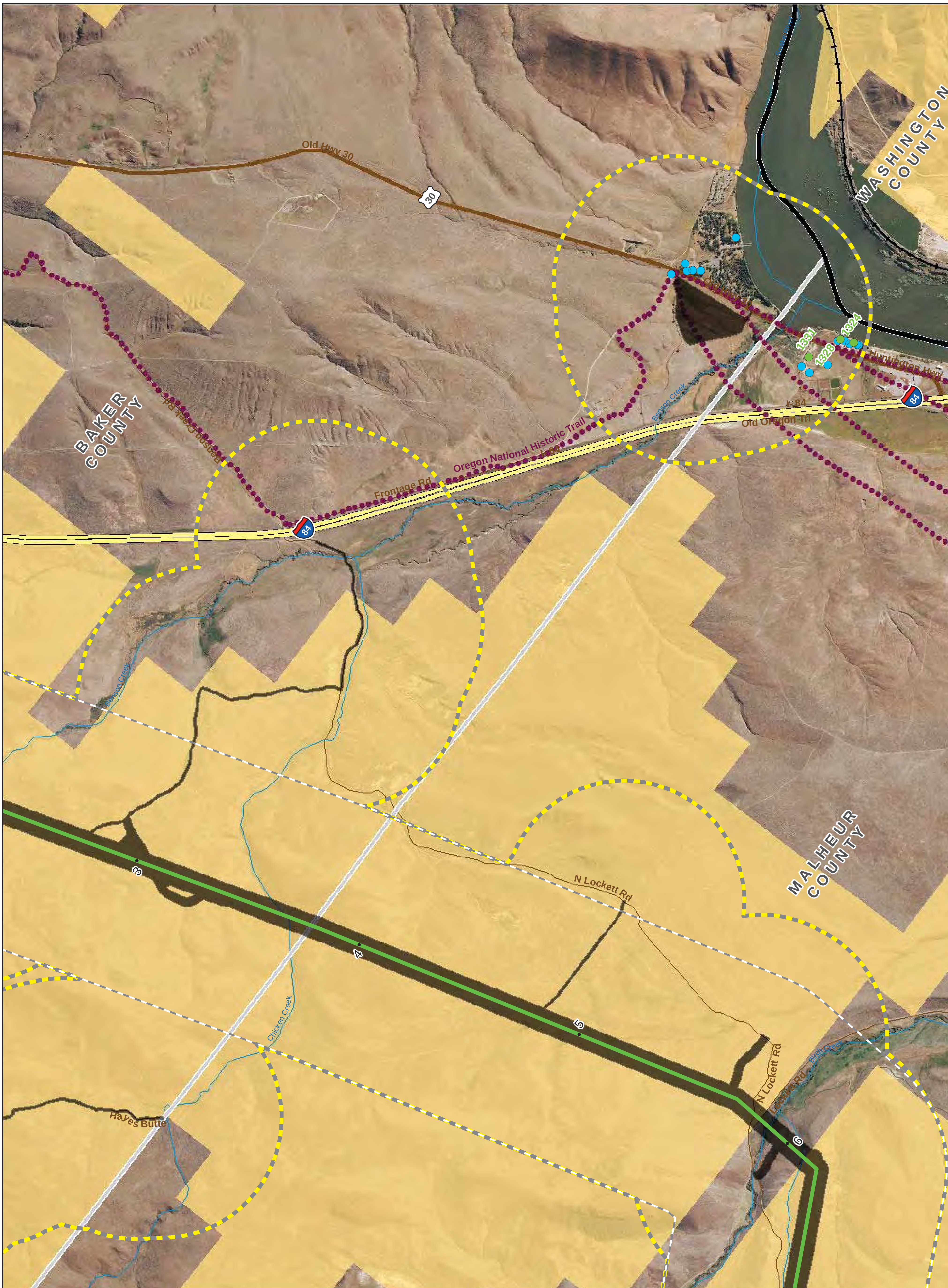
Feet

OREGON
IDAHO
Map 62 of 76



Attachment X-1
Noise Sensitive Receptors

Map 63 of 76
Willow Creek Alternate

Boardman to Hemingway
Transmission Line Project
Oregon-Idaho

February 2013

- Sound Monitoring Position
- Receptor with Noise Exceedance
- Noise Sensitive Receptor
- Non-Noise Sensitive Receptor
- Analysis Area Boundary
- Operational Noise Analysis Area Boundary
- Site Boundary
- Proposed Substation
- Alternative Substation
- Mile Marker
- Proposed Rebuild
- Proposed Corridor
- Alternate Corridor
- County Boundary
- State Boundary
- Existing Transmission Line
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
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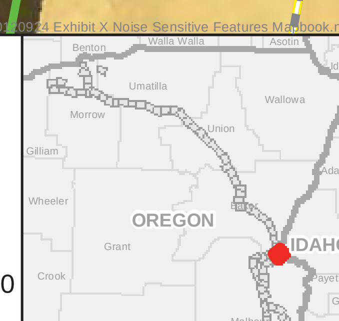

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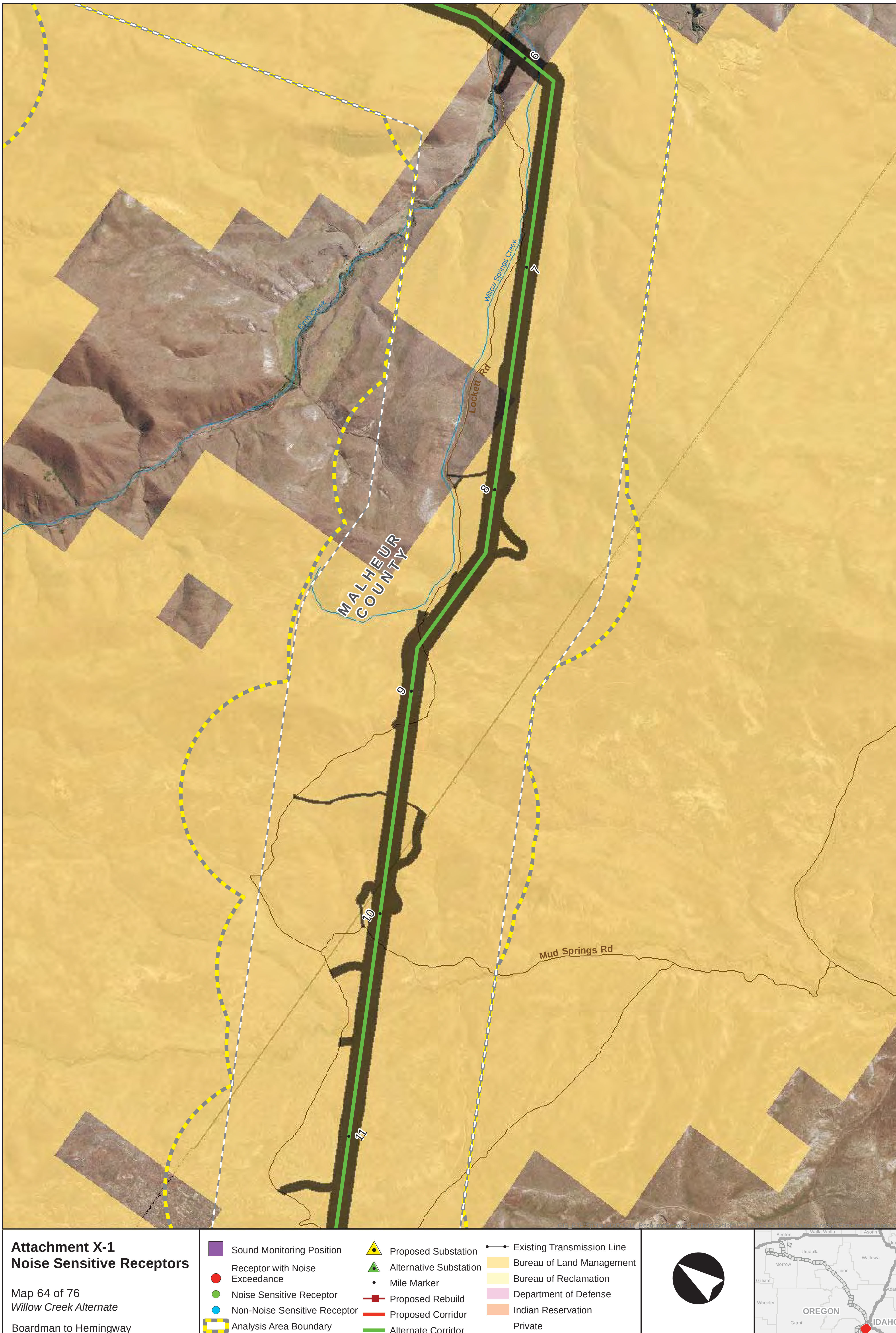

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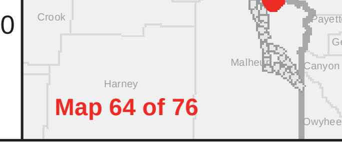

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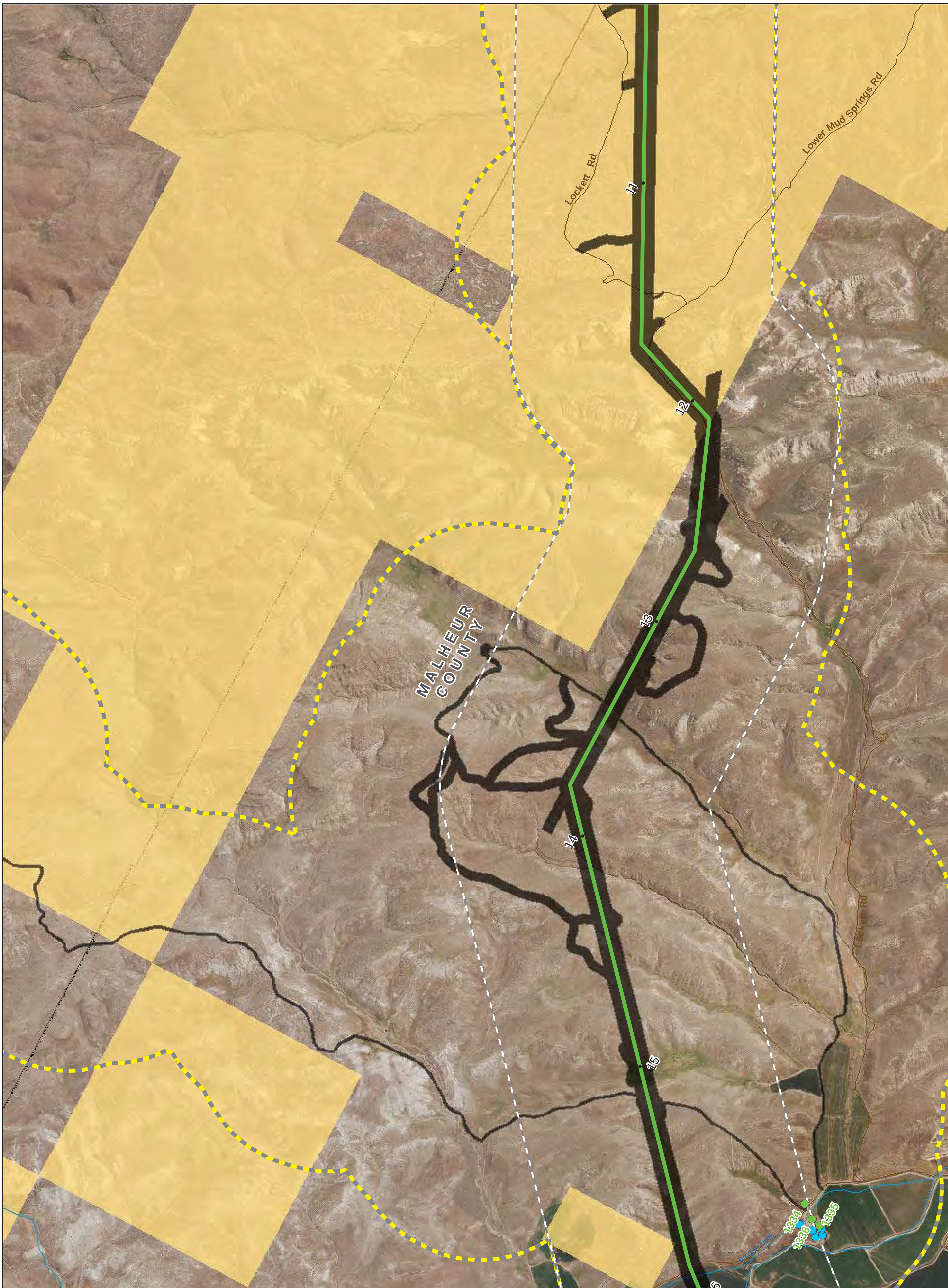

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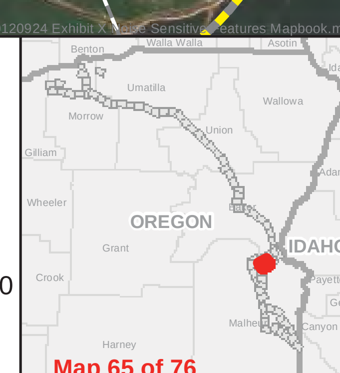

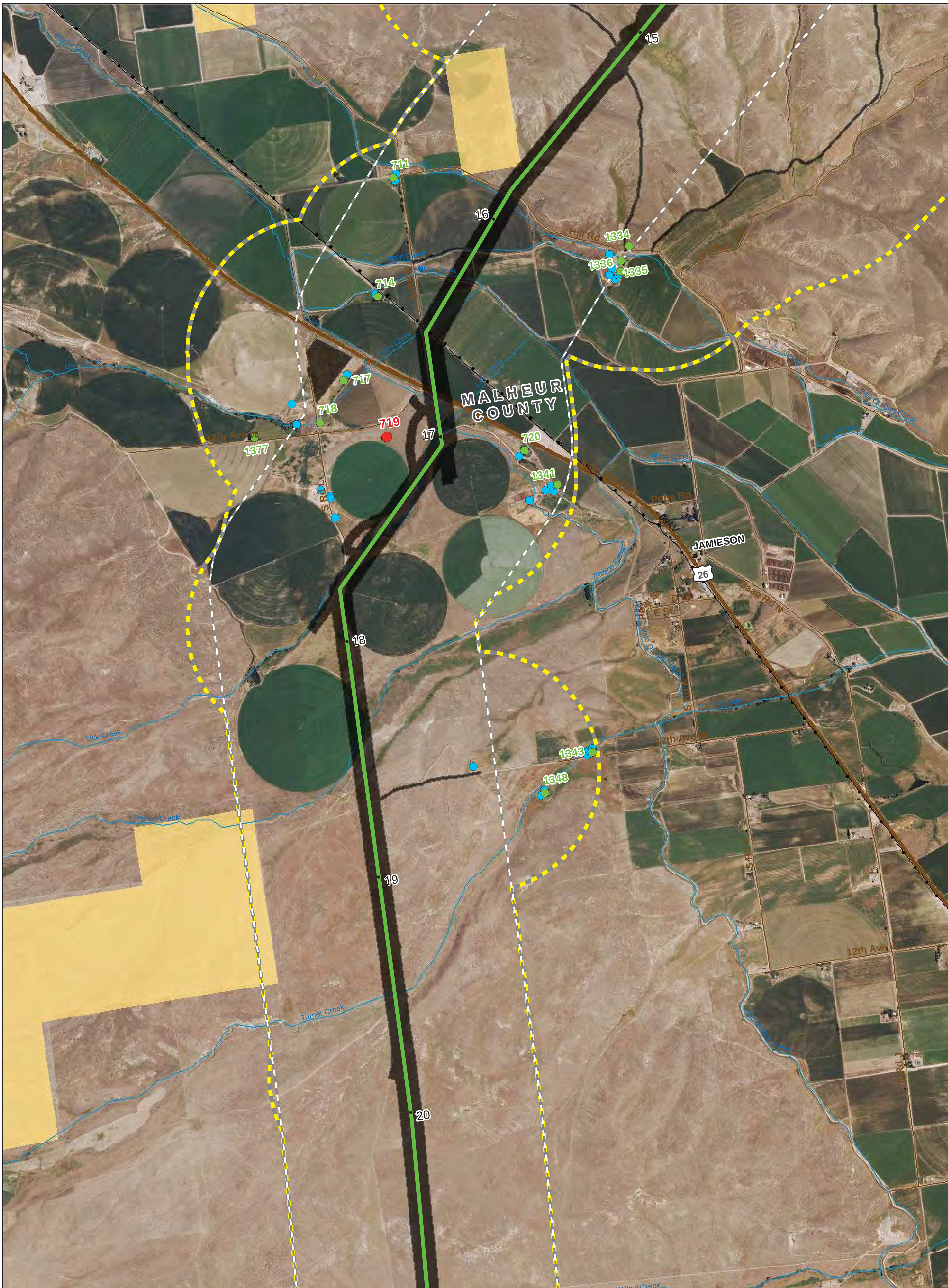

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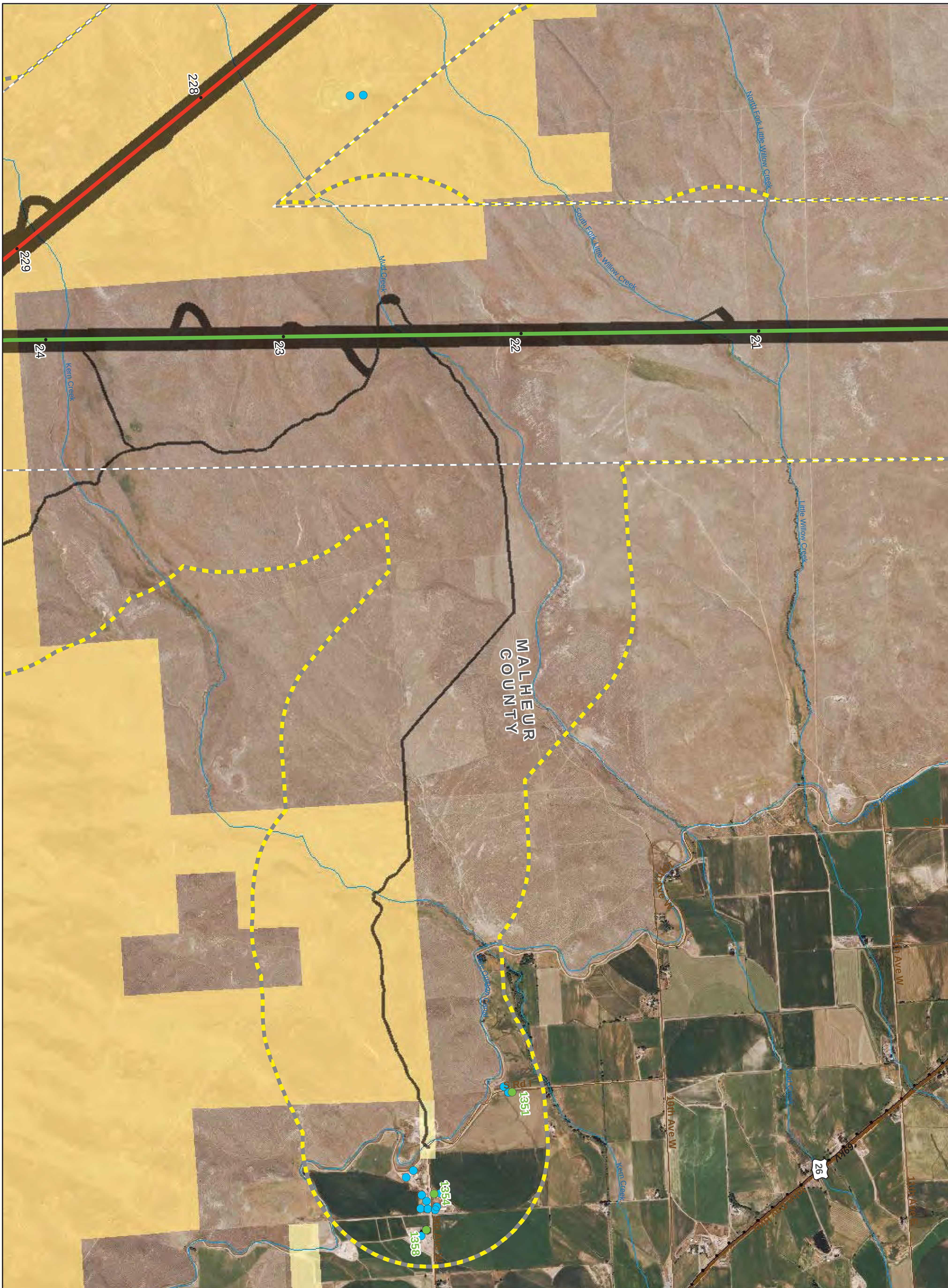

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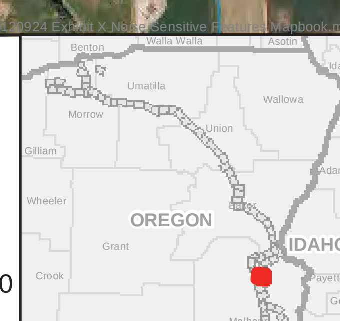

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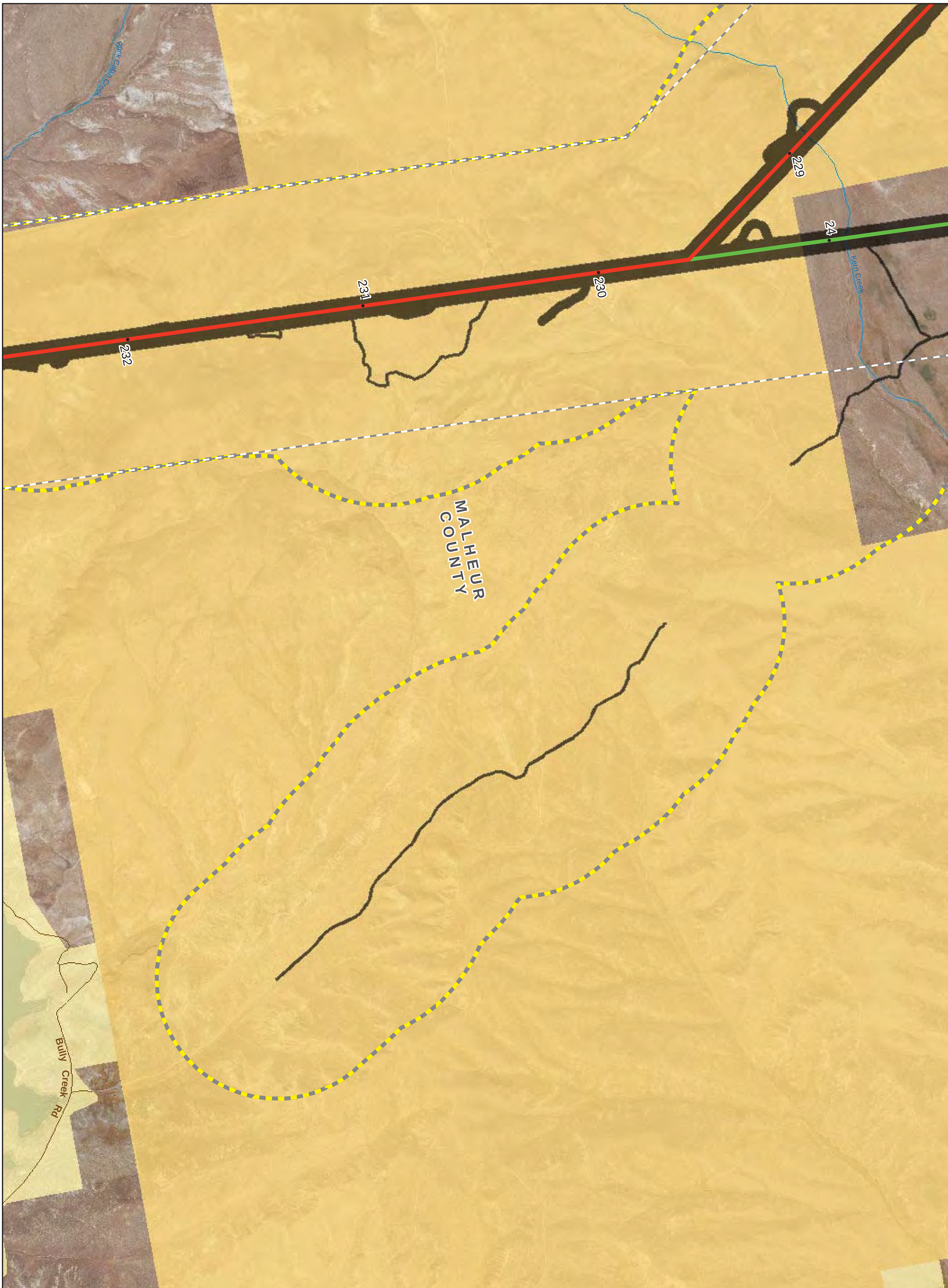

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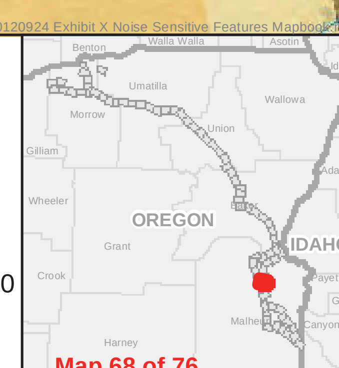

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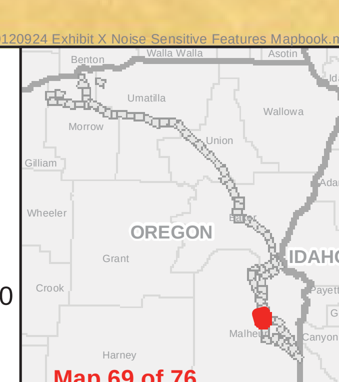

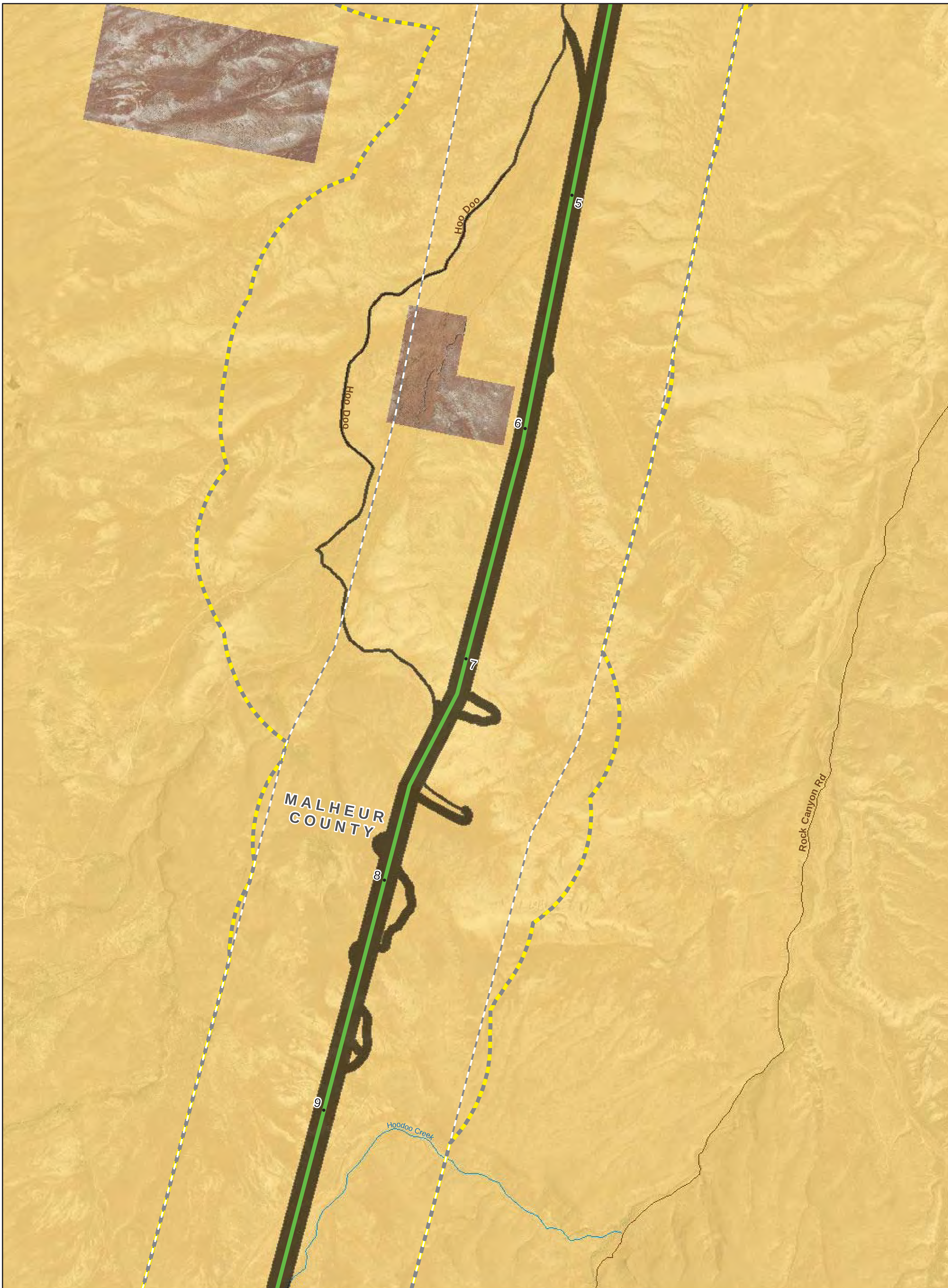

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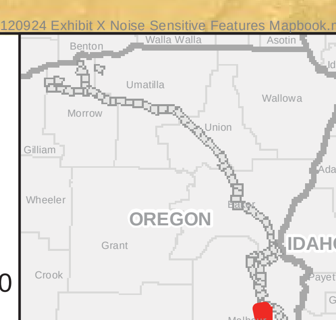

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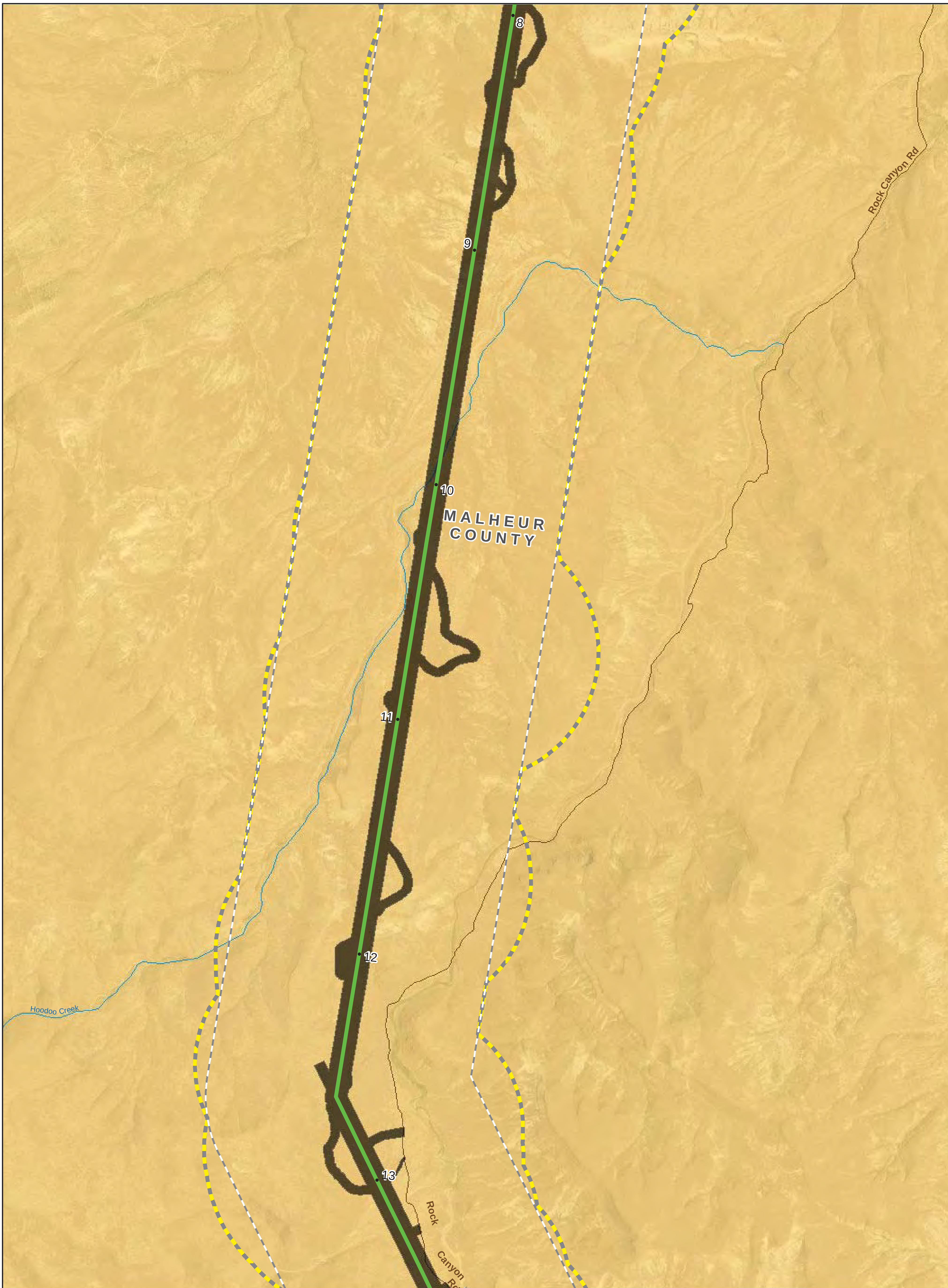

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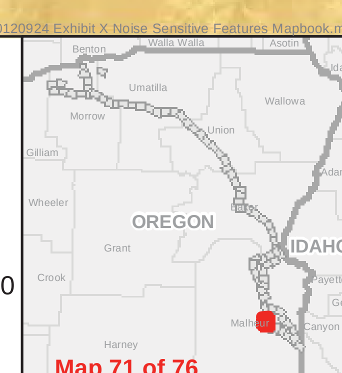

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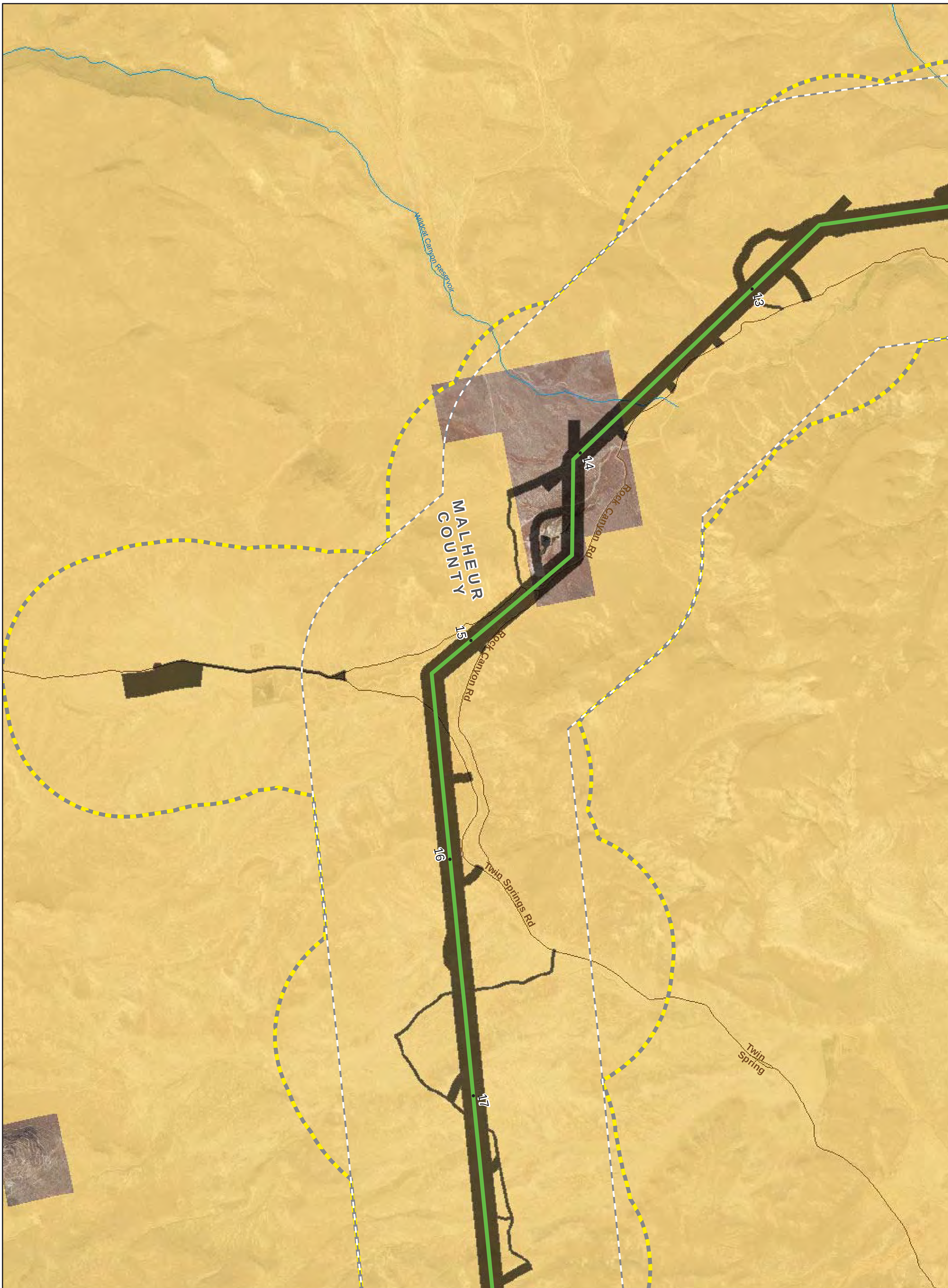

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IDAHO POWER
An IDACORP Company

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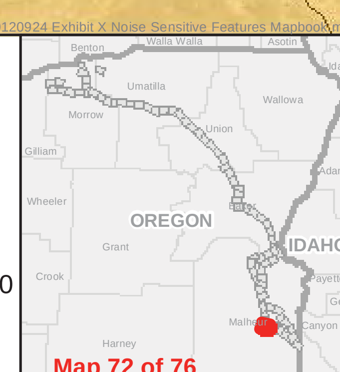

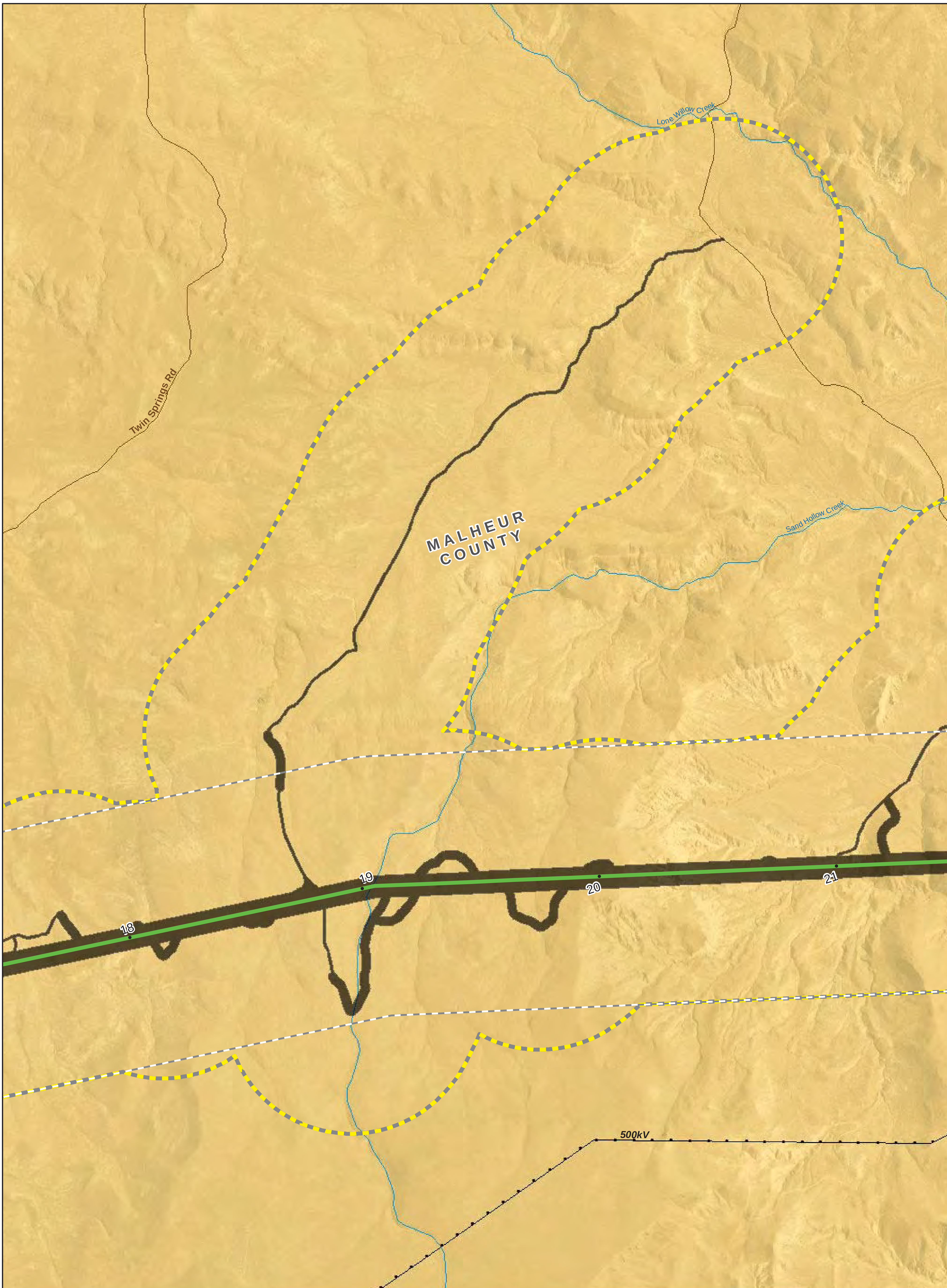

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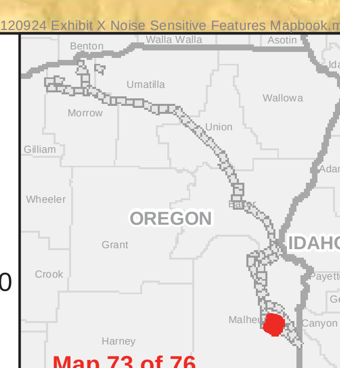

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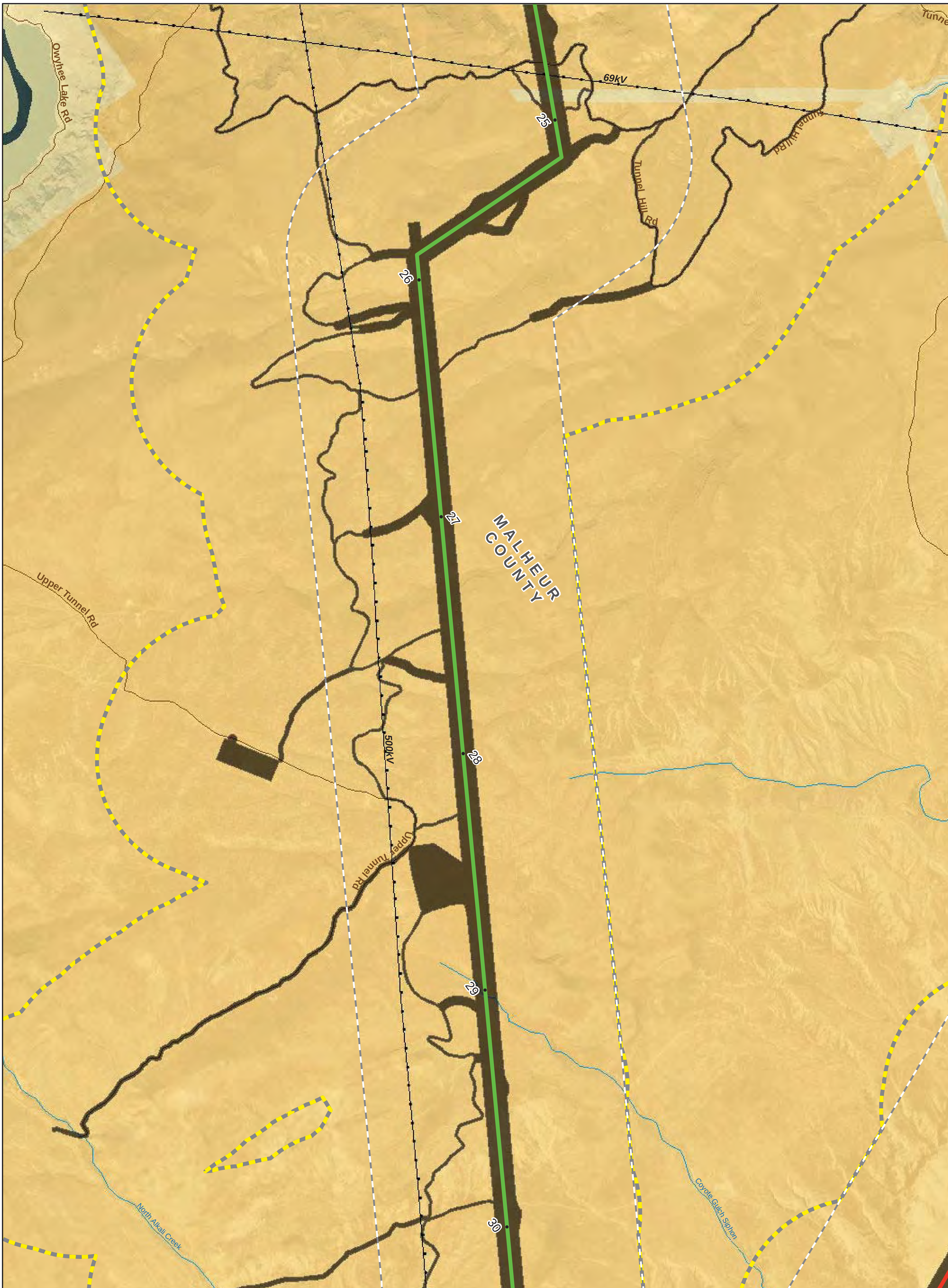

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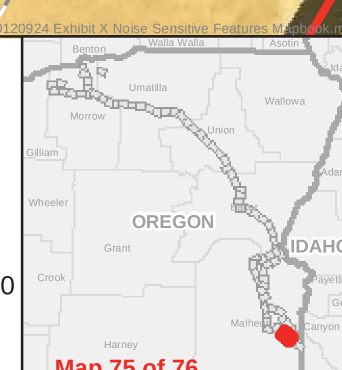

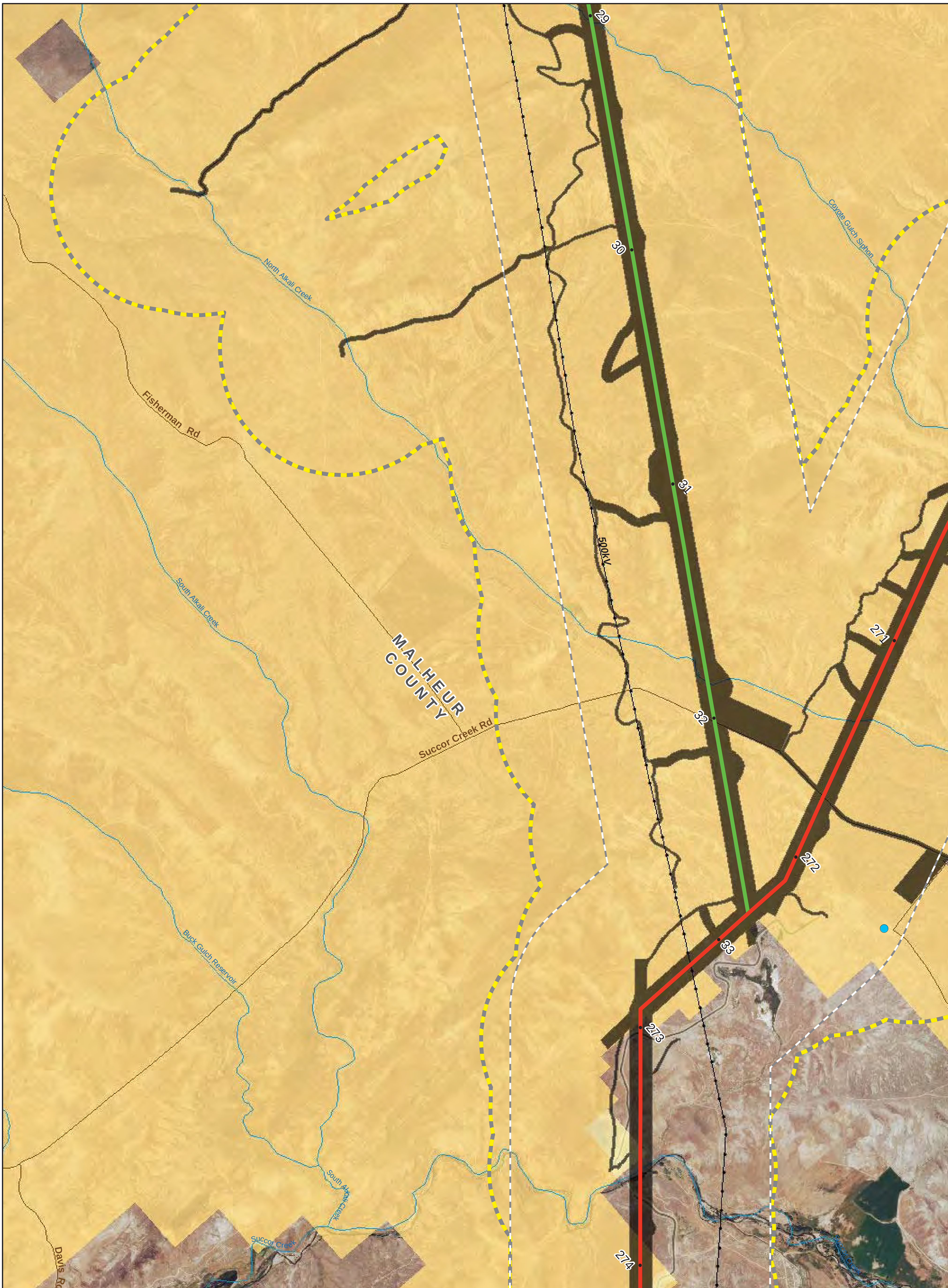

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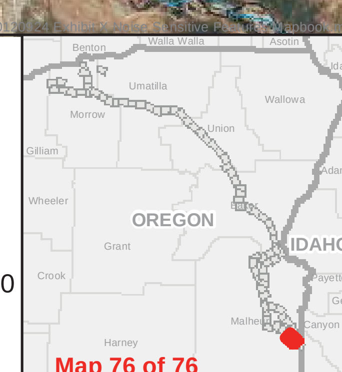

ATTACHMENT X-2
DRAFT AUDIBLE NOISE REPORT
PREPARED BY EXPONENT

Audible Noise

Audible noise levels from the transmission line(s) would not occur until energization of the line(s). During construction audible noise related to the line(s) would consist of construction noise and be limited to localized areas that have active construction activities. Once energized, the audible noise due to the line(s) would vary depending on the weather conditions, with foul weather producing increased levels of audible noise over levels in fair weather.

The audible noise levels would depend on the altitude of the line, with the noise increasing with the altitude and with voltage. The impacts of both line design and altitude on the audible noise produced by the proposed 500-kV transmission line are discussed below.

Audible Noise Calculations

The audible noise profiles in fair and foul weather at midspan were calculated for the proposed 500-kV line with steel lattice towers using the BPA CAFE program. The BPA CAFE program calculates audible noise from transmission lines based on long-term statistical data collected from operating and test transmission lines. This program evaluates the L_{50} audible noise levels assuming a rain rate of 1 mm/hr, which is the default rate for BPA audible noise calculations, and further assumes low wind on the conductor (0.5 mi/hr or less) for audible noise calculations.

The expected audible noise levels with the line operating at an overvoltage of 550-kV (10% overvoltage is considered “worst case scenario”) with a conductor ground clearance of at least 37 feet and at an altitude of 5,380 feet (highest altitude expected along proposed route) were calculated and plotted in Figure X-2-1. A lower voltage or lower altitude would result in lower audible noise. The audible noise level in fair weather at the edges of the ROW is approximately 27 dBA increasing to approximately 33 dBA within the ROW under the line (Figure X-2-1 Fair Weather). In foul weather, the audible noise levels from the line increase to approximately 52 dBA at the edges of the ROW and approximately 58 dBA under the line within the ROW (Figure X-2-1 Foul Weather).

The levels of audible noise produced by alternate 500-kV line designs (500-kV line with H-frame structures or the 500-kV line with monopole structures) are similar to the levels of audible noise produced by the proposed 500-kV line with lattice towers (Table X-2-1). Any differences in the audible noise levels between the various 500 kV line designs would not be noticeable. The proposed 500-kV line would be the primary source of possible audible noise from the lines involved in the proposed project since lower voltage lines such as 230-kV, 138-kV, and 69-kV lines contribute little or no audible noise to measured levels in fair weather. Although their contribution to audible noise may increase in foul weather, the audible noise in foul weather from these lower voltage lines is less than from the proposed 500-kV line.

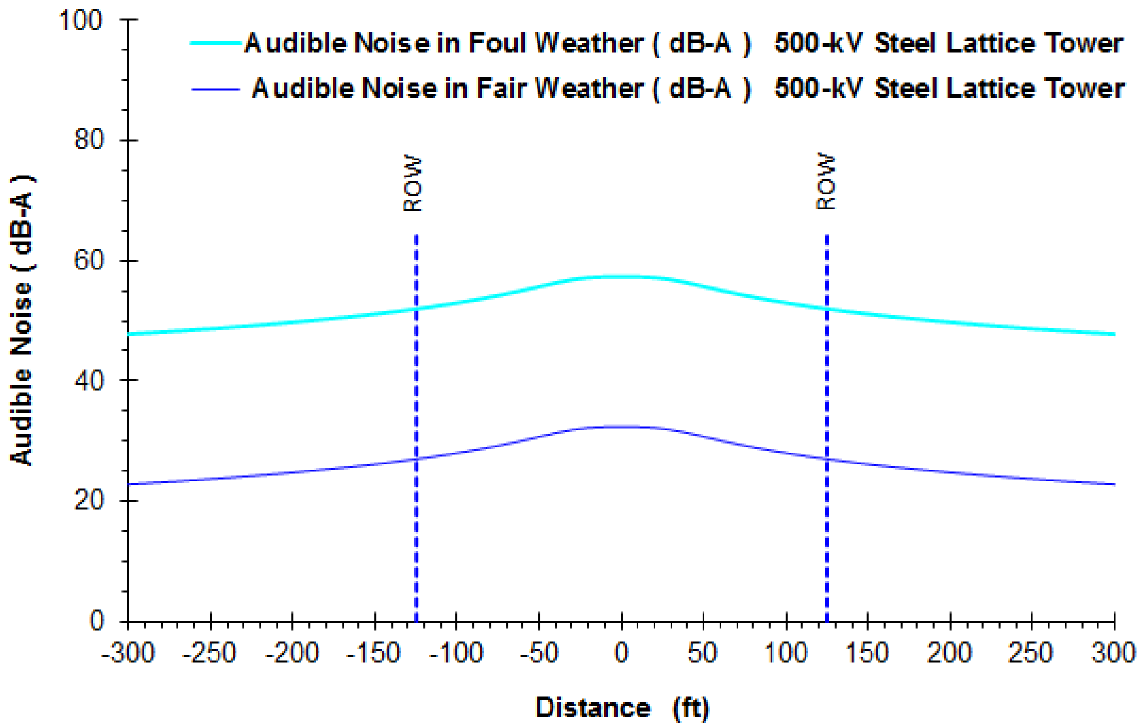

Figure X-2-1. Audible Noise Profile at Midspan for proposed Single-Circuit 500-kV Steel Lattice Tower.

Note: Audible noise profile calculated in fair and foul weather with the following conditions:

L_{50} audible noise calculated in dB with A-weighting referenced to 20 microPascals.
A-weighting chosen to match response of human ear.
37 feet minimum conductor ground clearance.
Voltage of 550-kV (audible noise would be less for voltage less than 550-kV).
Altitude of 5,380 feet (audible noise would be less for altitude lower than 5,380 feet).

Table X-2-1. Audible Noise in Fair and Foul Weather

Line Design	Weather Condition	ROW Width (ft)	South/West ROW Edge (dBA)	Profile Peak within ROW (dBA)	North/East ROW Edge (dBA)
500-kV Steel Lattice Tower (Proposed Design)	Fair	±125	27.0	32.4	27.0
	Foul		52.0	57.4	52.0
500-kV Steel Pole H-Frame Structure (Alternate Design)	Fair	±125	27.2	33.0	27.2
	Foul		52.2	58.0	52.2
500-kV Steel Monopole Structure (Alternate Design)	Fair	±125	27.0	33.0	27.9
	Foul		52.0	58.0	52.9

Median audible noise in fair and foul weather measured in dB referenced to 20 microPascals with A-weighting.
A-weighting chosen to match response of human ear. 37 feet minimum conductor ground clearance
Voltage of 550-kV (audible noise would be less for voltage less than 550-kV).
Altitude of 5,380 feet (audible noise would be less for altitude lower than 5,380 feet).

Altitude Impact on Audible Noise

The audible noise level at the edge of the ROW was calculated for the proposed 500-kV line in foul weather at various altitudes from approximately 1,000 feet to 6,500 feet (300 m to 2000 m in 100 m increments). Table X-2-2 lists the audible noise calculated at the edge of the ROW in foul weather for the proposed 500-kV transmission line with steel lattice towers for various altitudes. Audible noise from the proposed 500-kV transmission line is seen to change at a rate of 1 dBA per 300 m (approximately 1000 feet). A decrease in altitude of 1,000 feet will decrease audible noise from the transmission line by approximately 1 dBA.

Table X-2-2. Altitude Impact on Audible Noise from Proposed 500-kV Line

Altitude (meters)	Altitude (feet)	ROW Edge (dBA) in Foul Weather
300	984	47.5
400	1312	47.9
500	1640	48.2
600	1968	48.5
700	2296	48.9
800	2624	49.2
900	2952	49.5
1000	3280	49.9
1100	3608	50.2
1200	3936	50.5
1300	4264	50.9
1400	4592	51.2
1500	4920	51.5
1600	5248	51.9
1700	5576	52.2
1800	5904	52.5
1900	6232	52.9
2000	6560	53.2

Median audible noise in foul weather measured in dB referenced to 20 microPascals with A-weighting.
A-weighting chosen to match response of human ear.
37 feet minimum conductor ground clearance
Voltage of 550-kV (audible noise would be less for voltage less than 550-kV).

The foul weather audible noise levels at the edge of the ROW for the proposed 500-kV transmission line operating at various altitudes have been used as the basis for determining the audible noise at NSRs along the transmission line route. Audible noise produced in foul weather with the line operating at 550-kV (10% over voltage can be considered "worst-case"). Audible noise levels for voltage levels less than 550-kV and during better weather conditions than foul weather will be less than those calculated.

ATTACHMENT X-3
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 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 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

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

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 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.

- 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.

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

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.

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

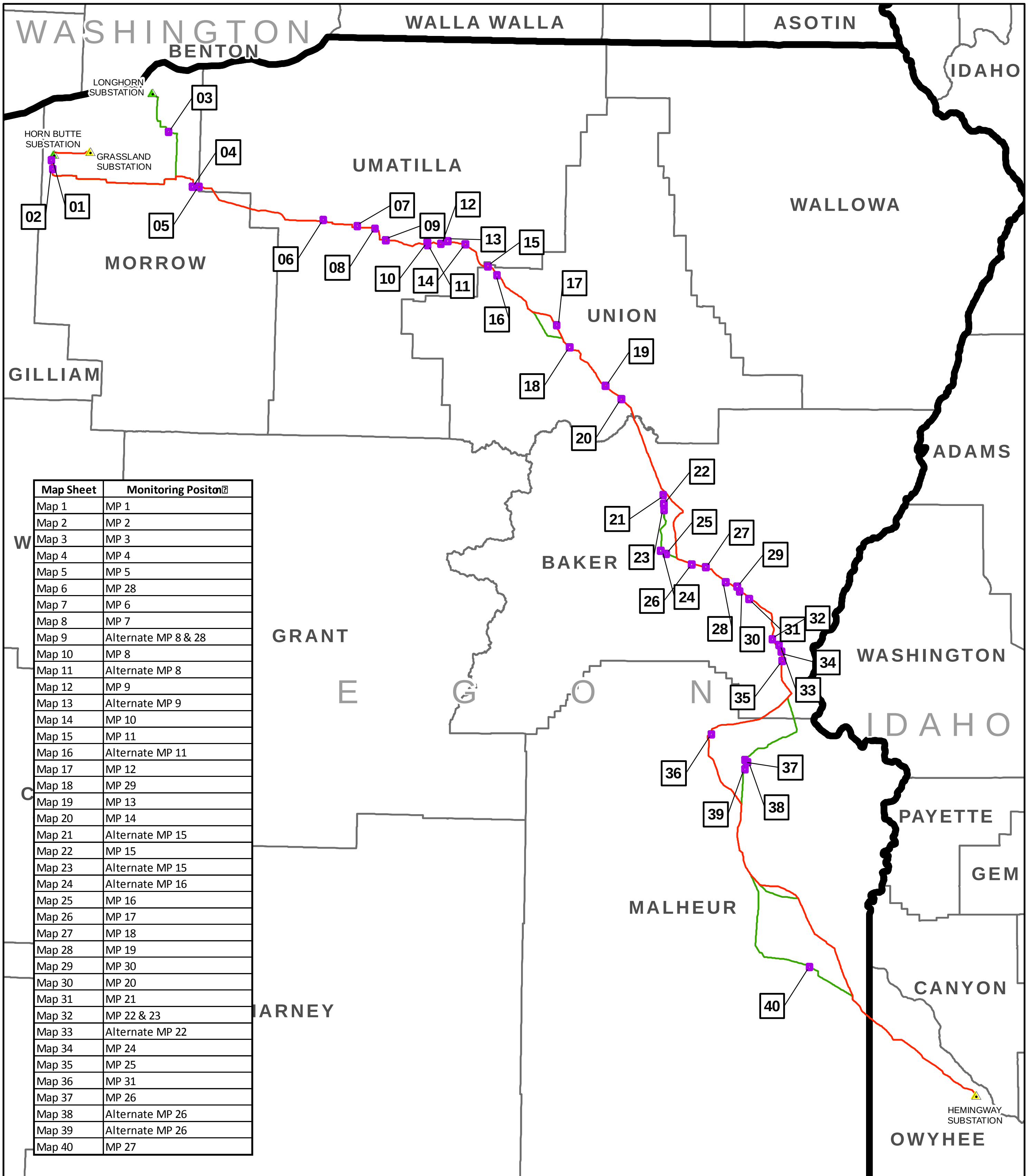
Statistical Descriptor	Maximum Permissible Statistical Noise Levels (dBA)	
	Daytime (7:00 a.m. – 10 p.m.)	Nighttime (10 p.m. – 7 a.m.)
L_{50}	55	50
L_{10}	60	55
L_{1}	75	60

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.

APPENDIX C: MAP BOOK IDENTIFYING POTENTIAL NOISE MONITORING POSITIONS



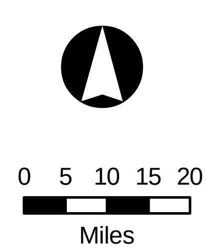
Map Sheet	Monitoring Positon
Map 1	MP 1
Map 2	MP 2
Map 3	MP 3
Map 4	MP 4
Map 5	MP 5
Map 6	MP 28
Map 7	MP 6
Map 8	MP 7
Map 9	Alternate MP 8 & 28
Map 10	MP 8
Map 11	Alternate MP 8
Map 12	MP 9
Map 13	Alternate MP 9
Map 14	MP 10
Map 15	MP 11
Map 16	Alternate MP 11
Map 17	MP 12
Map 18	MP 29
Map 19	MP 13
Map 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

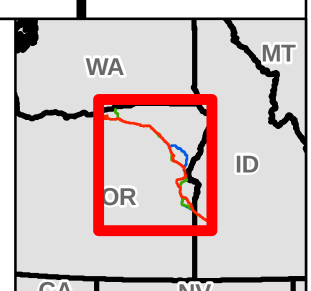
Potential Noise Monitoring Positions

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

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





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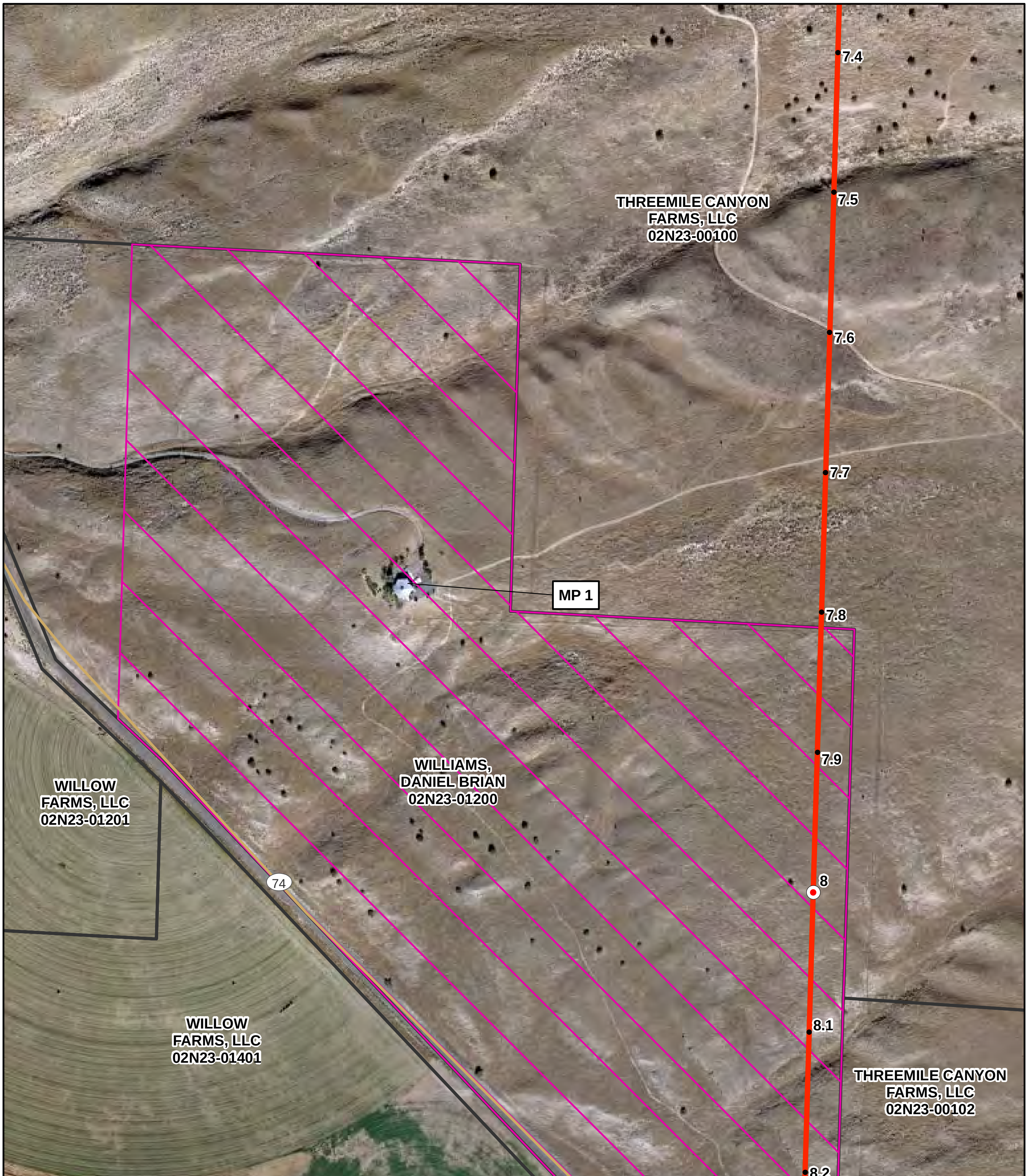


Monitoring Position 1
Morrow County

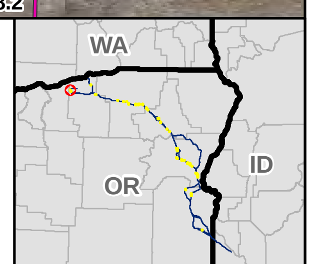
Map 1 of 40

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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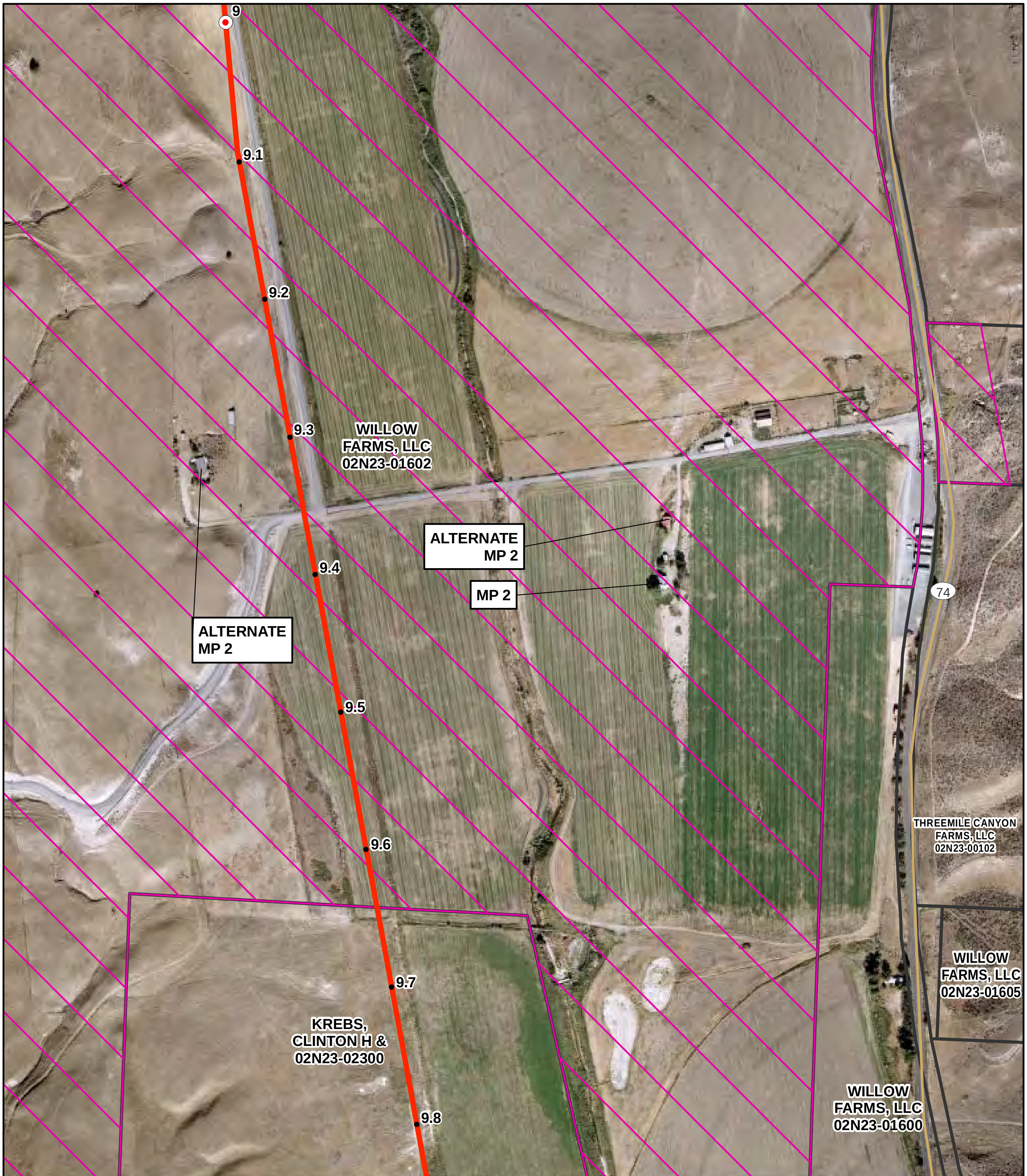


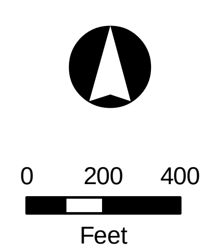
Monitoring Position 2
Morrow County

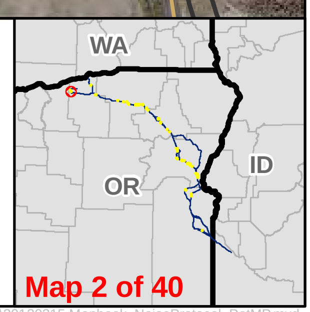
Map 2 of 40

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





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Monitoring Position 3
Morrow County

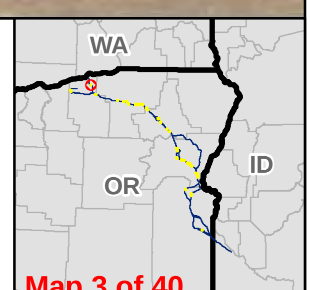
Map 3 of 40

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



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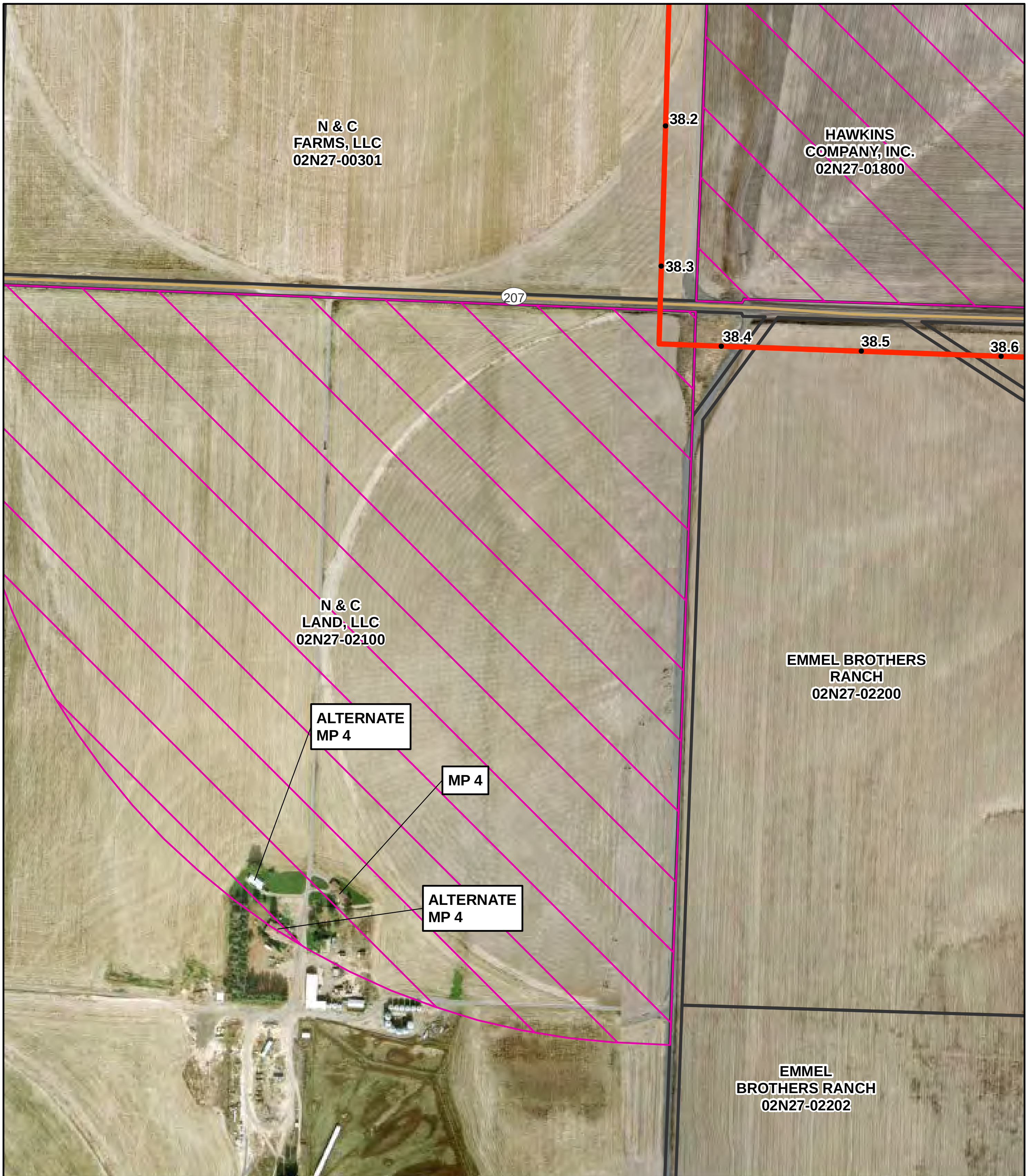


Monitoring Position 4
Morrow County

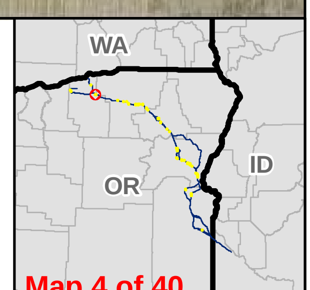
Map 4 of 40

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 5

Morrow/Umatilla Counties

Map 5 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

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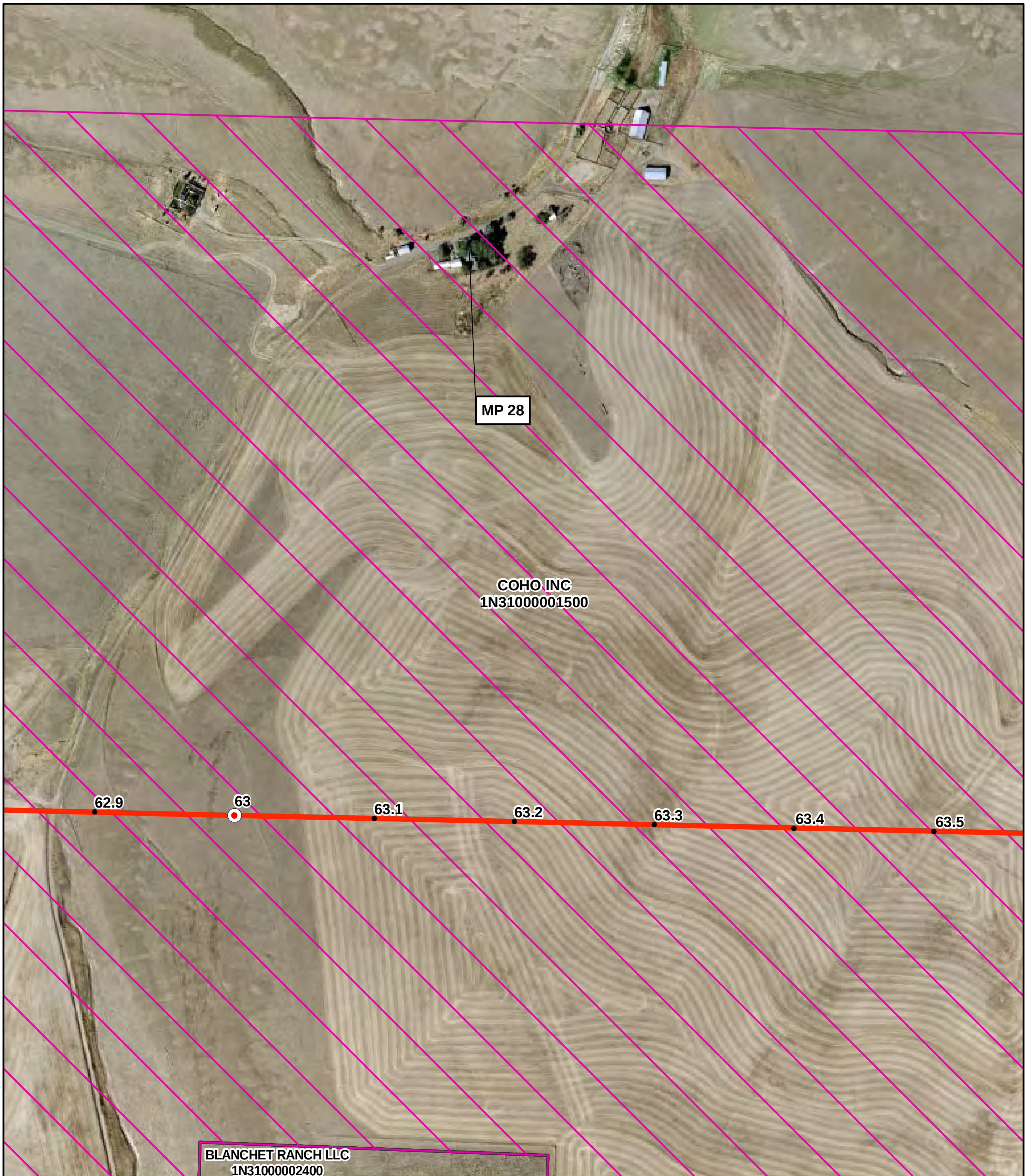


Monitoring Position 28
Umatilla County

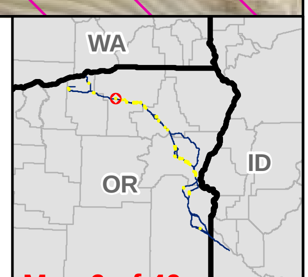
Map 6 of 40

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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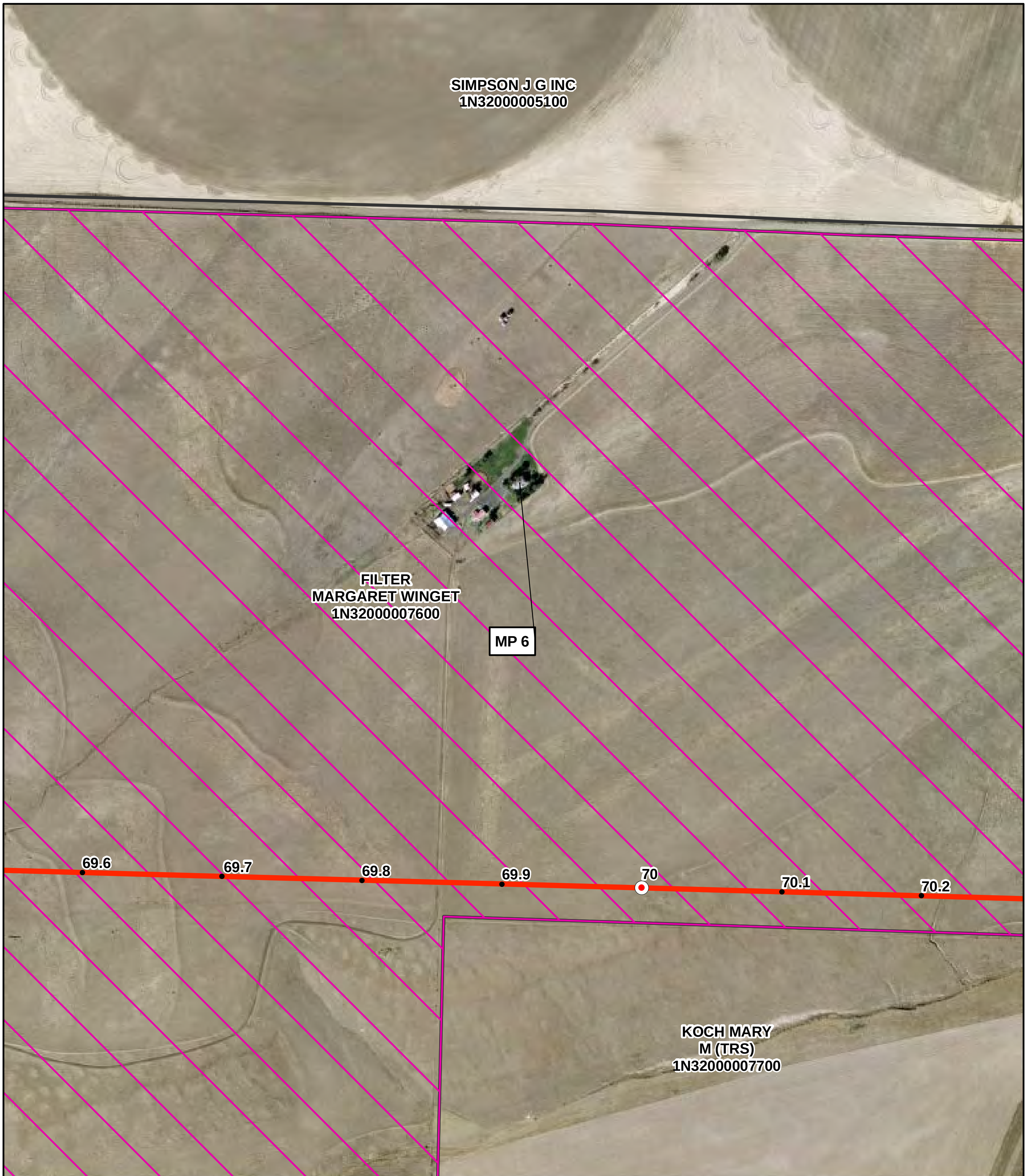


Monitoring Position 6
Umatilla County

Map 7 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

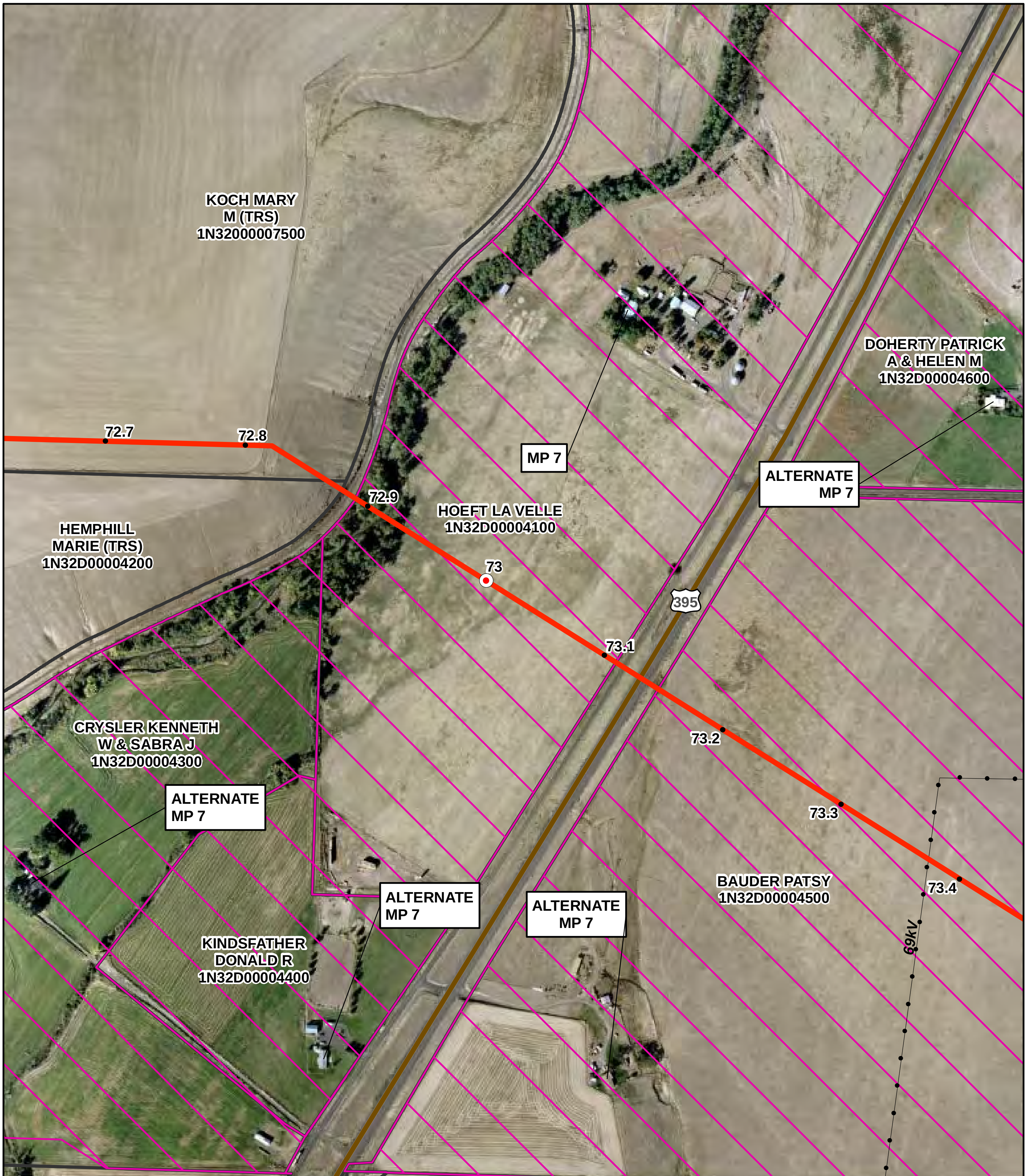
March 21, 2012

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

WA
OR
ID
Map 7 of 40

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



Monitoring Position 7

Umatilla County

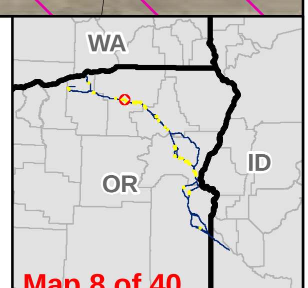
Map 8 of 40

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

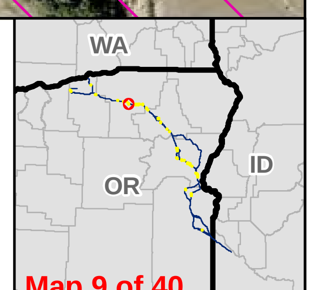
Map 9 of 40

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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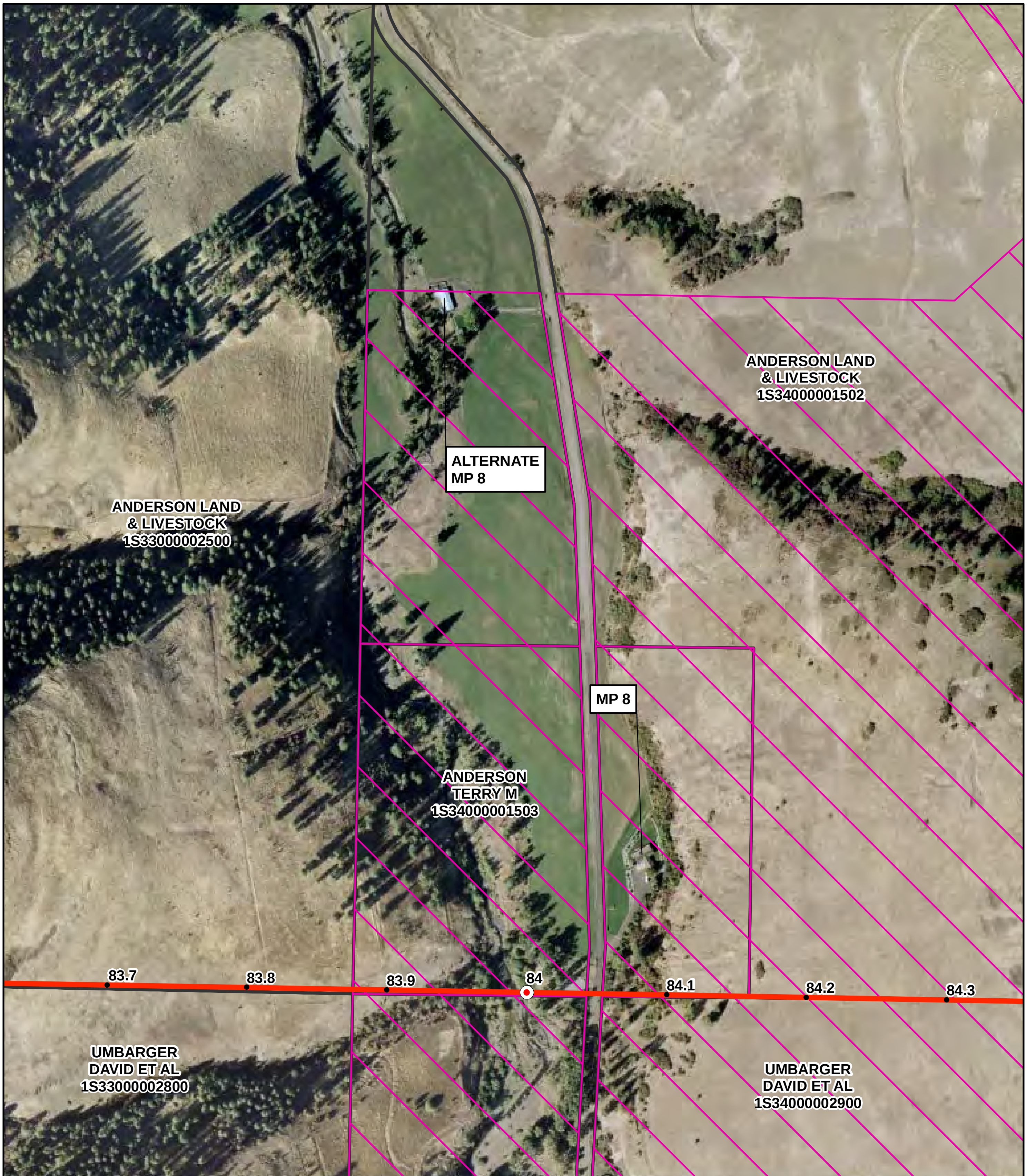


Monitoring Position 8
Umatilla County

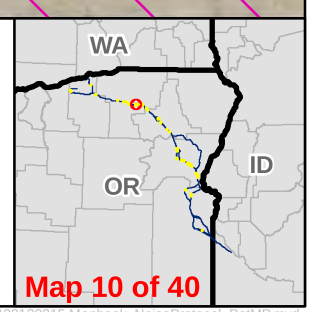
Map 10 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

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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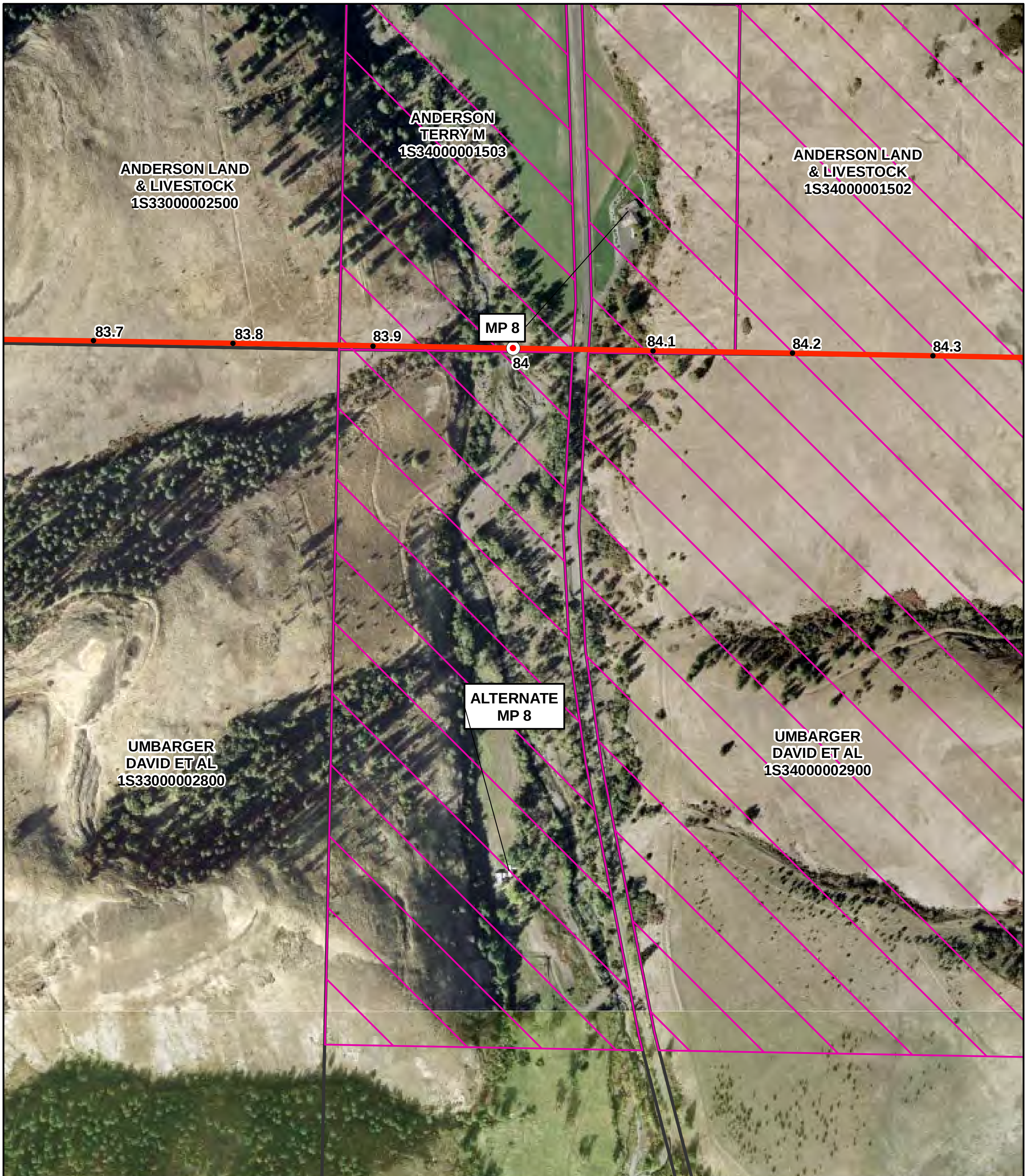


Alternate MP 8

Umatilla County

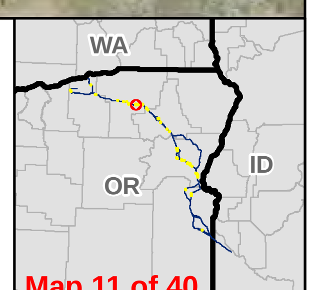
Map 11 of 40

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

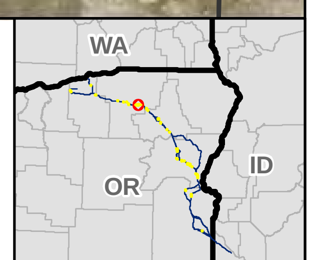
Map 12 of 40

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



Map 12 of 40

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

Alternate MP 9
Umatilla County

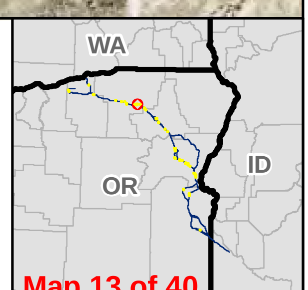
Map 13 of 40

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



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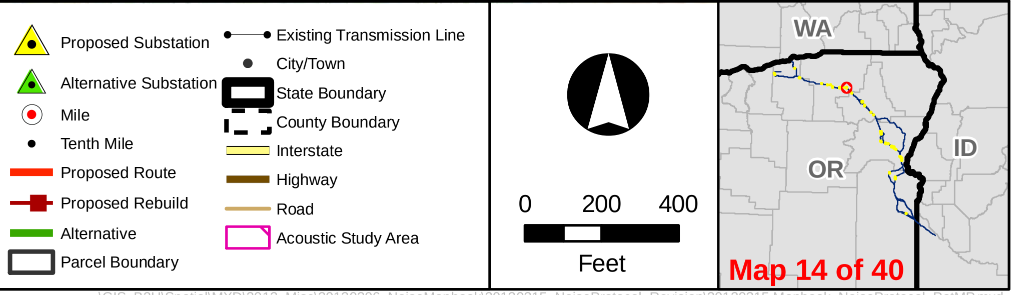
Monitoring Position 10
Umatilla County

Map 14 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012



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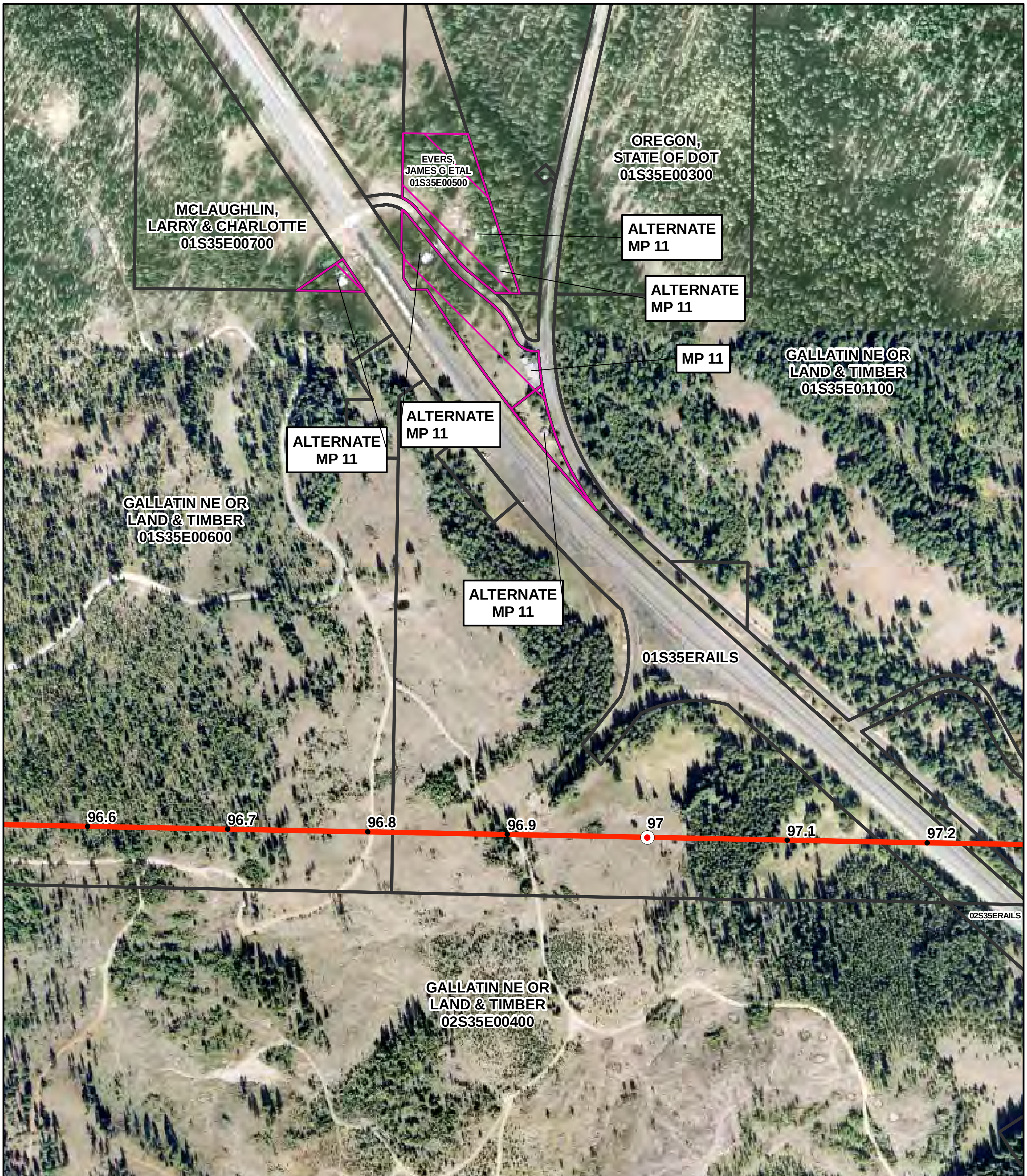


Monitoring Position 11
Union County

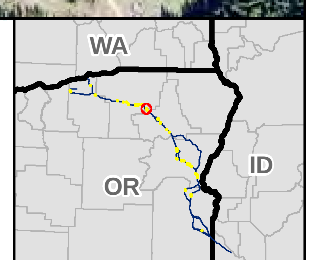
Map 15 of 40

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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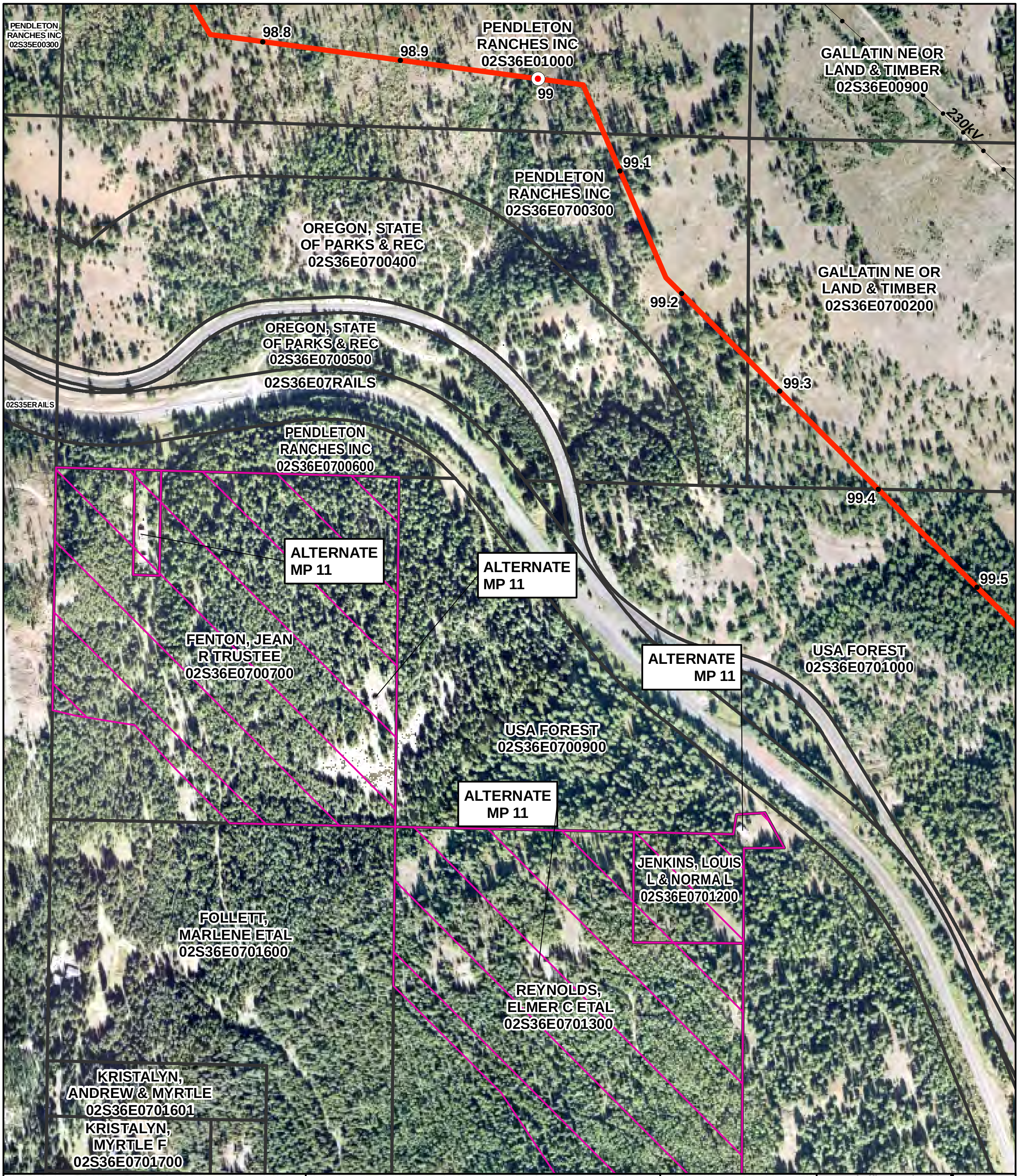


Alternate MP 11
Union County

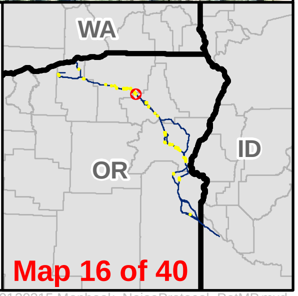
Map 16 of 40

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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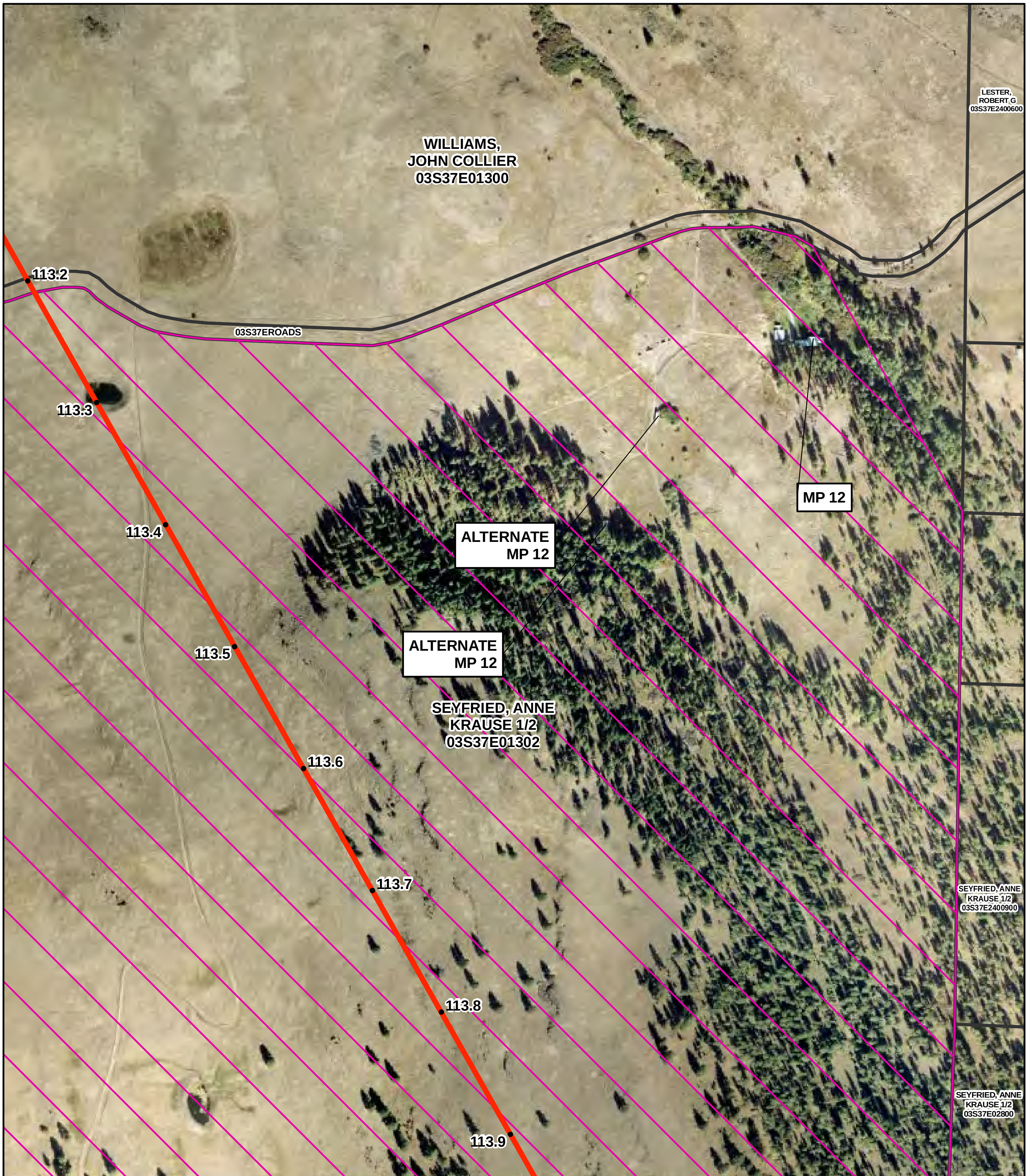


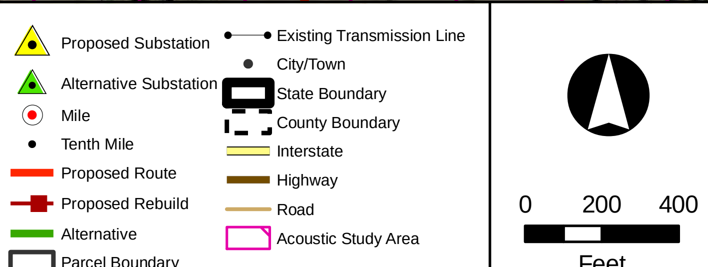
Monitoring Position 12

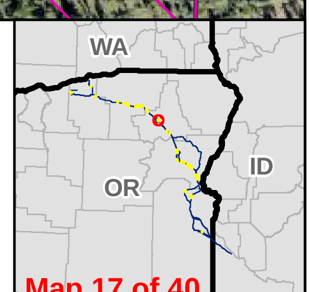
Union County

Map 17 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012





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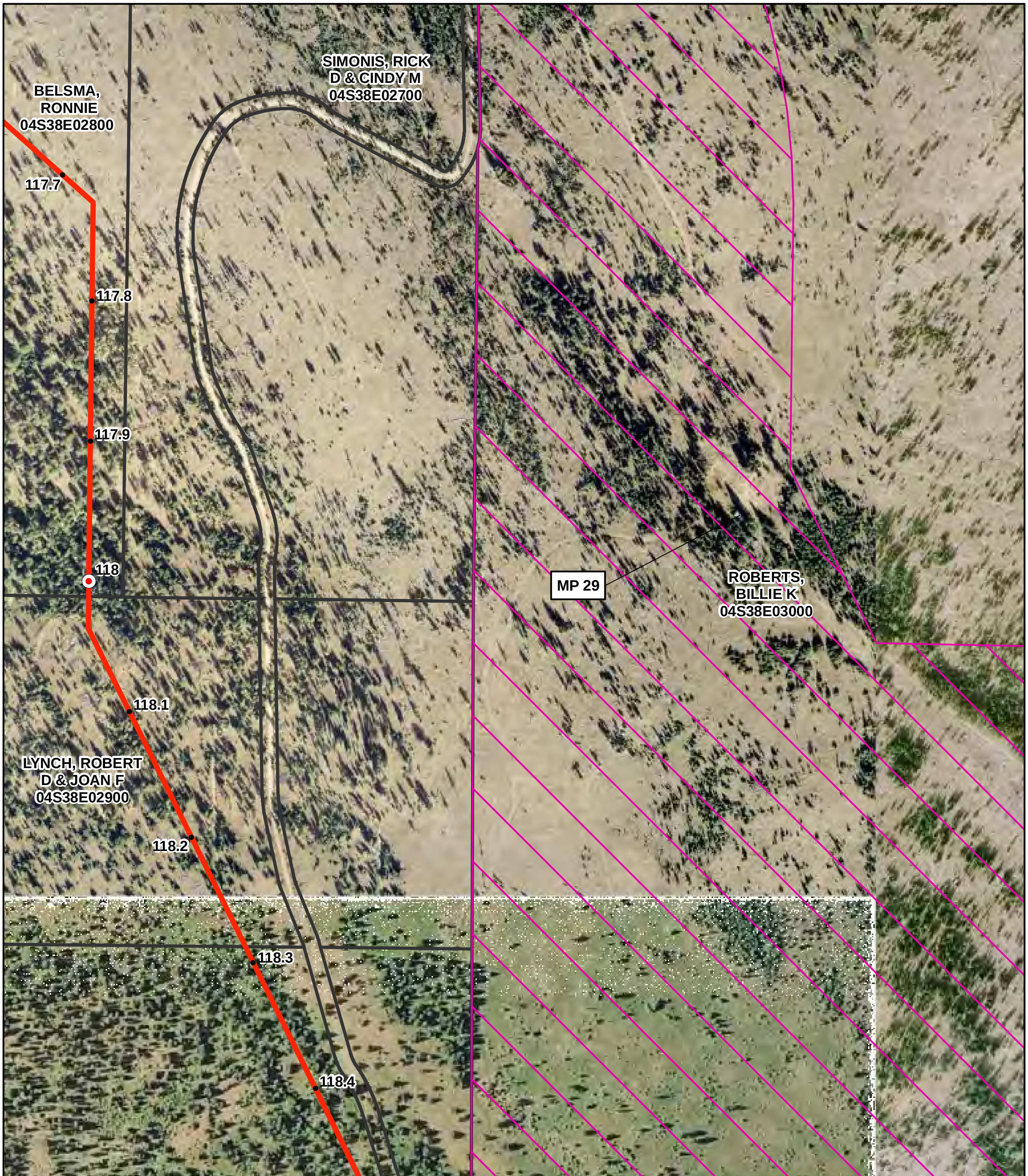


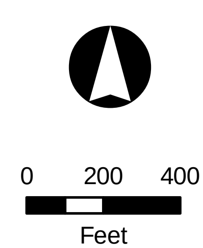
Monitoring Position 29
Union County

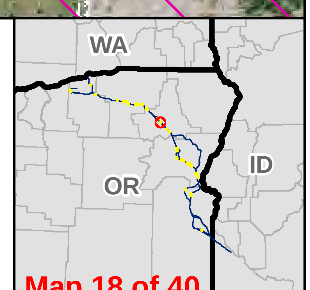
Map 18 of 40

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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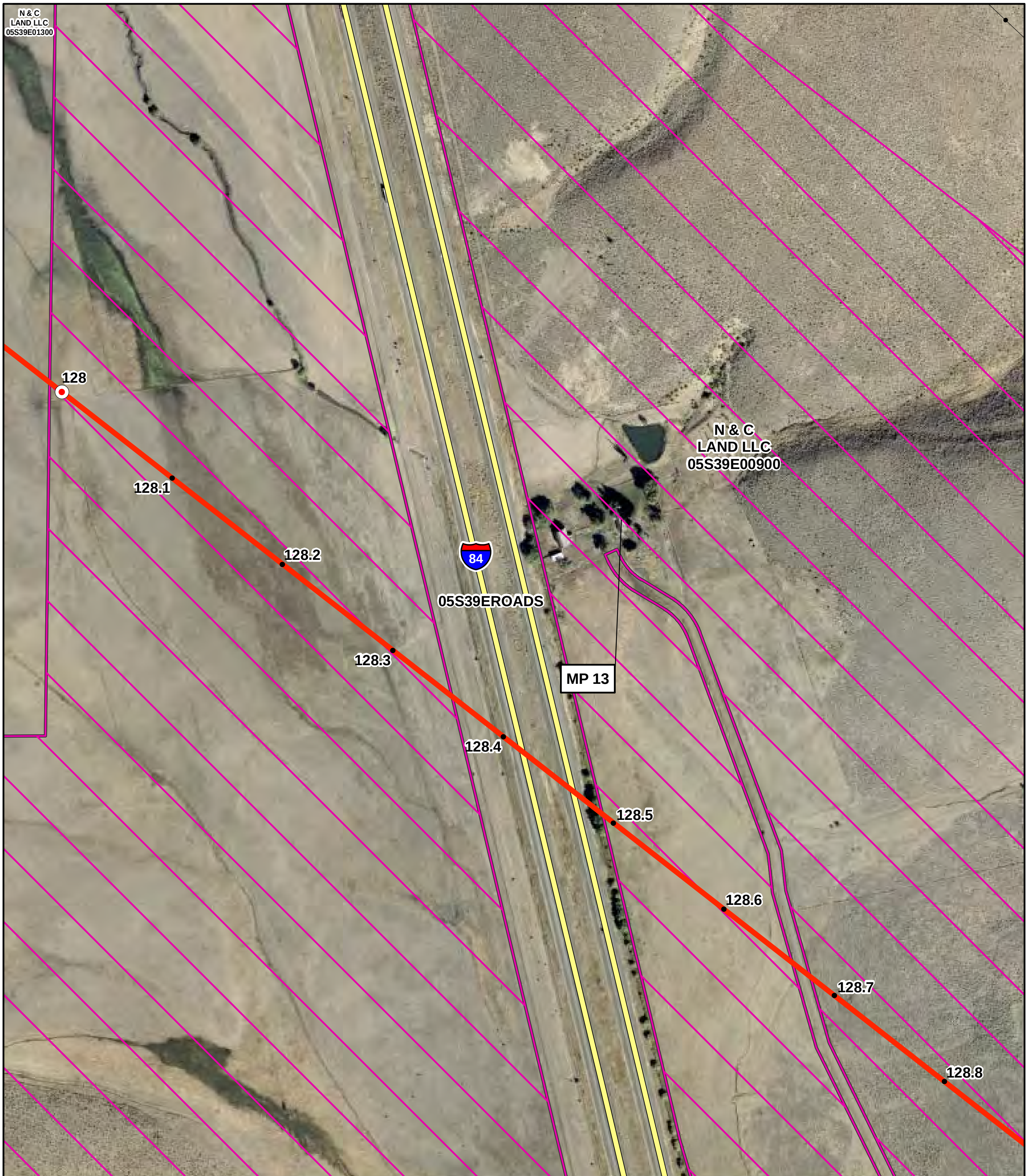


Monitoring Position 13
Union County

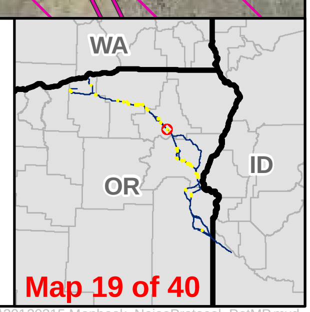
Map 19 of 40

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



Map 19 of 40

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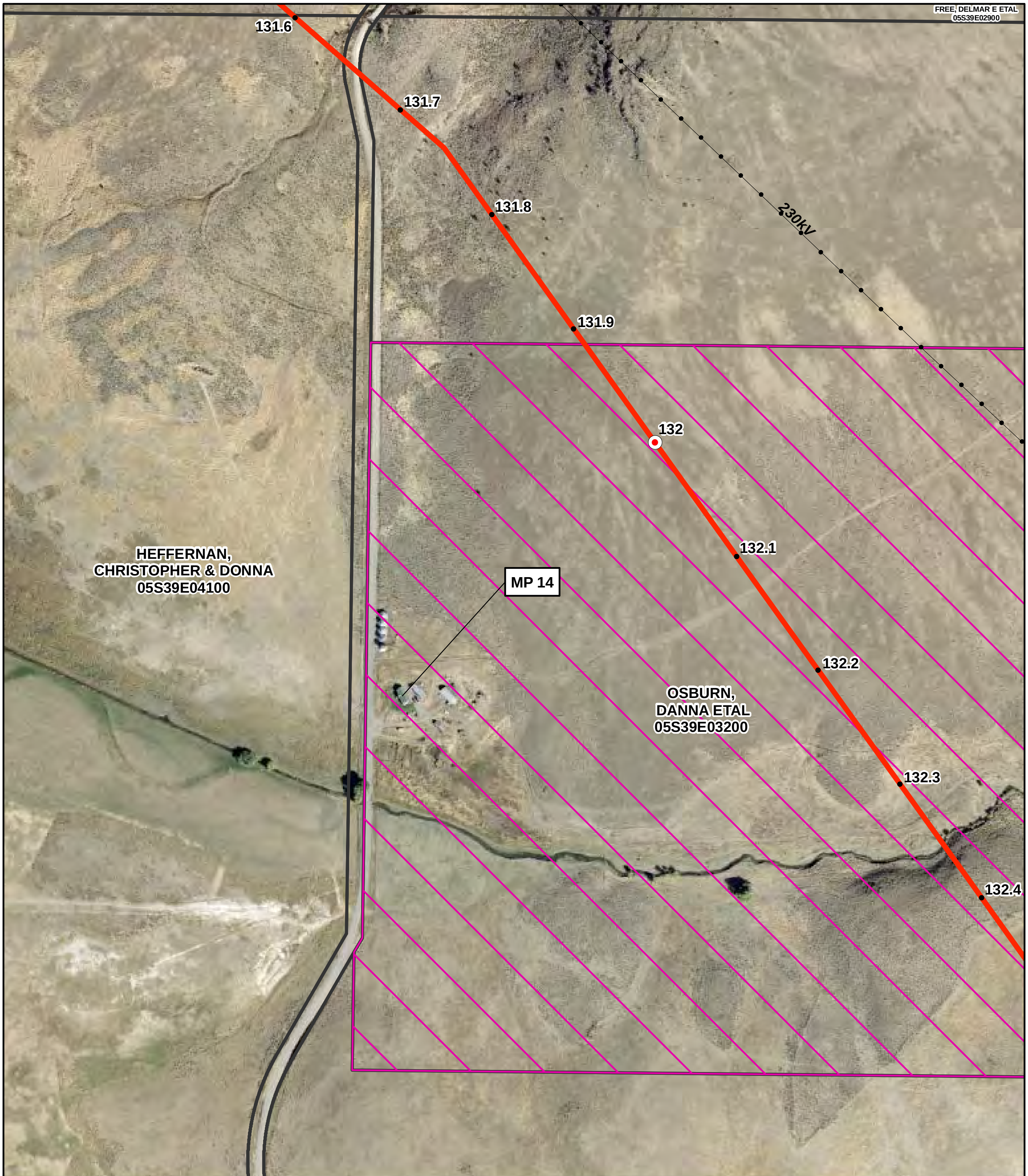
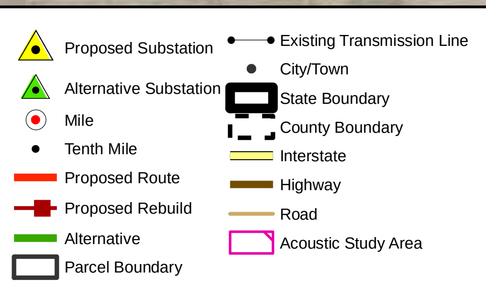


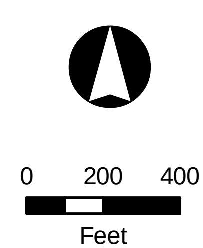
Monitoring Position 14
Union County

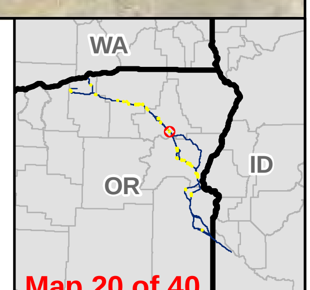
Map 20 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012







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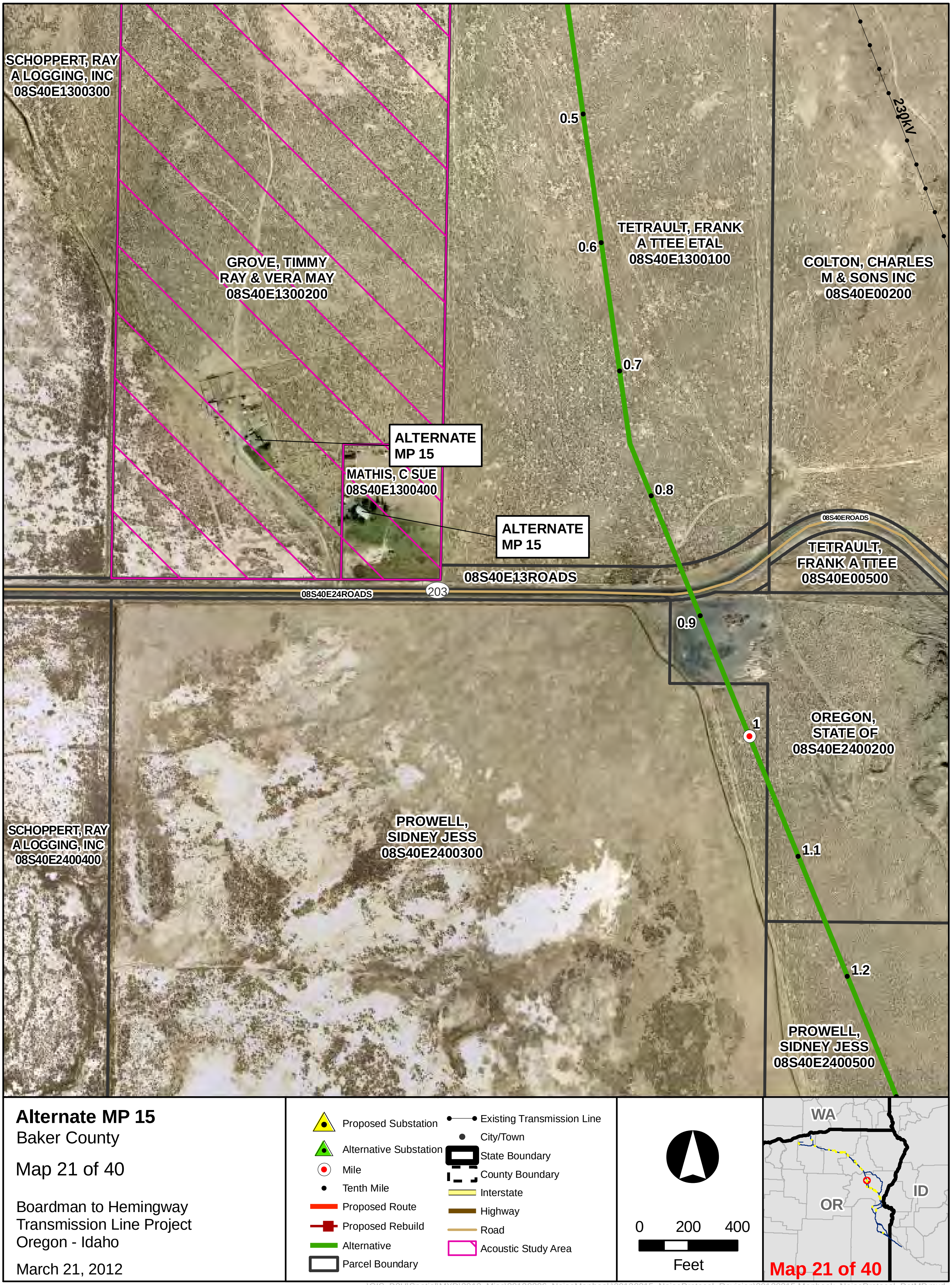

Alternate MP 15
Baker County

Map 21 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

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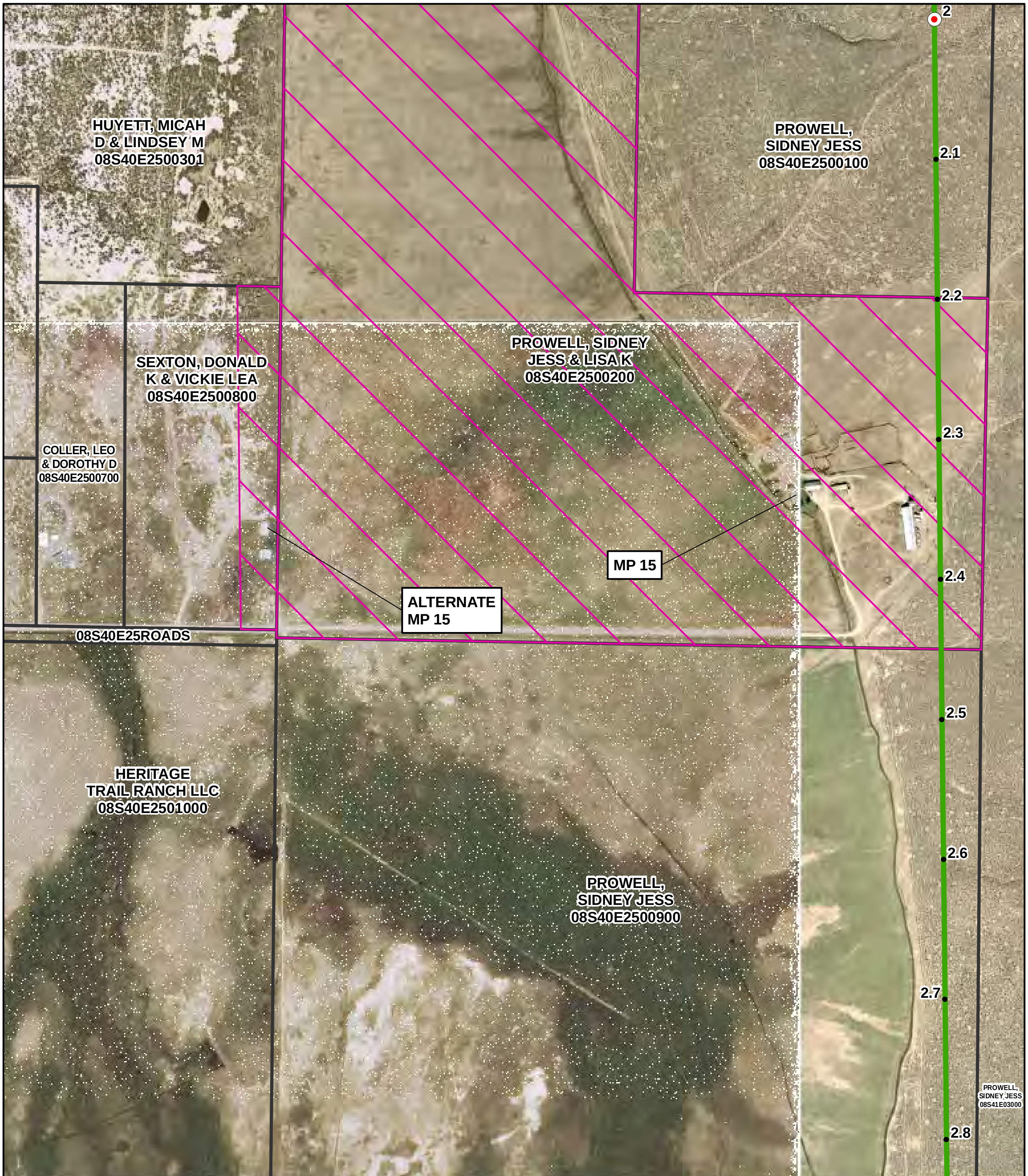


Monitoring Position 15

Baker County

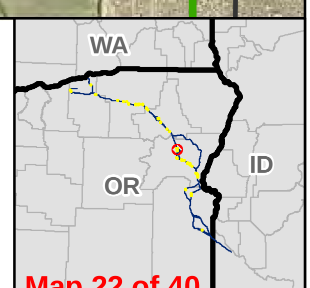
Map 22 of 40

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

0 200 400
Feet



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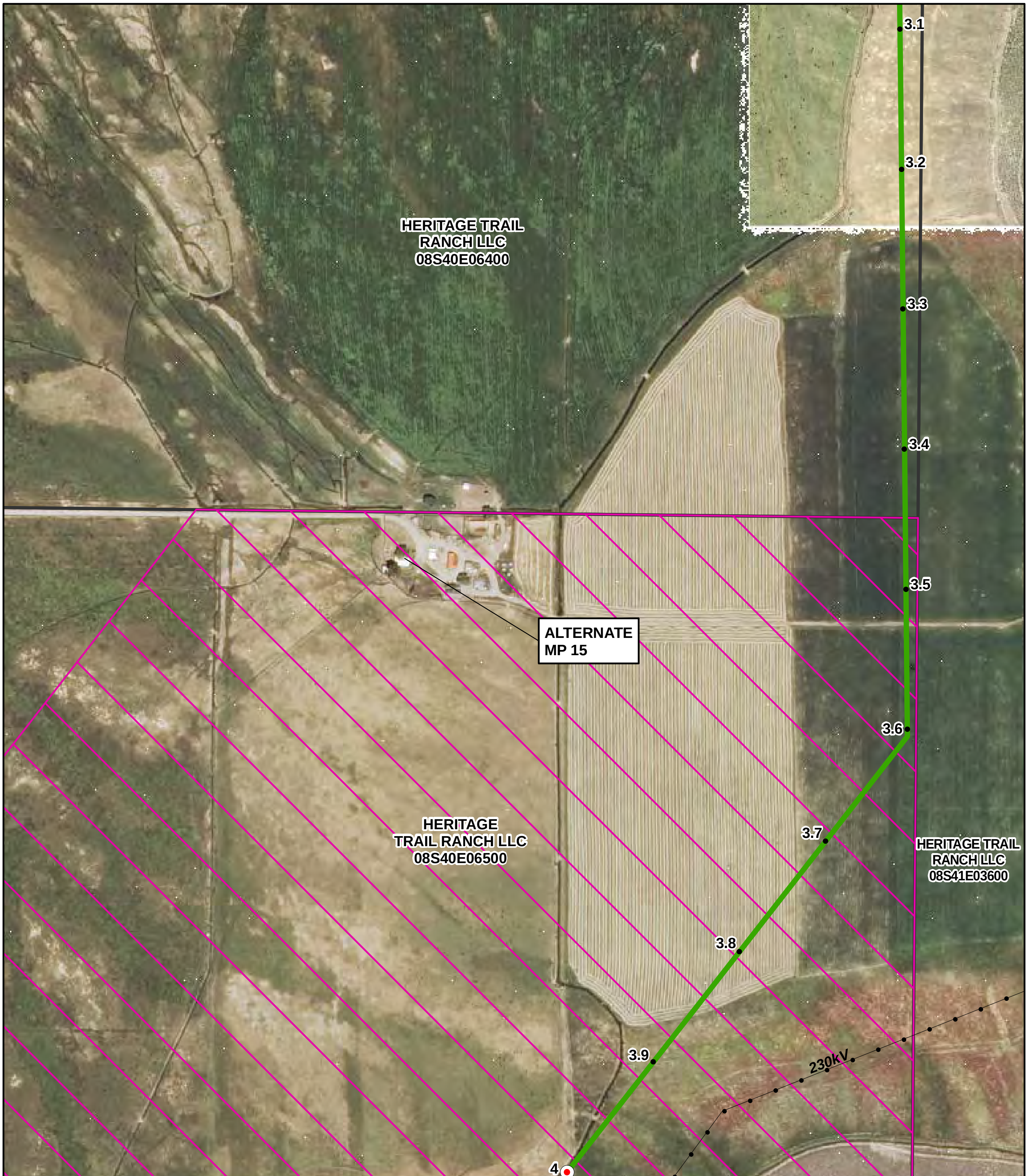
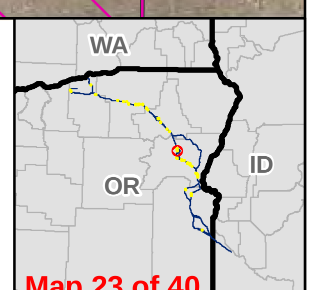


Alternate MP 15
Baker County

Map 23 of 40

Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012



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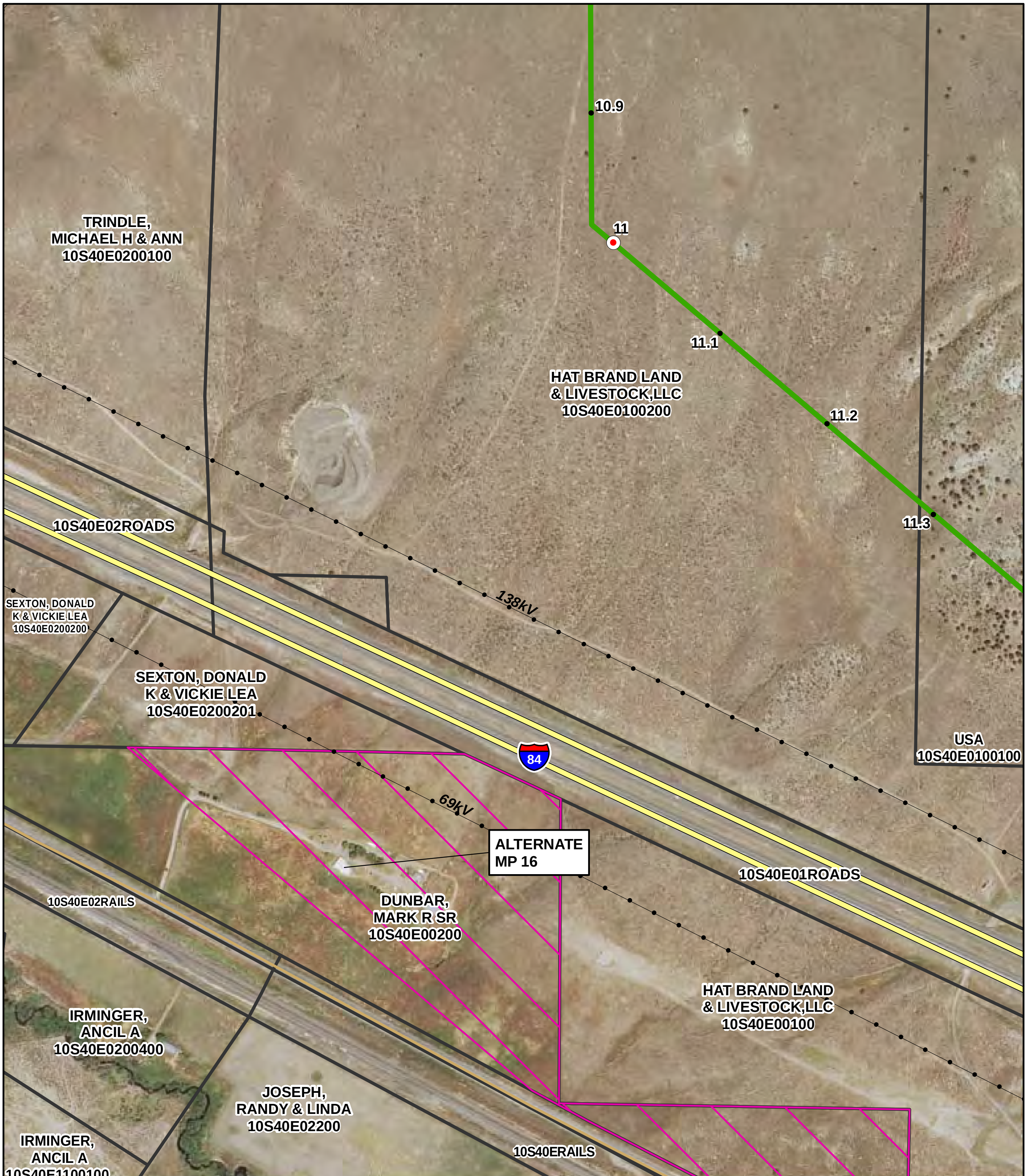


Alternate MP 16

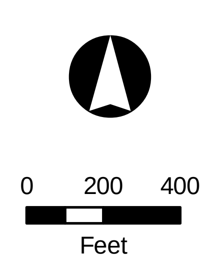
Baker County

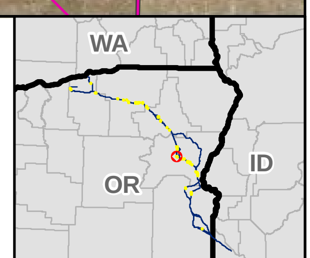
Map 24 of 40

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

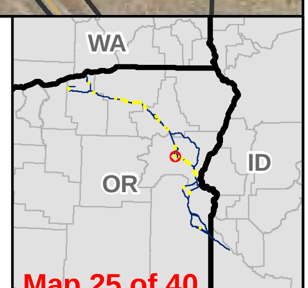
Map 25 of 40

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 25 of 40

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Monitoring Position 17
Baker County

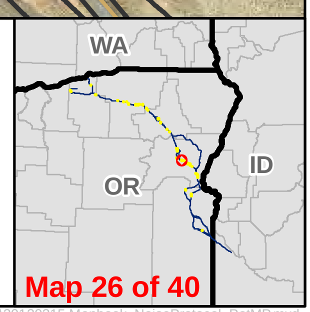
Map 26 of 40

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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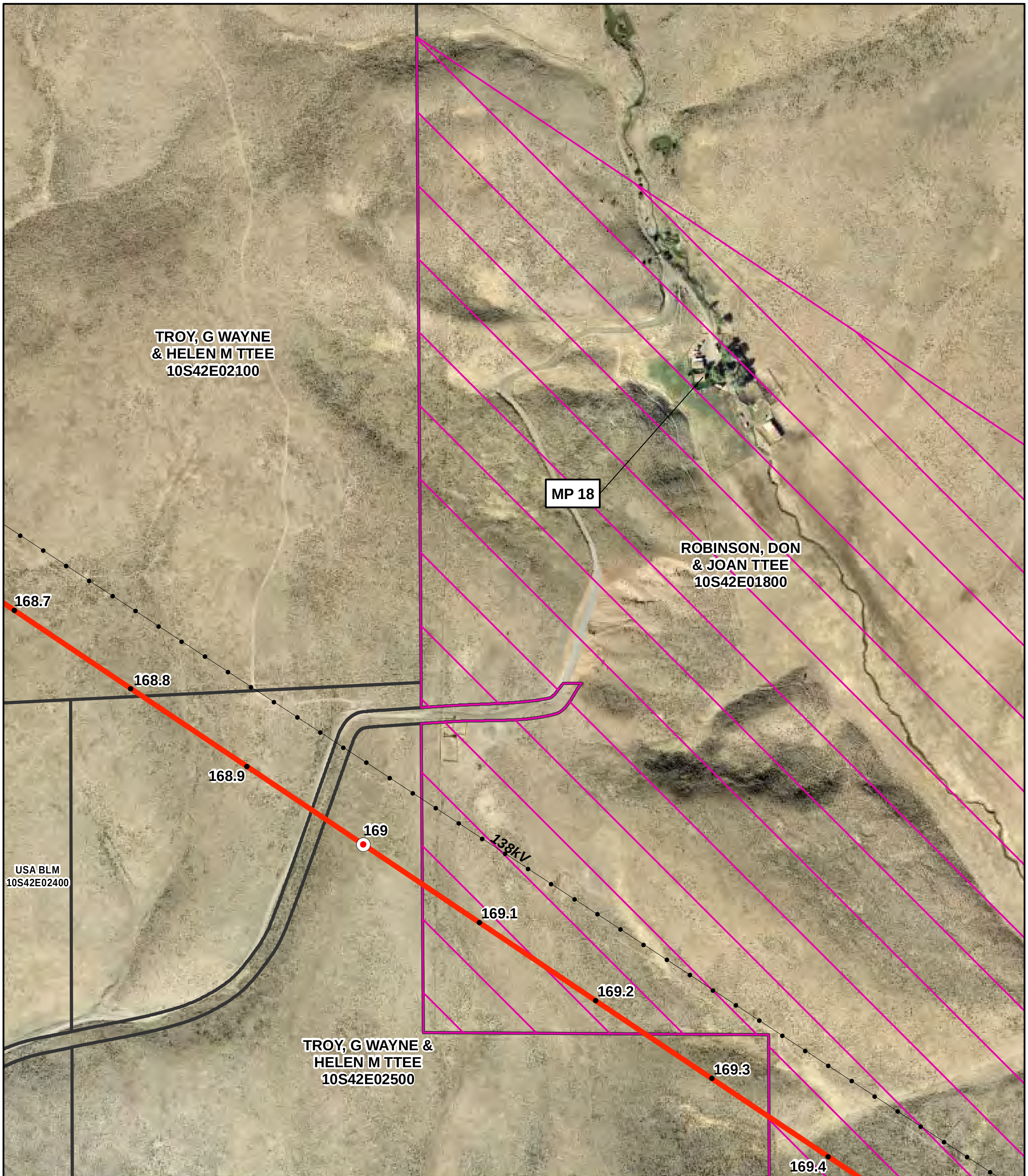


Monitoring Position 18
Baker County

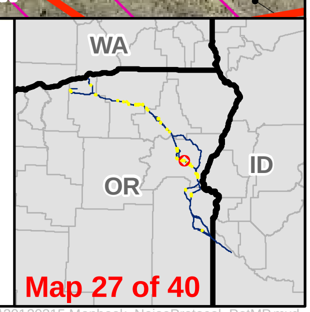
Map 27 of 40

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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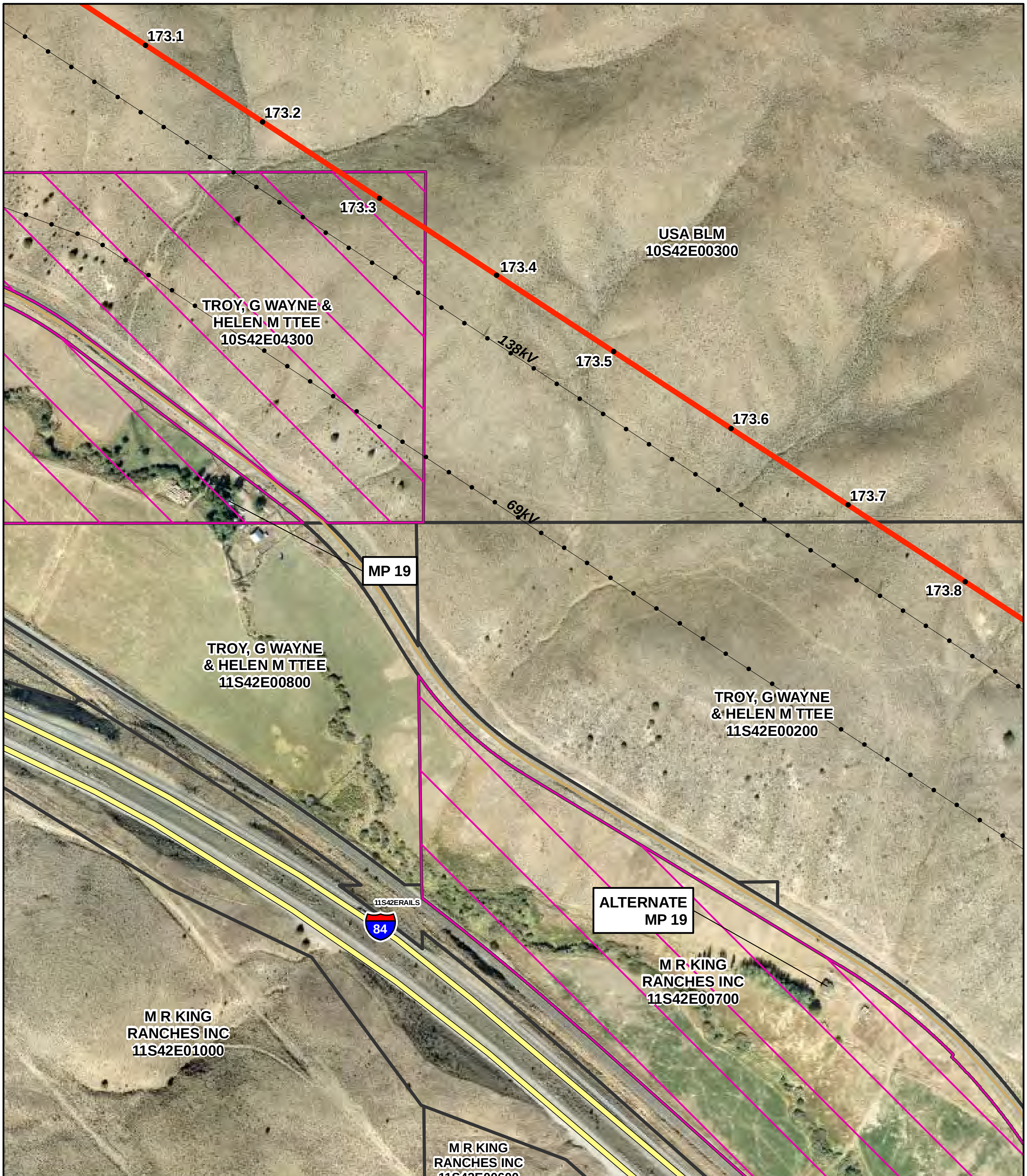


Monitoring Position 19
Baker County

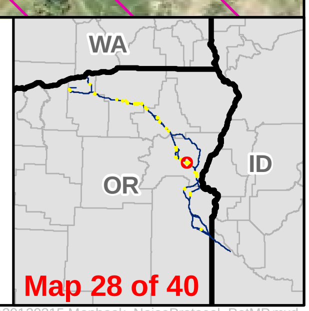
Map 28 of 40

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 28 of 40

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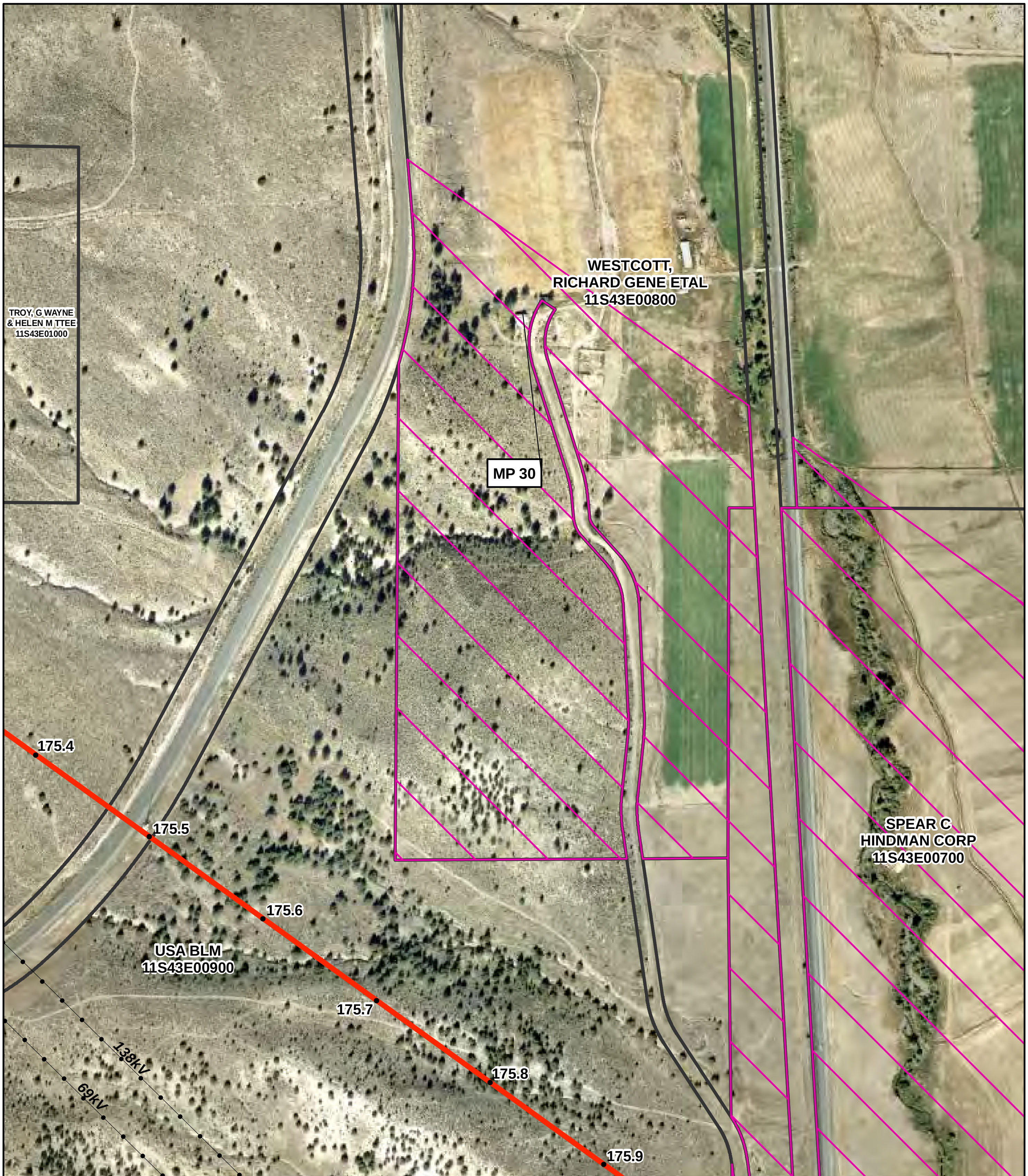

Monitoring Position 30
Baker County

Map 29 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

WA
OR
ID
Map 29 of 40

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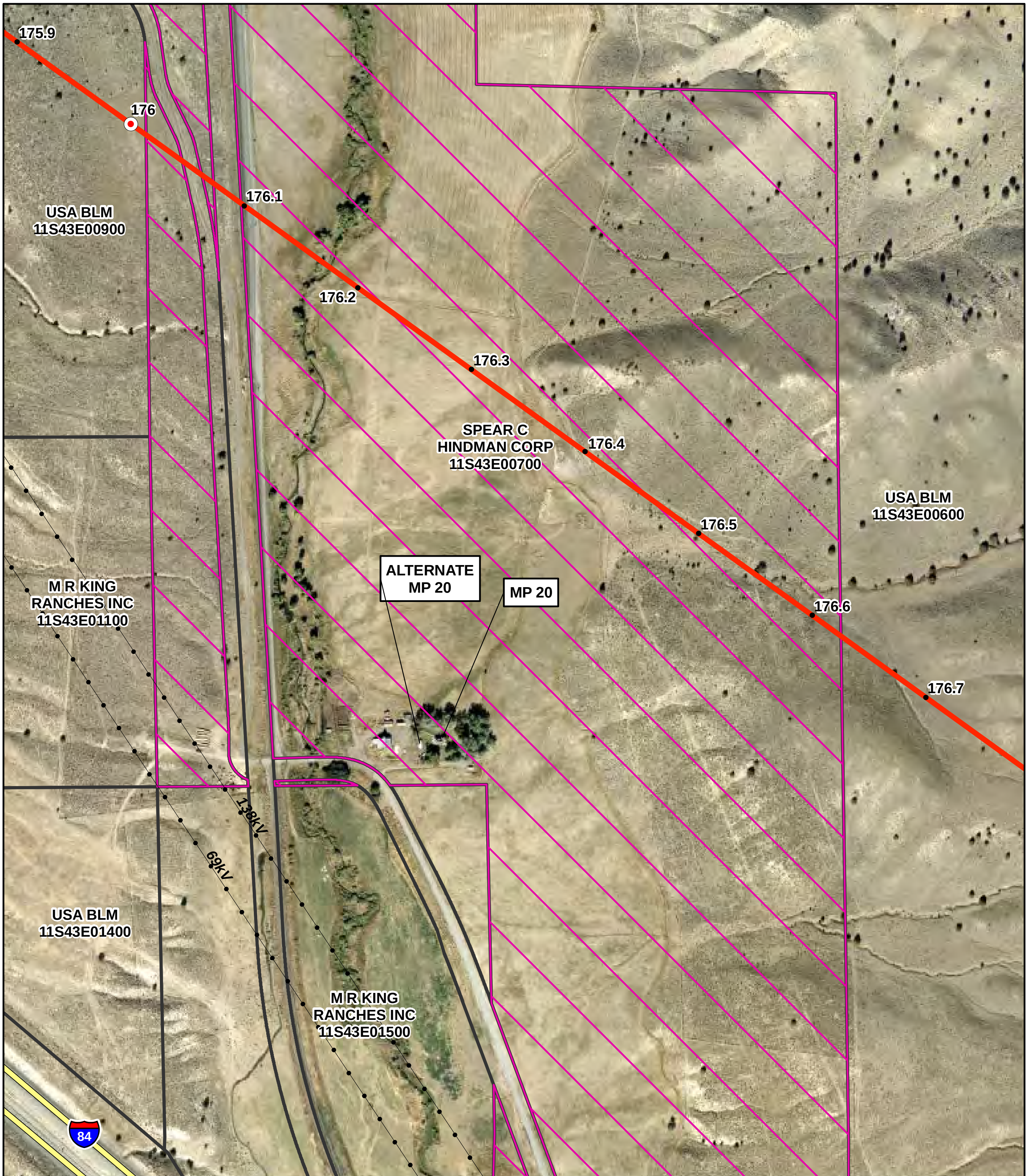

Monitoring Position 20
Baker County

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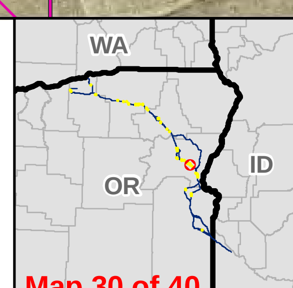
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

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



Map 30 of 40

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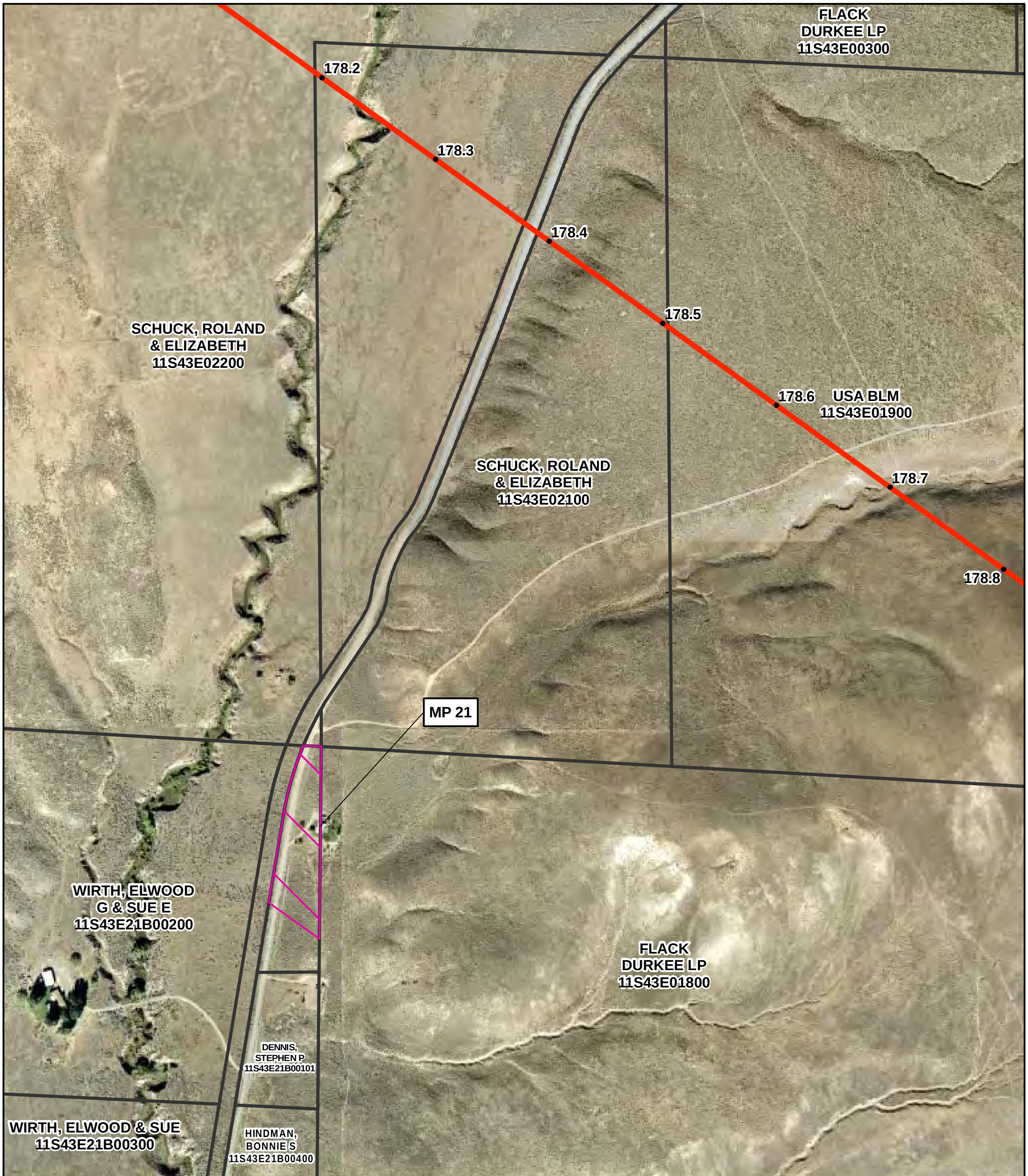

Monitoring Position 21

Baker County

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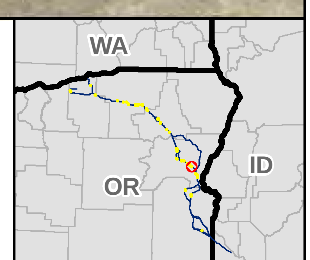
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

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

0 200 400
Feet



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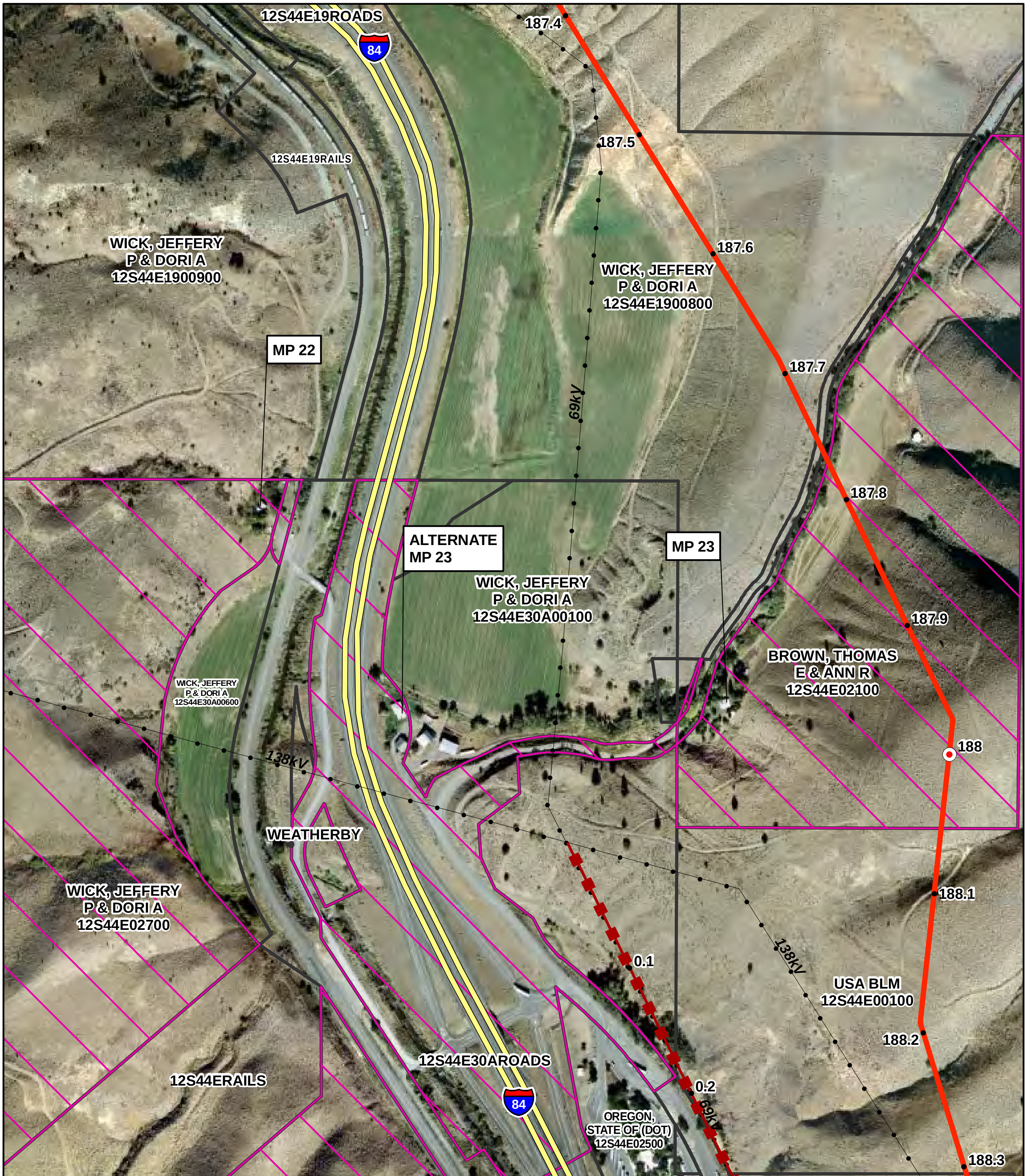

Monitoring Position 22 & 23
Baker County

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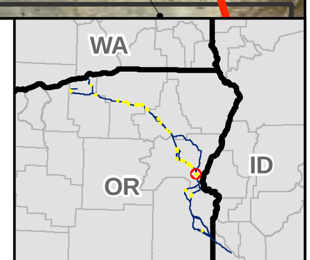
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

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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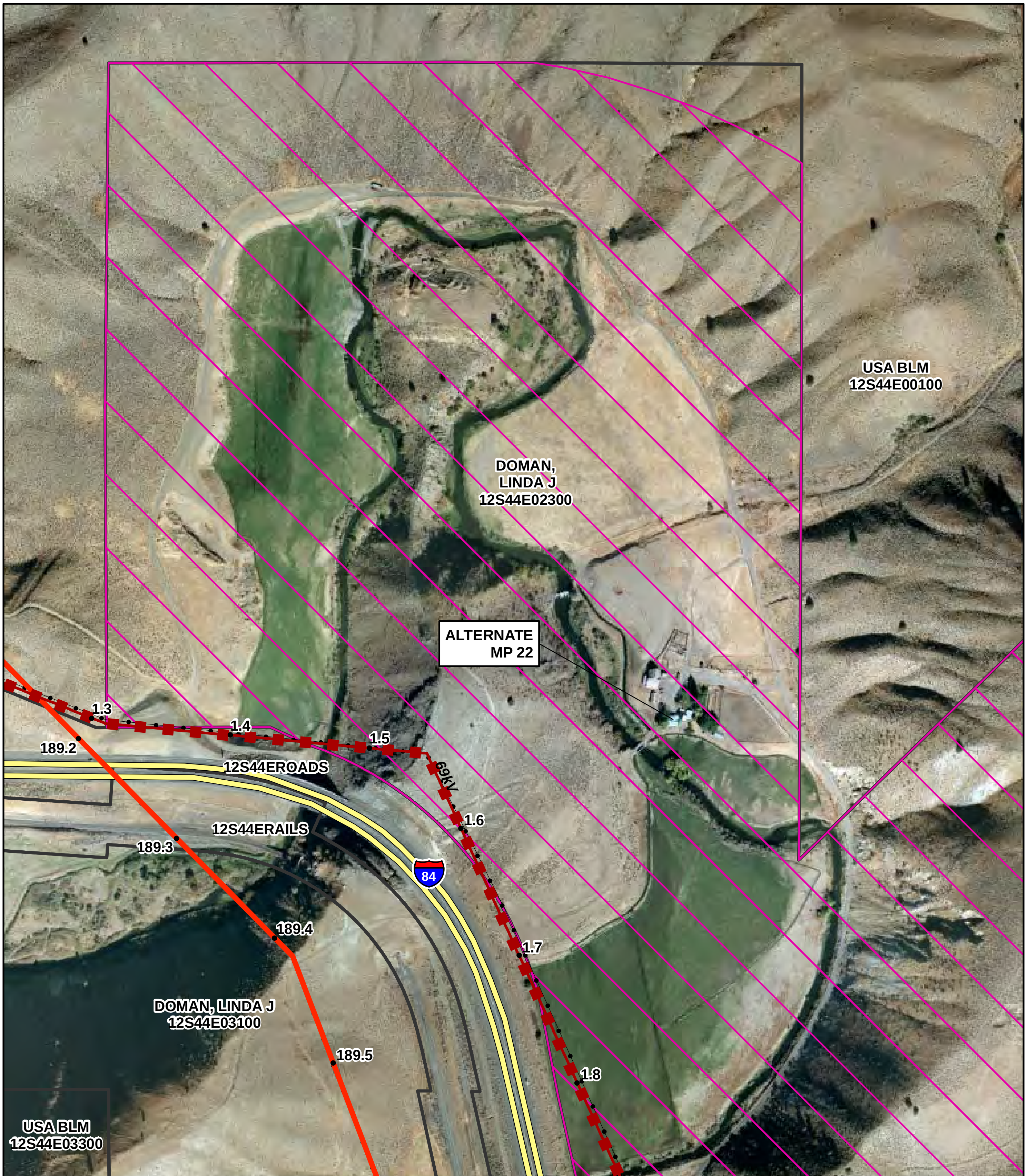

Alternate MP 22
Baker County

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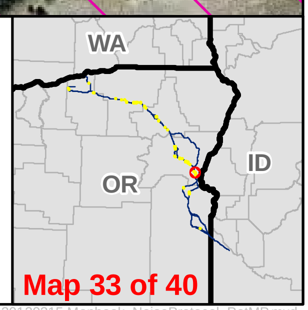
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

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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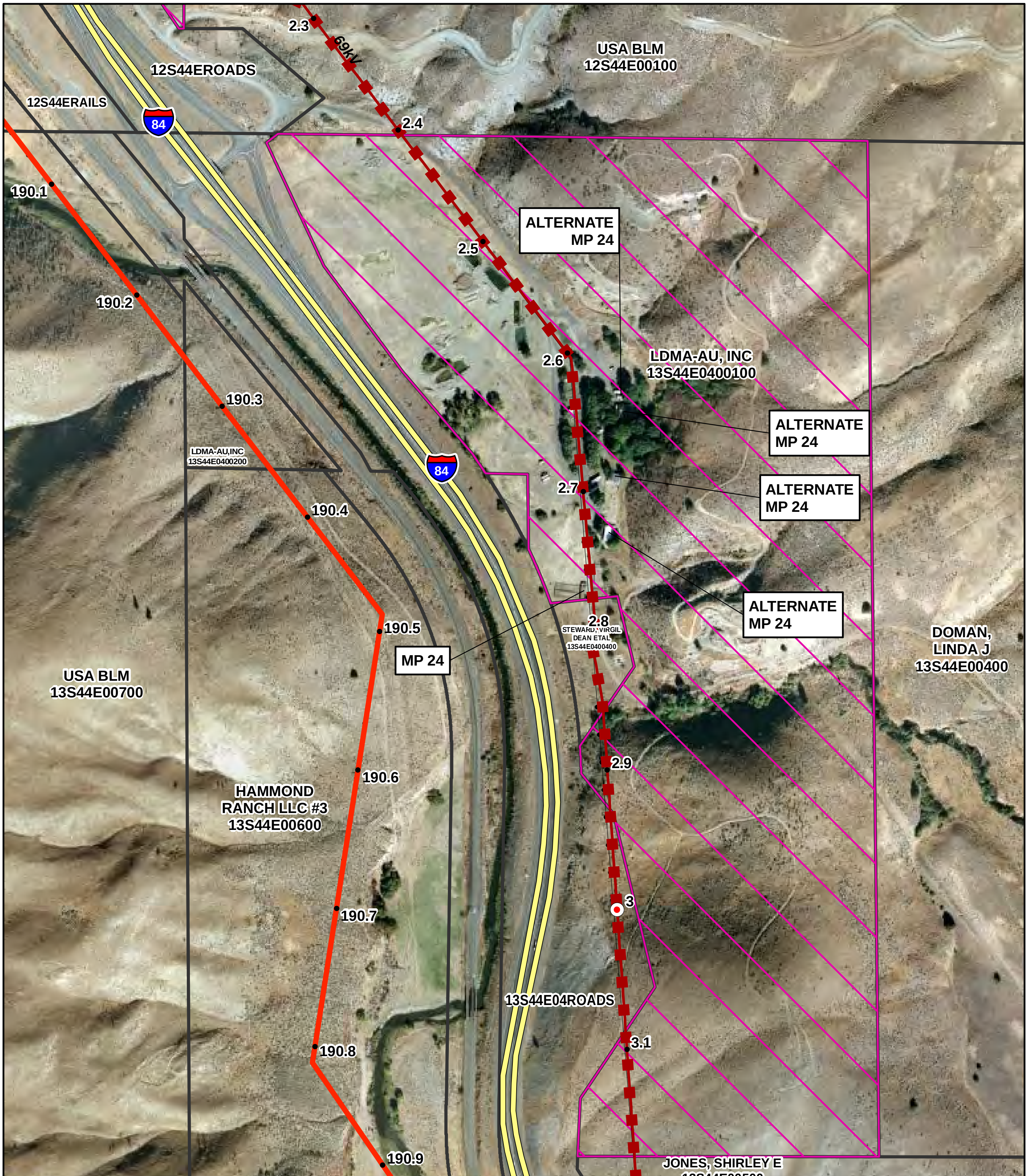

Monitoring Position 24

Baker County

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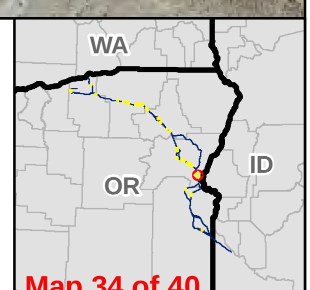
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

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

0 200 400

Feet



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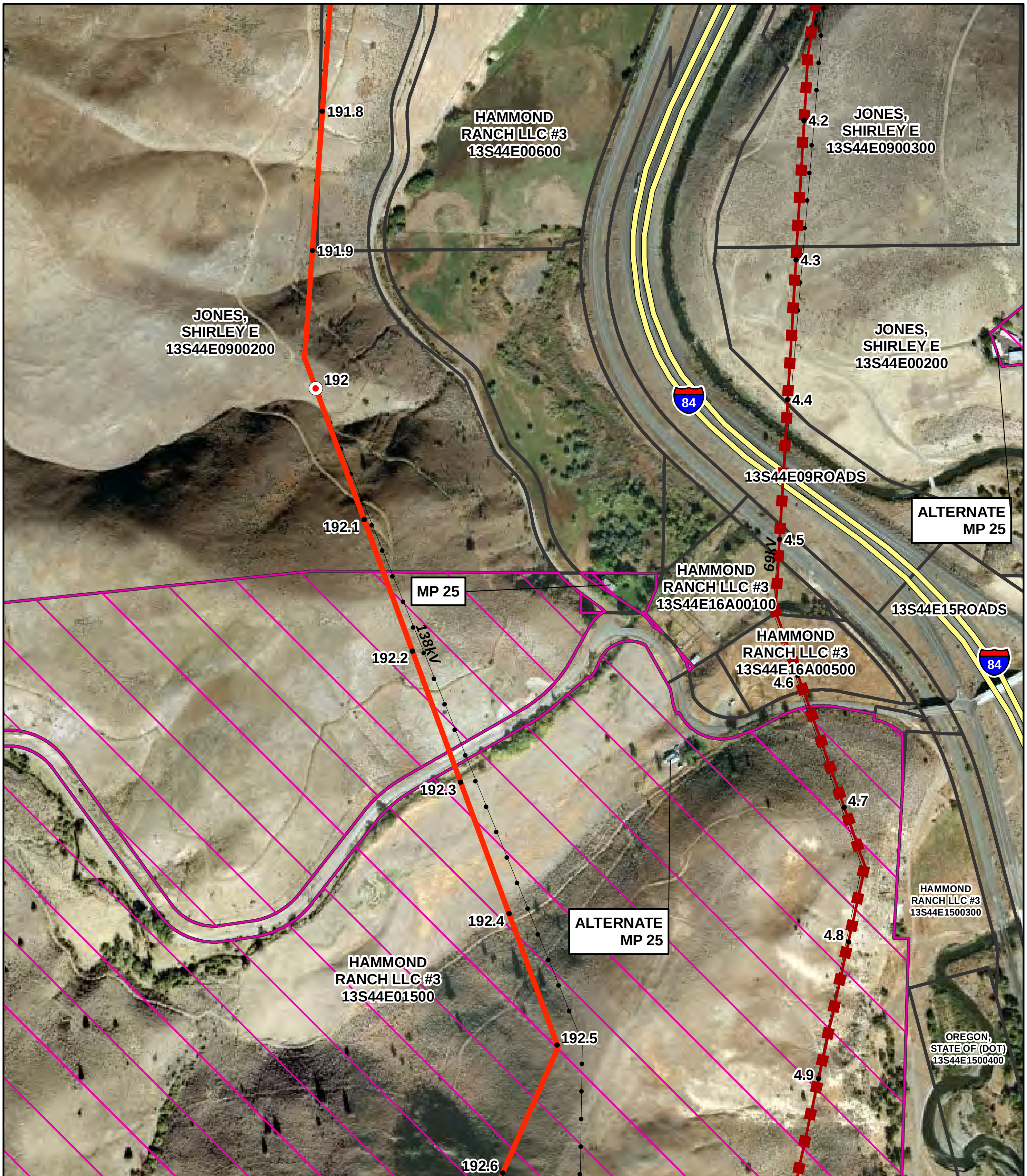

Monitoring Position 25

Baker County

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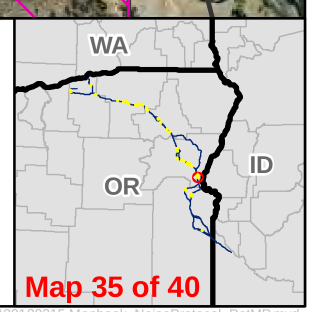
Boardman to Hemingway Transmission Line Project
Oregon - Idaho

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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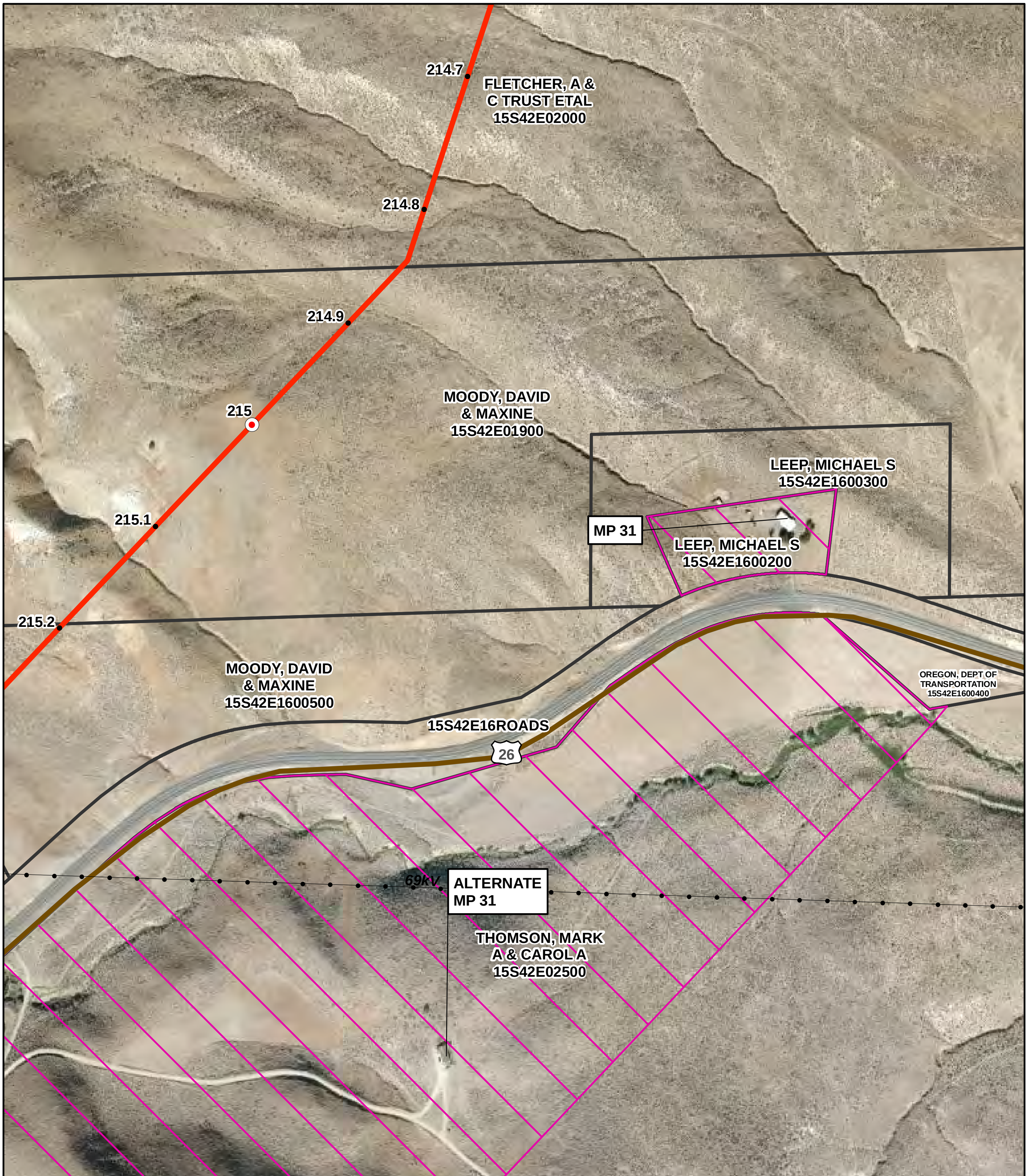

Monitoring Position 31
Malheur County

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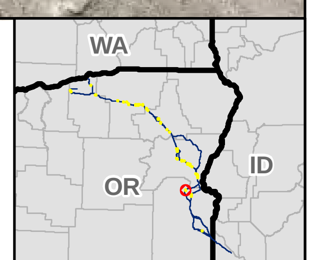
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

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



Map 36 of 40

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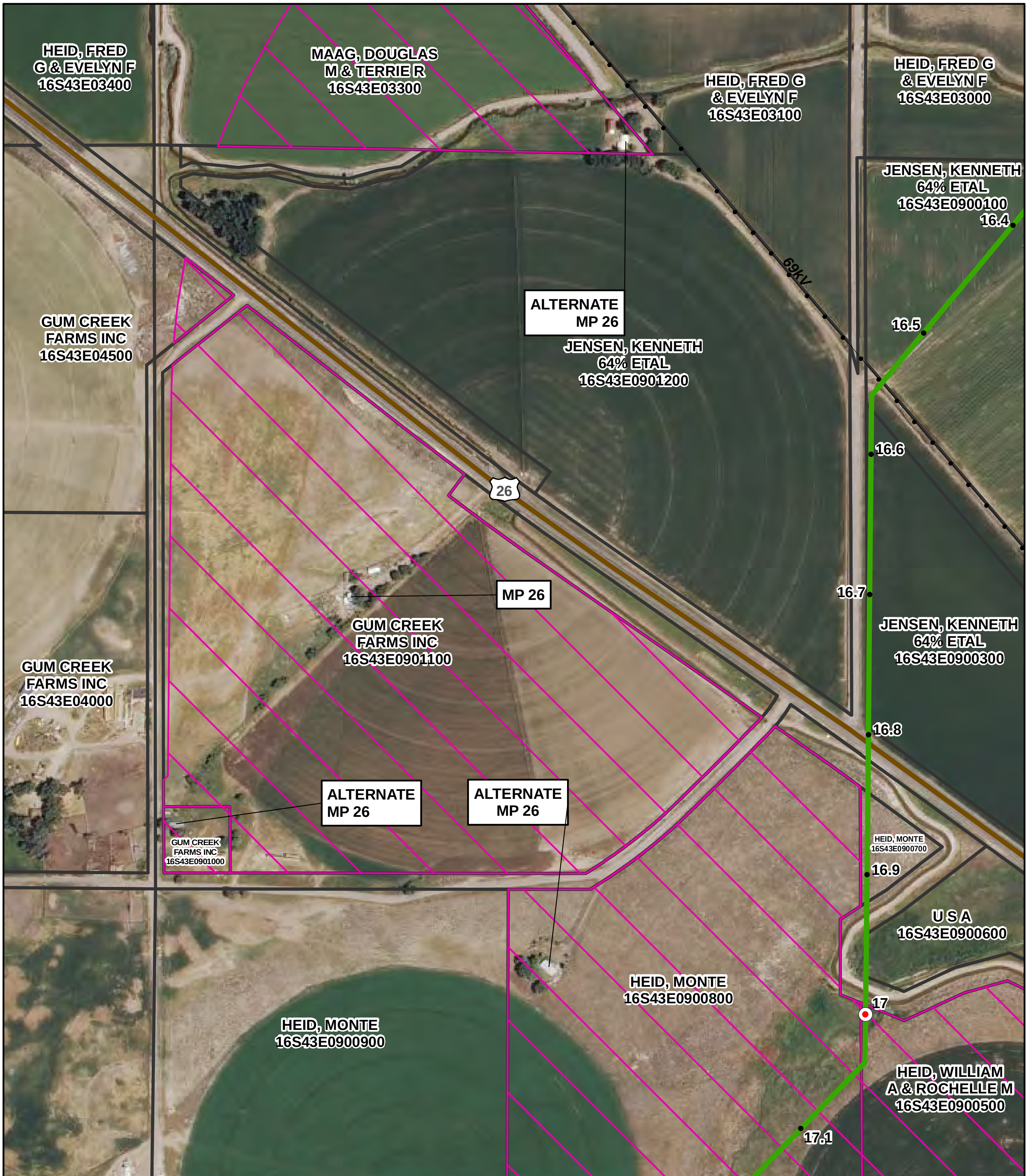

Monitoring Position 26

Malheur County

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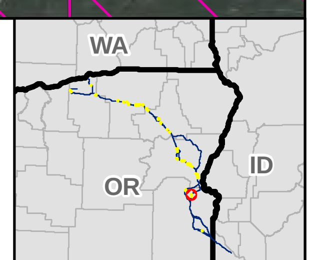
Boardman to Hemingway Transmission Line Project
Oregon - Idaho

March 21, 2012

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

0 200 400
Feet



Map 37 of 40

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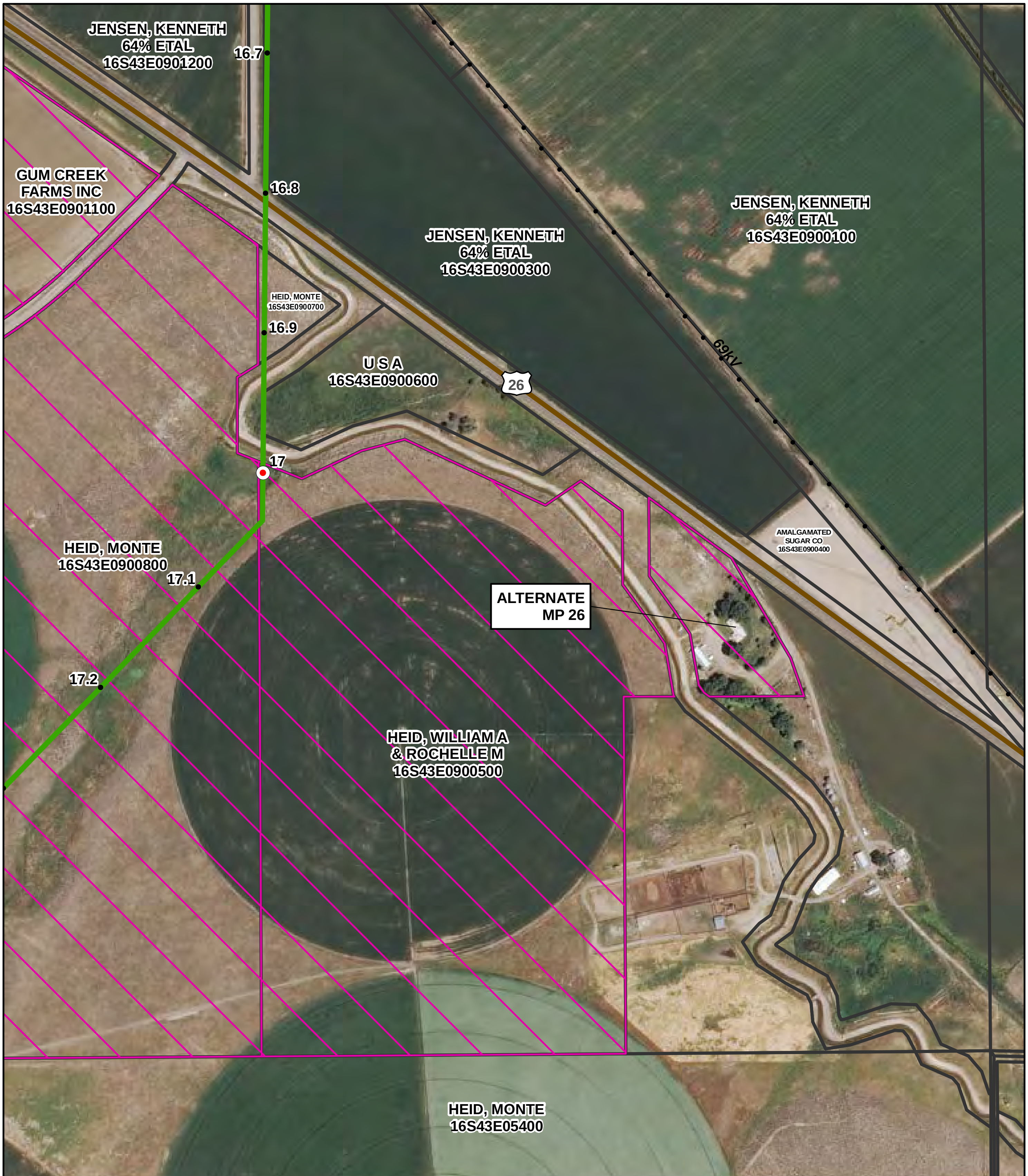

Alternate MP 26
Malheur County

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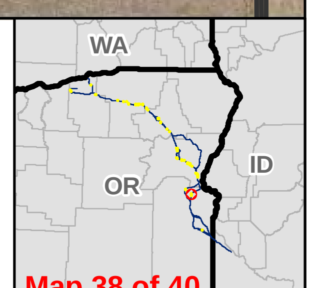
Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

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

0 200 400
Feet



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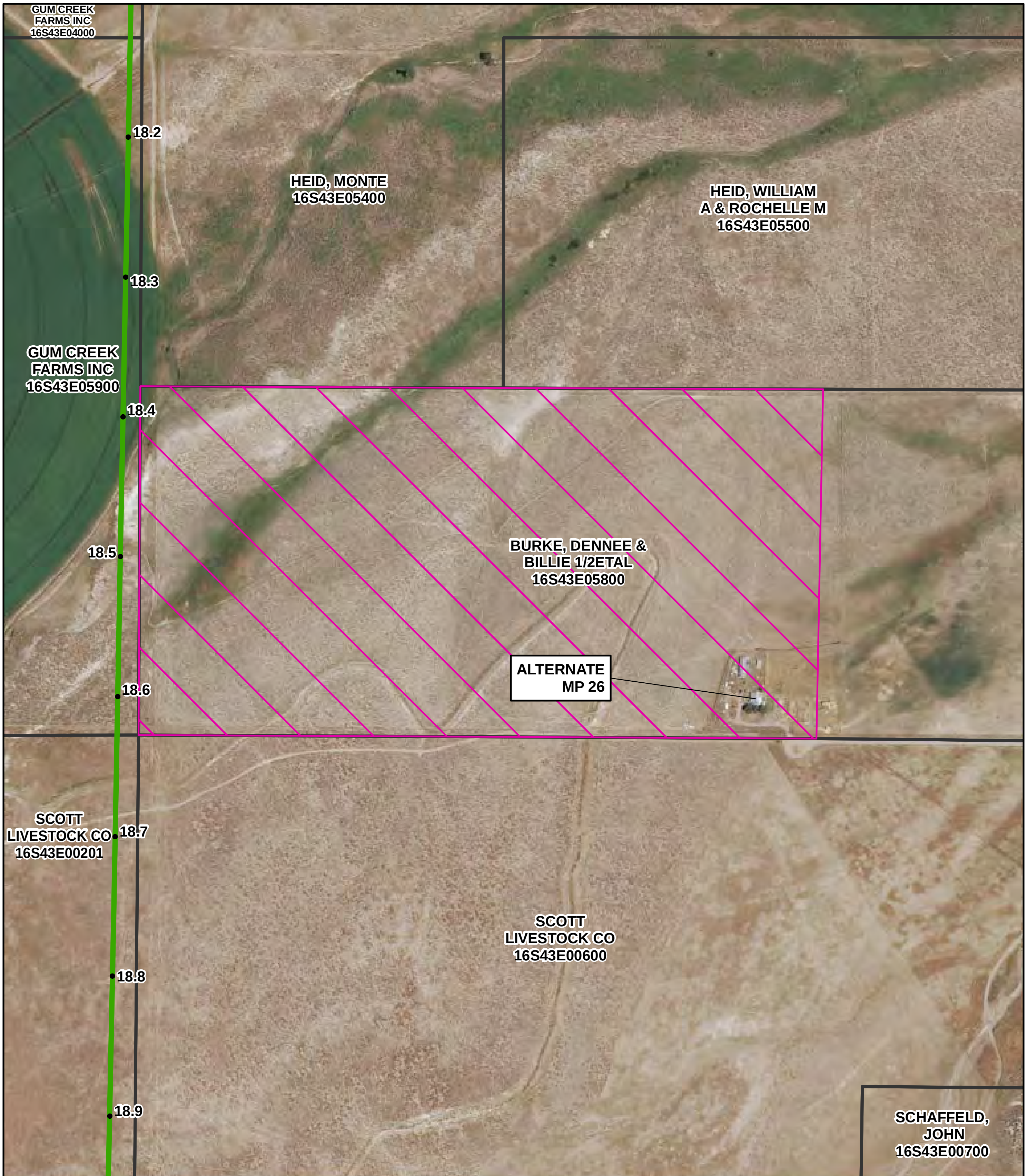


Alternate MP 26
Malheur County

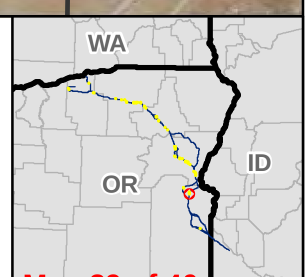
Map 39 of 40

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
County Boundary
Interstate
Highway
Road
Acoustic Study Area

0 200 400
Feet



Map 39 of 40

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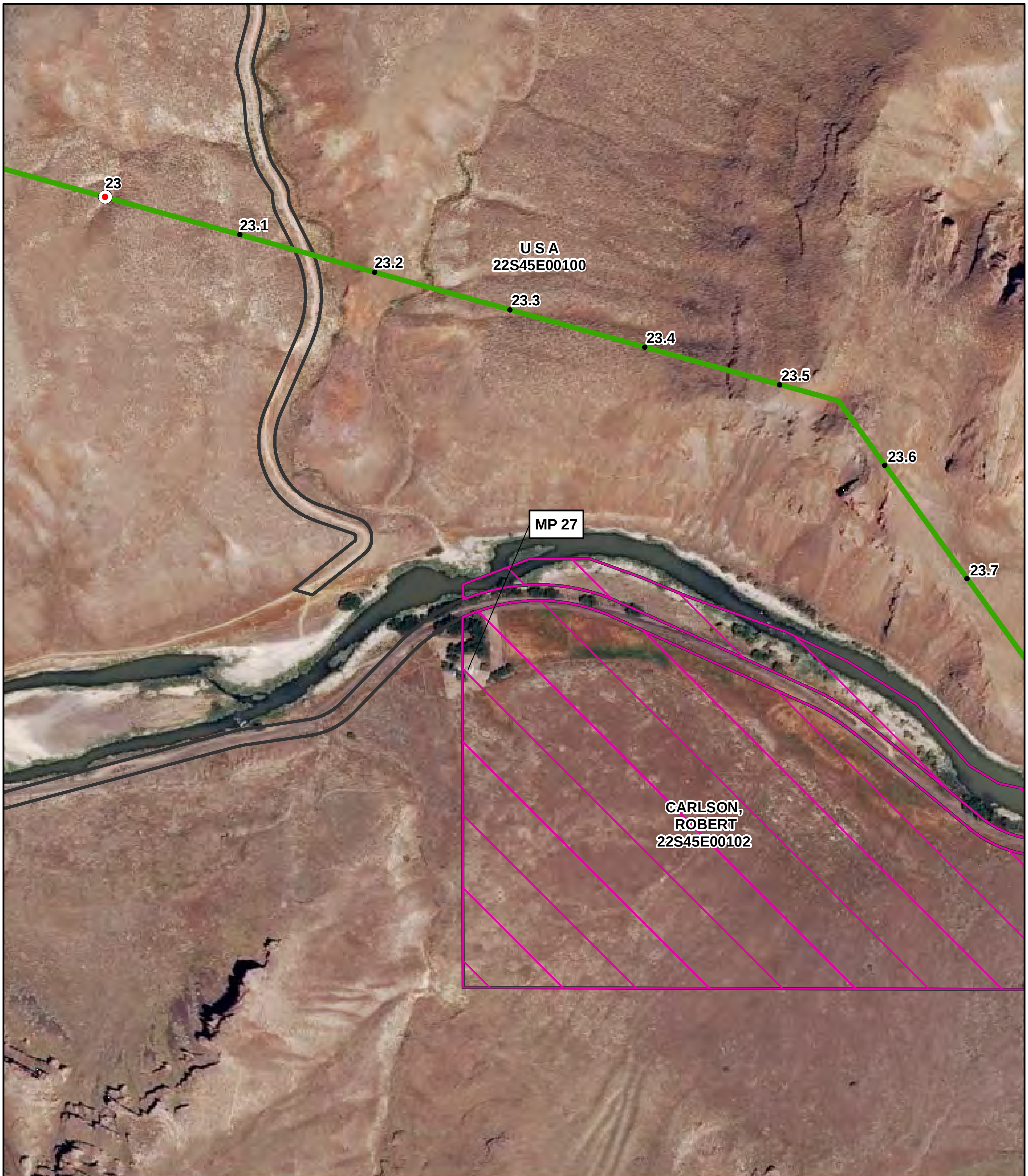

Monitoring Position 27
Malheur County

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Boardman to Hemingway
Transmission Line Project
Oregon - Idaho

March 21, 2012

Proposed Substation
Alternative Substation
Mile
Tenth Mile
Proposed Route
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 40 of 40

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ATTACHMENT X-4
BASELINE SOUND SURVEY REPORT

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.

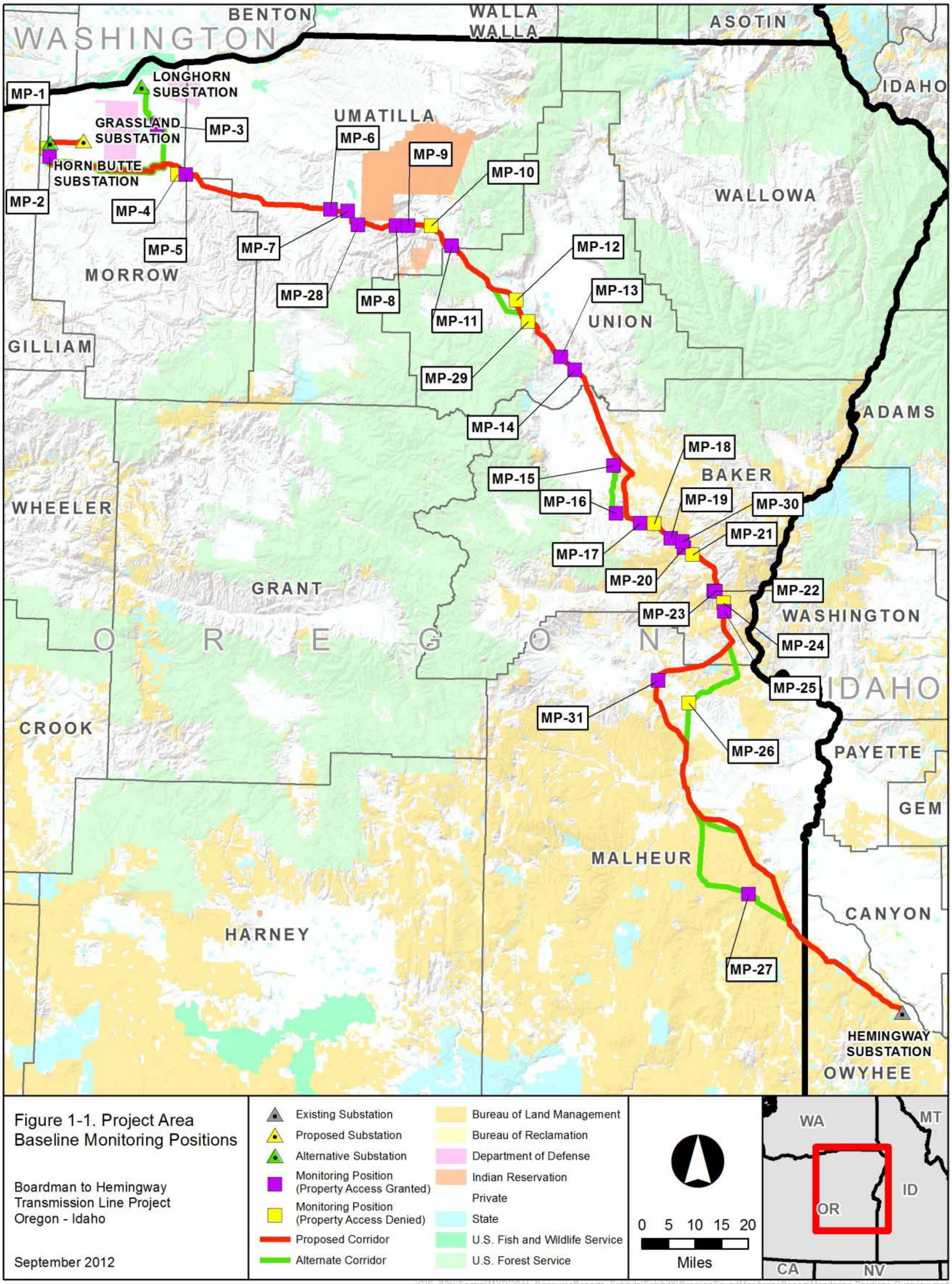


Figure 1-1. Project Area Baseline Monitoring Positions

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.

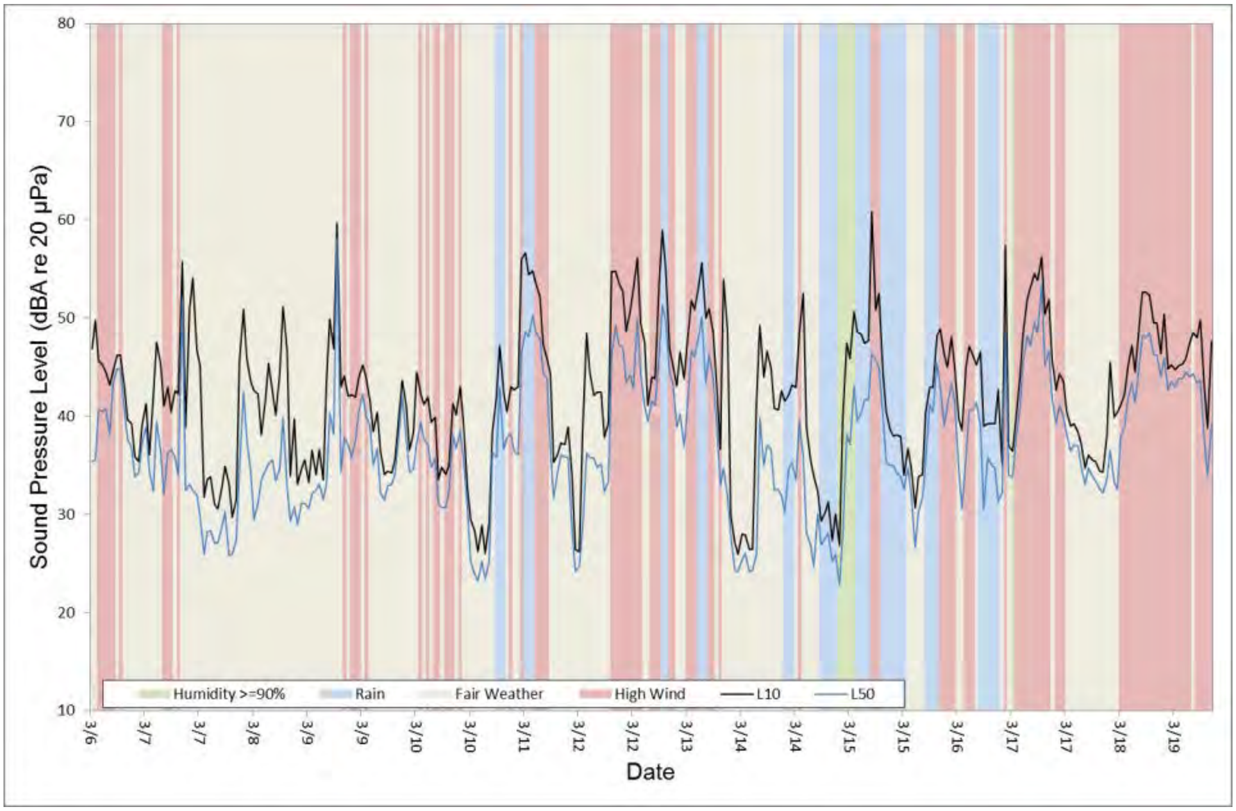
4.1 Monitoring Position 2 – Description and Results

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.

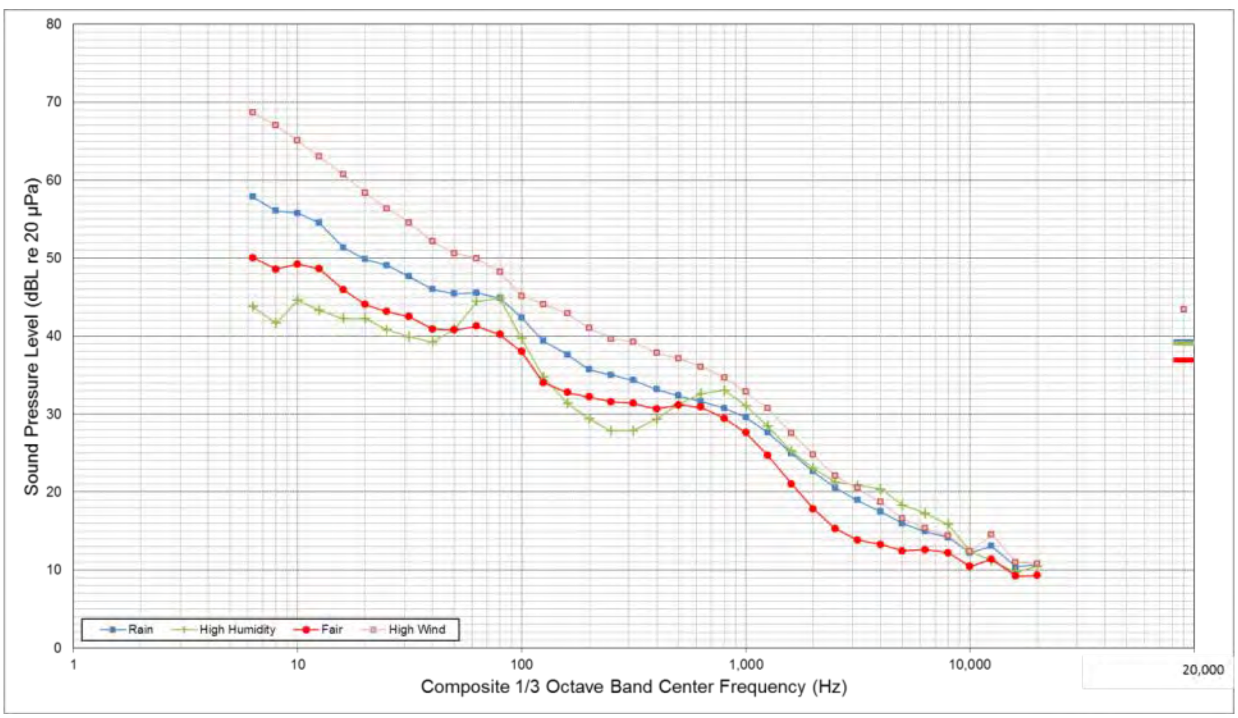
Photograph taken in the direction of one of the residential structures

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

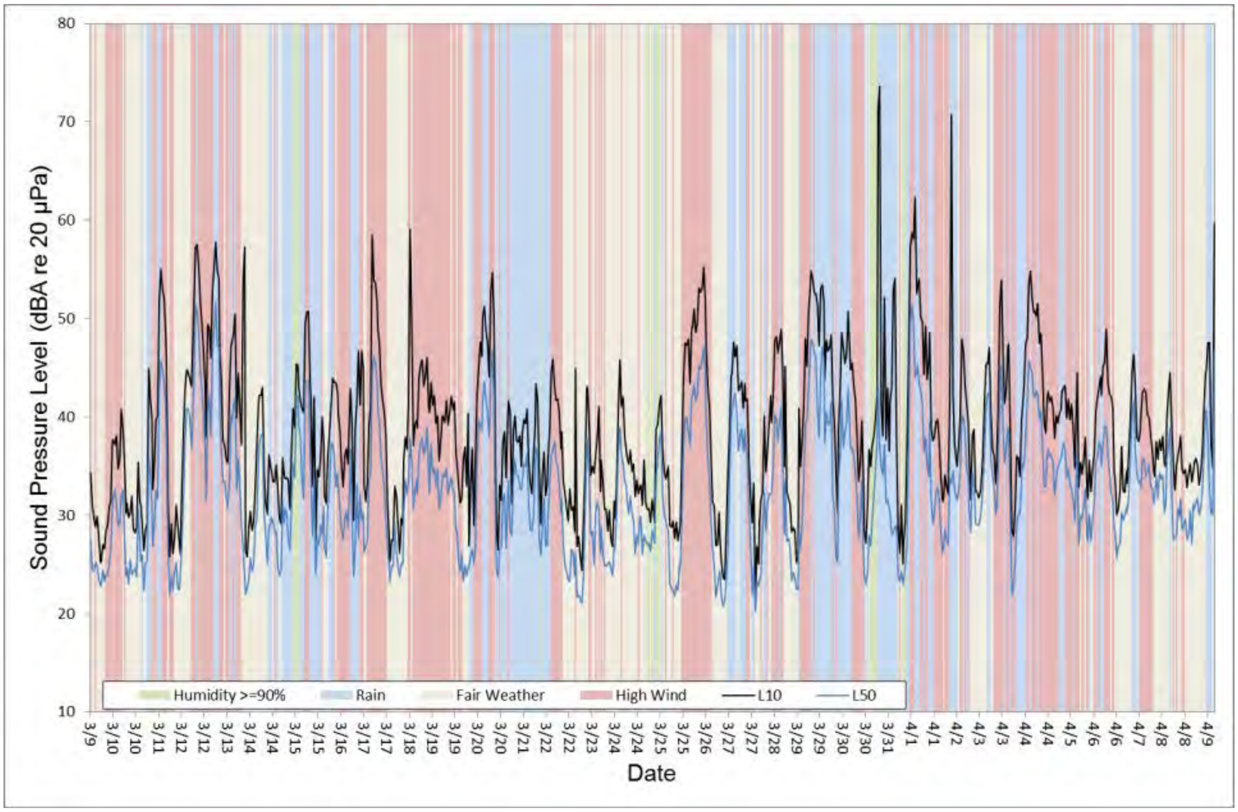
Figure 4-2. Monitoring Position 2 Summary of Measured Sound Pressure Levels

4.2 Monitoring Position 3 – Description and Results

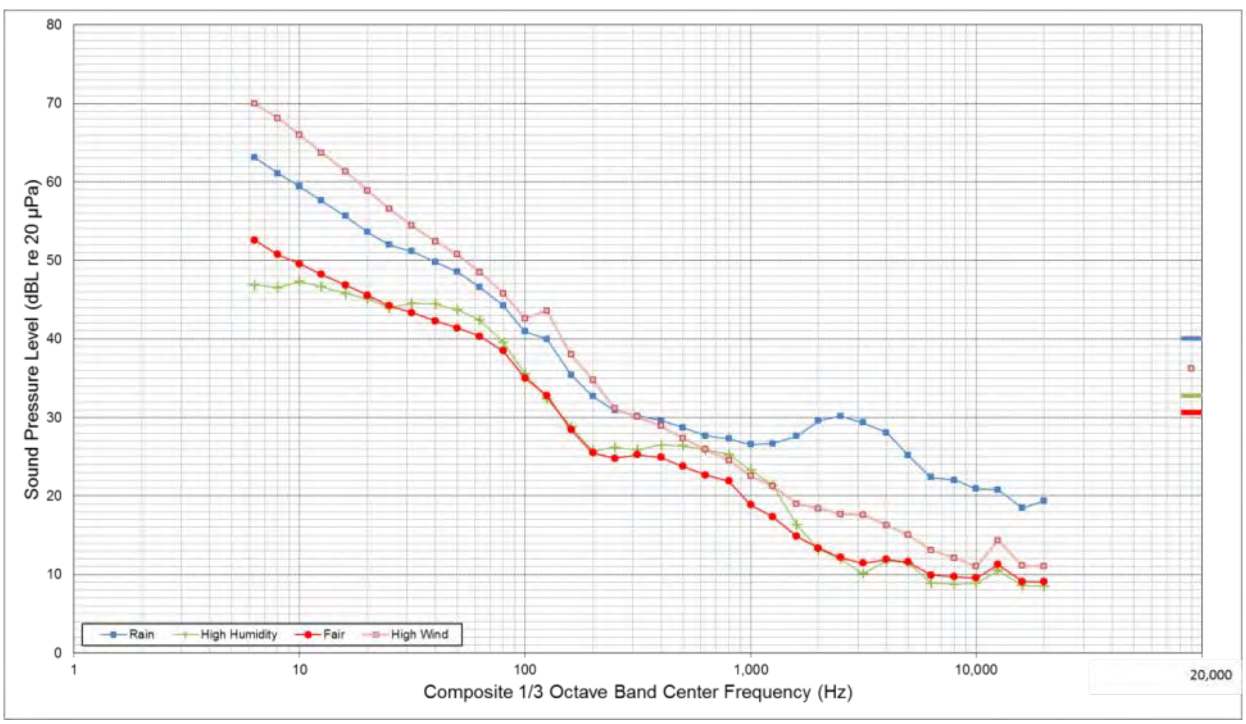
MP-3 was located in an agricultural field approximately 10 miles southeast of Boardman, Oregon, along Segment 1 (Morrow County). The MP could not be located at the nearest residence because of access restrictions imposed by the property owner. Field engineers worked with the neighboring property owner (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

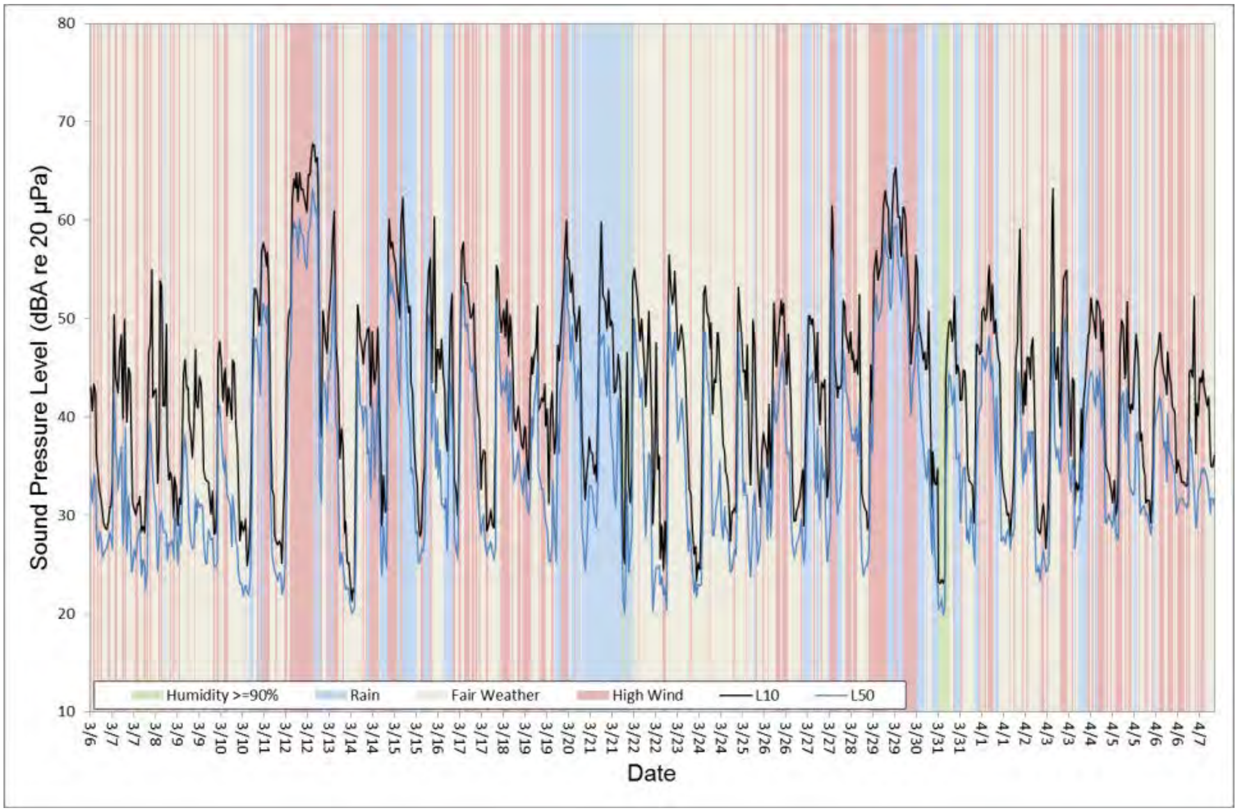
4.3 Monitoring Position 5 – Description and Results

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.

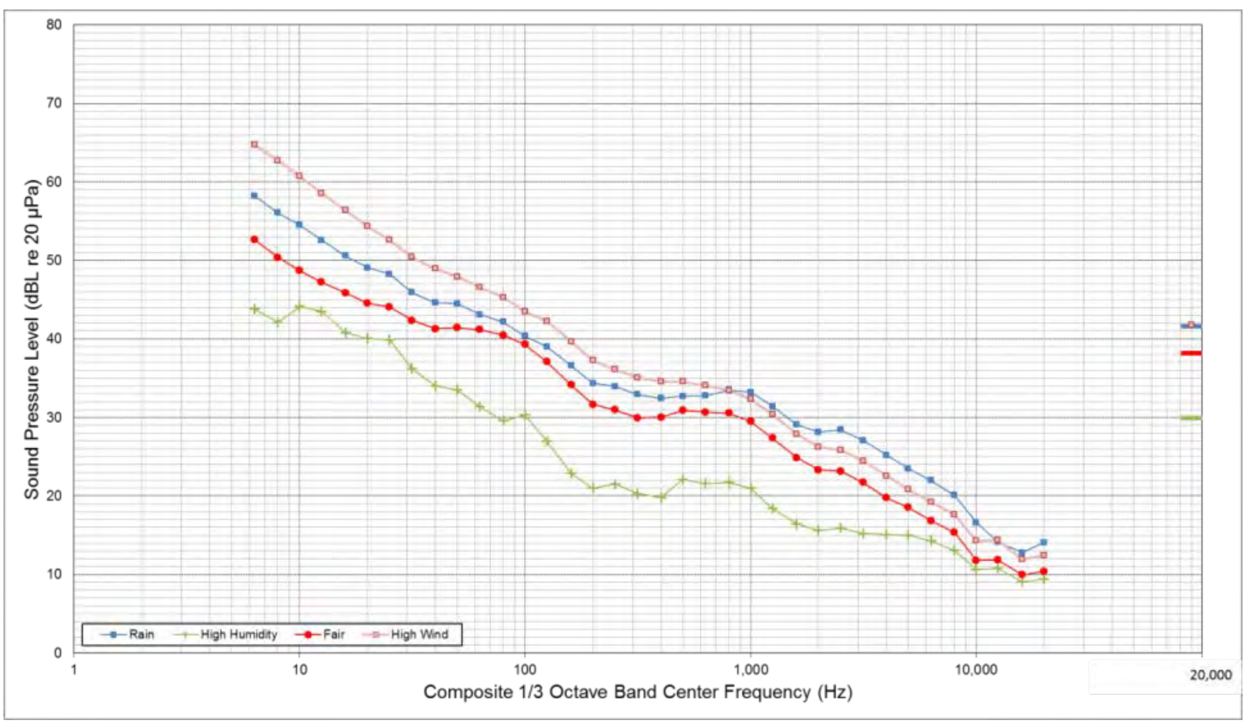
Photograph taken in the direction of the primary residential structure

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

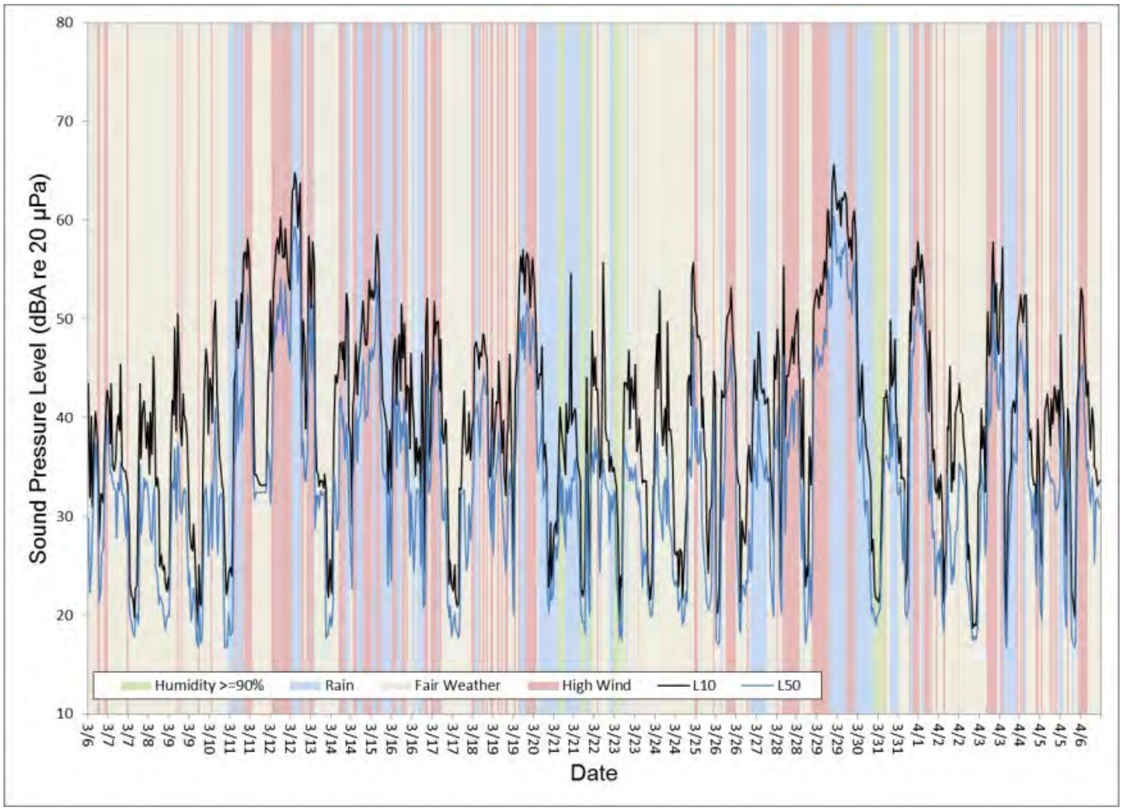
4.4 Monitoring Position 6 – Description and Results

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.

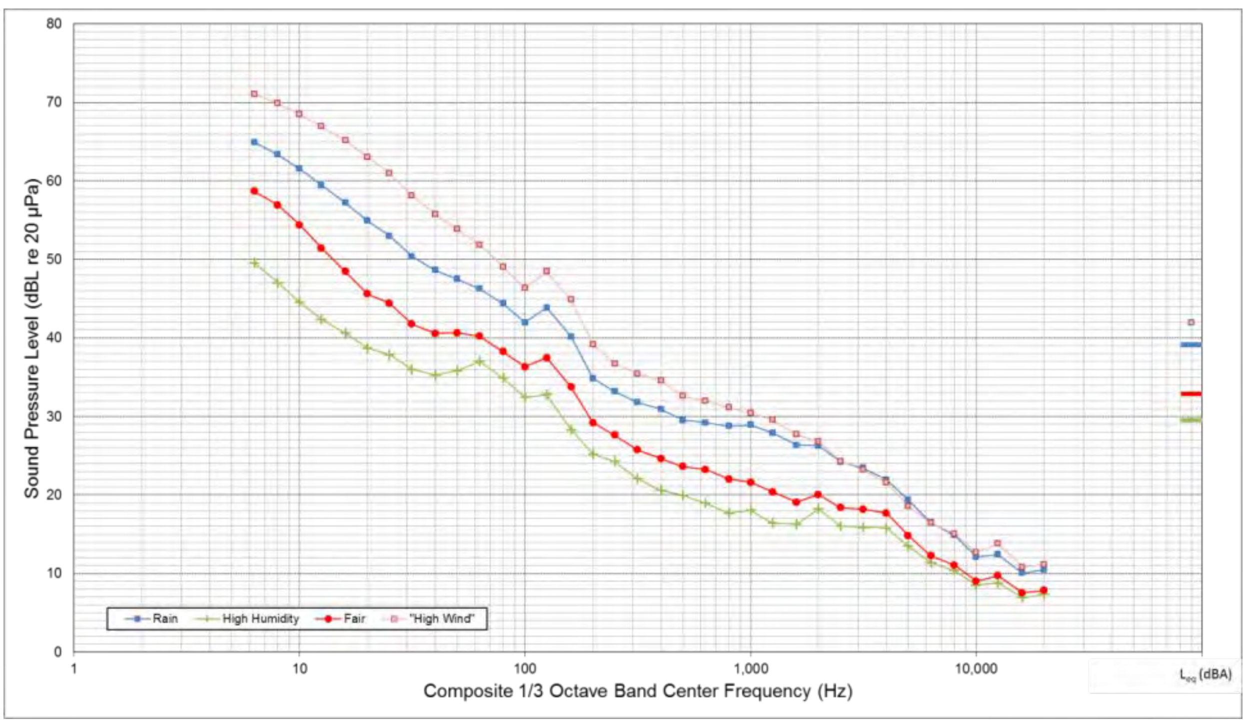
Photograph taken in the direction of the primary residential structure

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

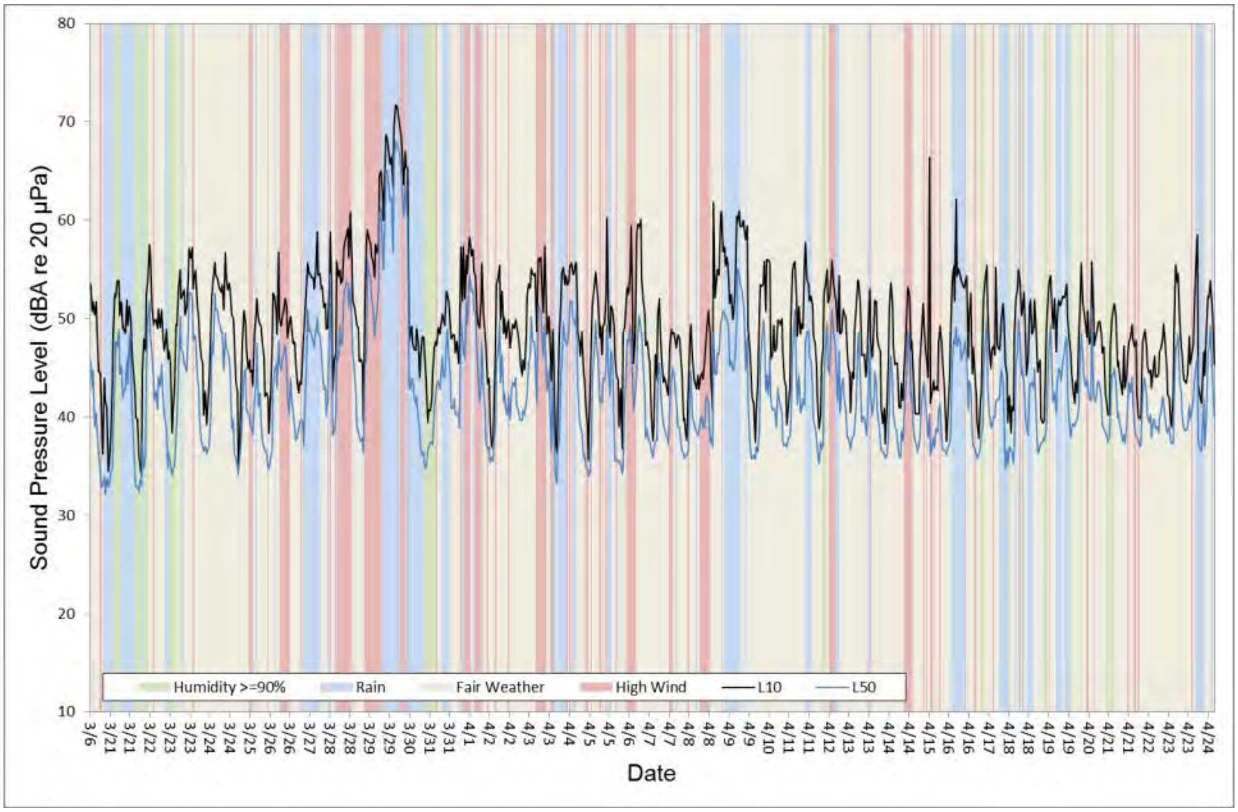
4.5 Monitoring Position 7 – Description and Results

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.

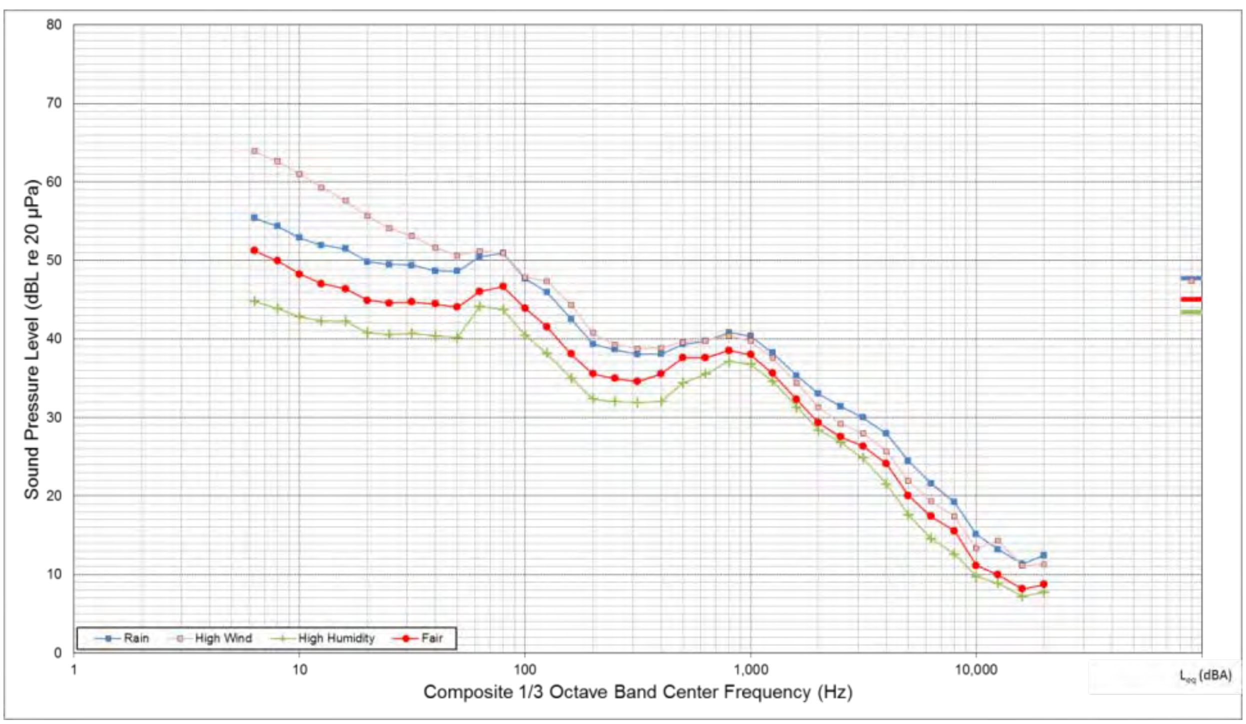
Photograph taken in the direction of the primary residential structure

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

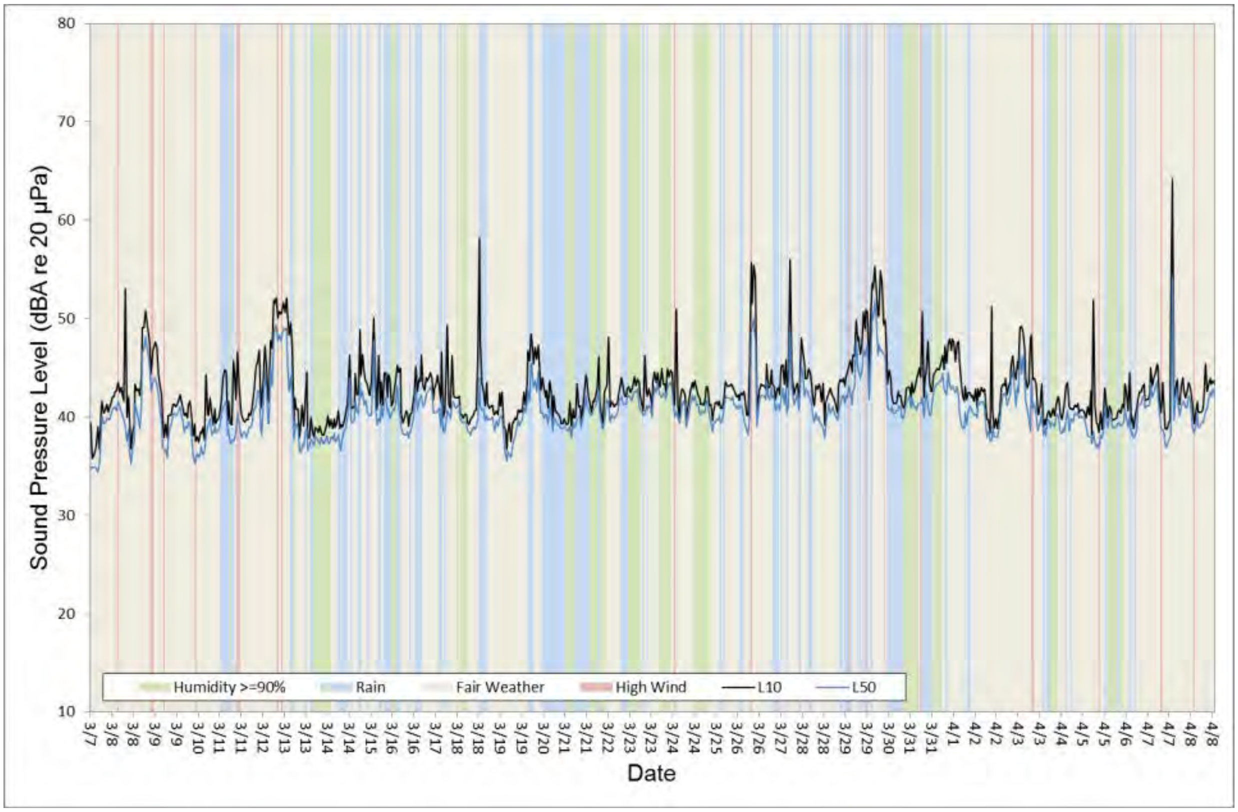
4.6 Monitoring Position 8 – Description and Results

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.

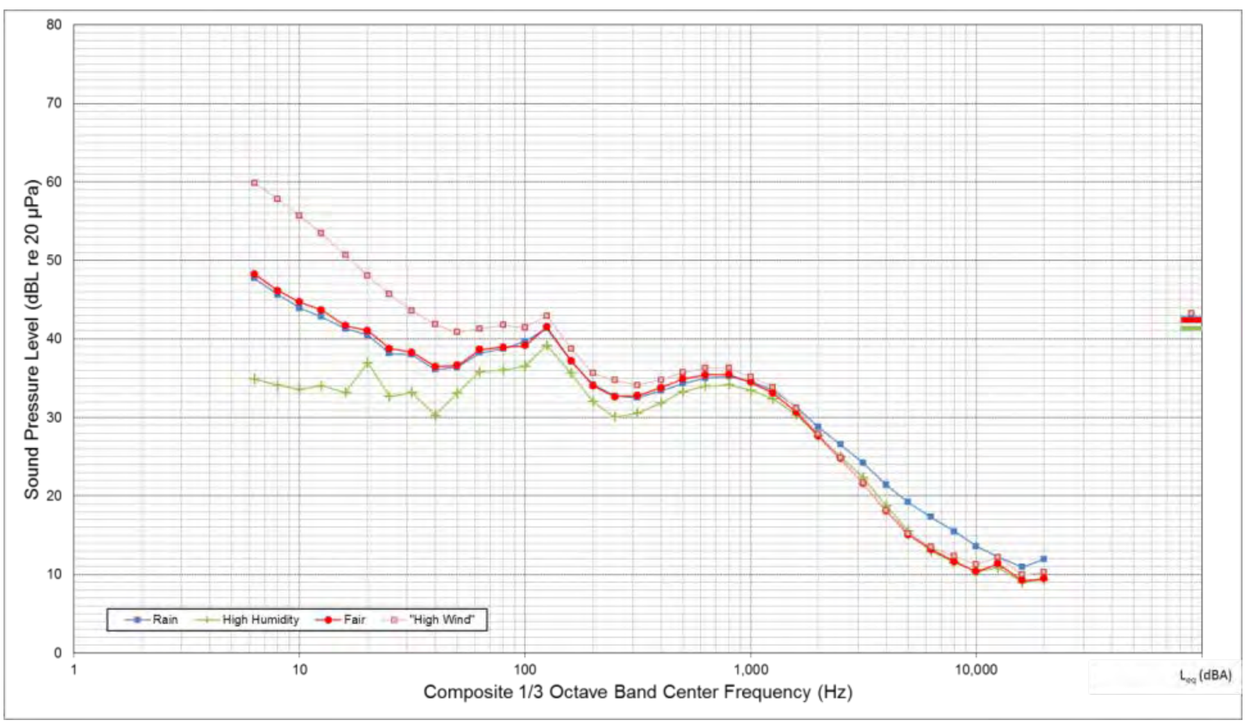
Photograph taken in the direction of the primary residential structure

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

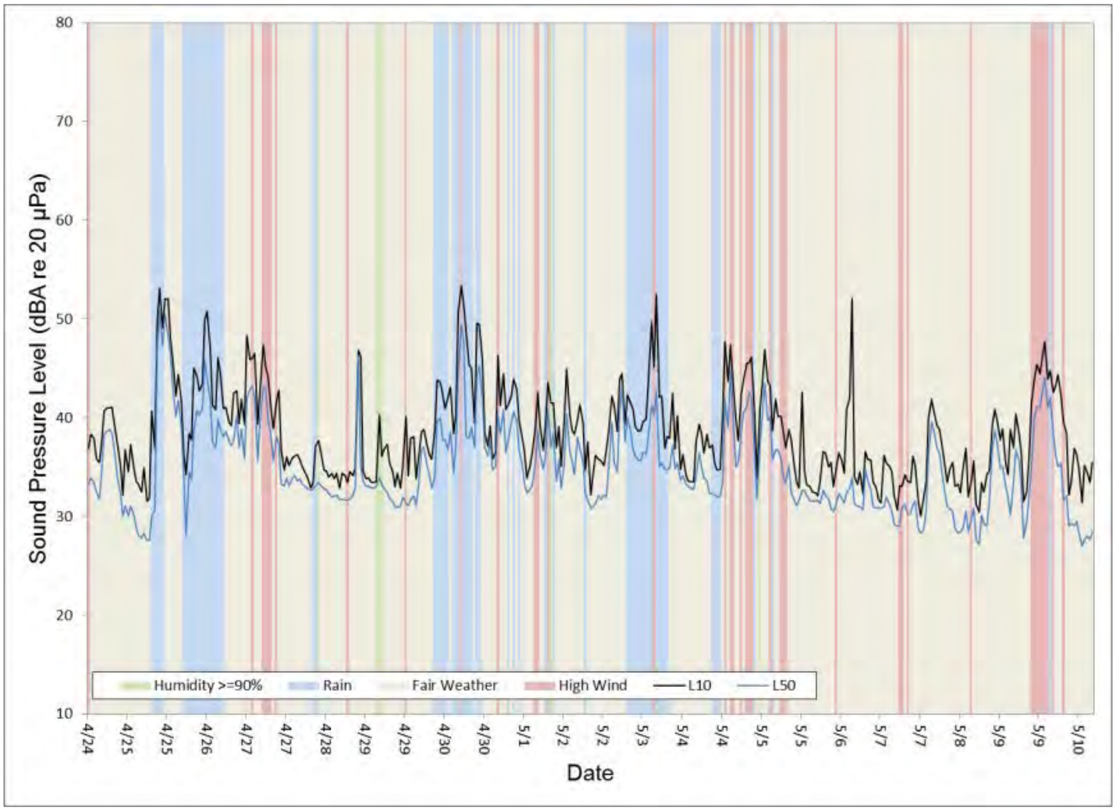
4.7 Monitoring Position 9 – Description and Results

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.

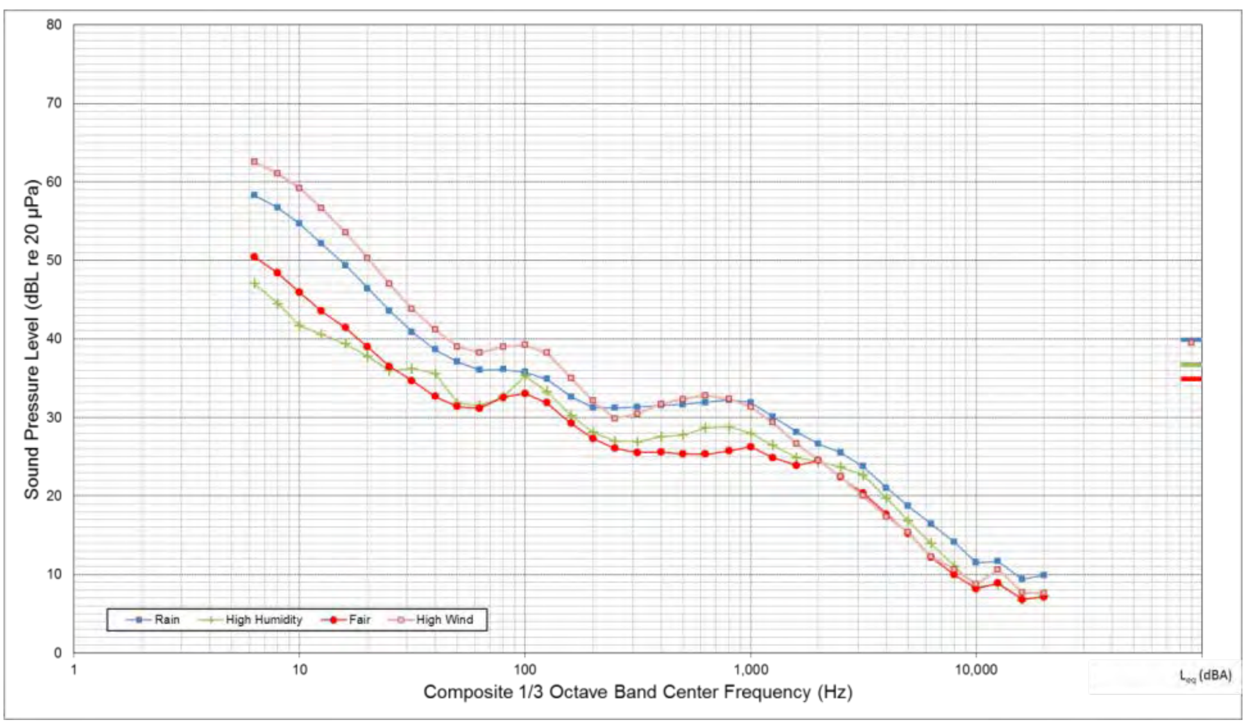
Photograph taken in the direction of the primary residential structure

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

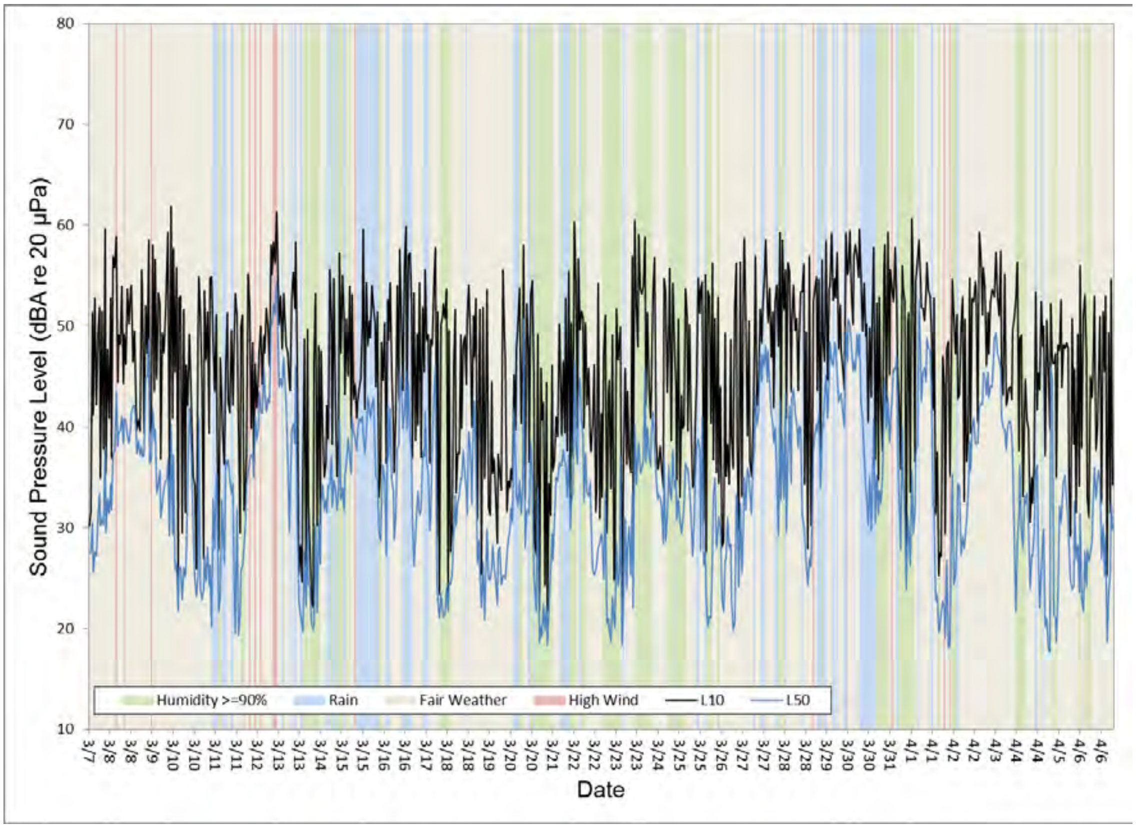
4.8 Monitoring Position 11 – Description and Results

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.

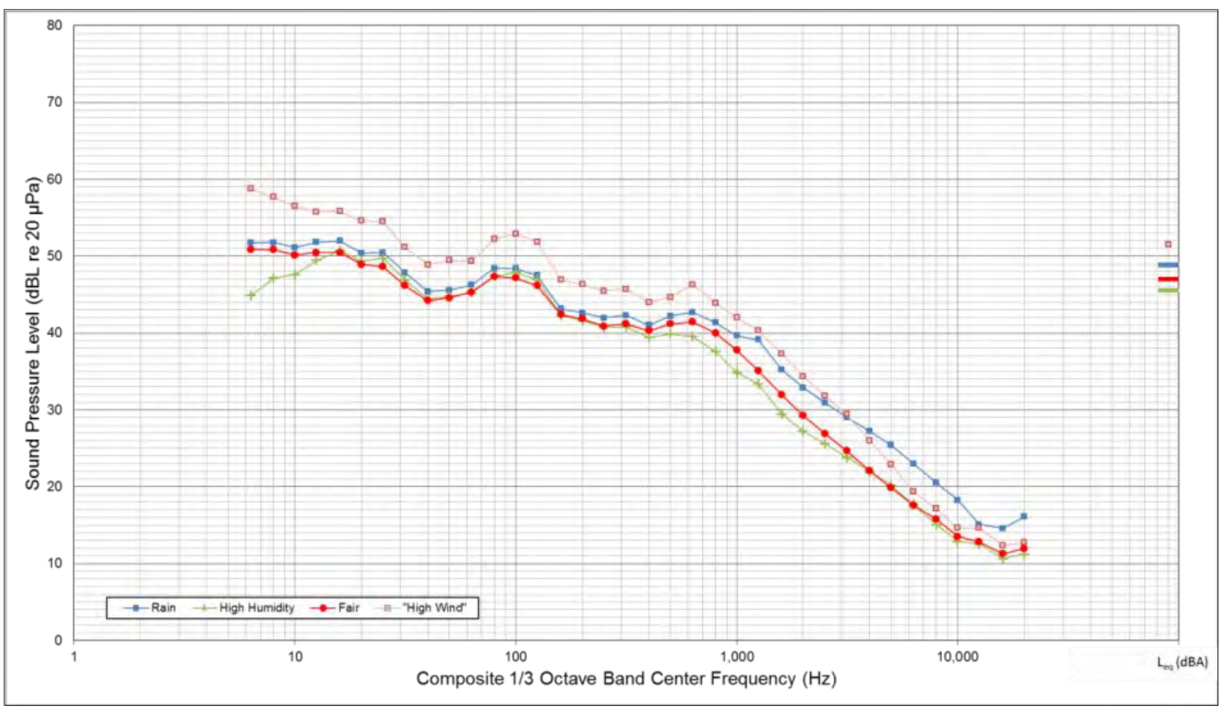
Photograph taken in the direction of the primary residential structure

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

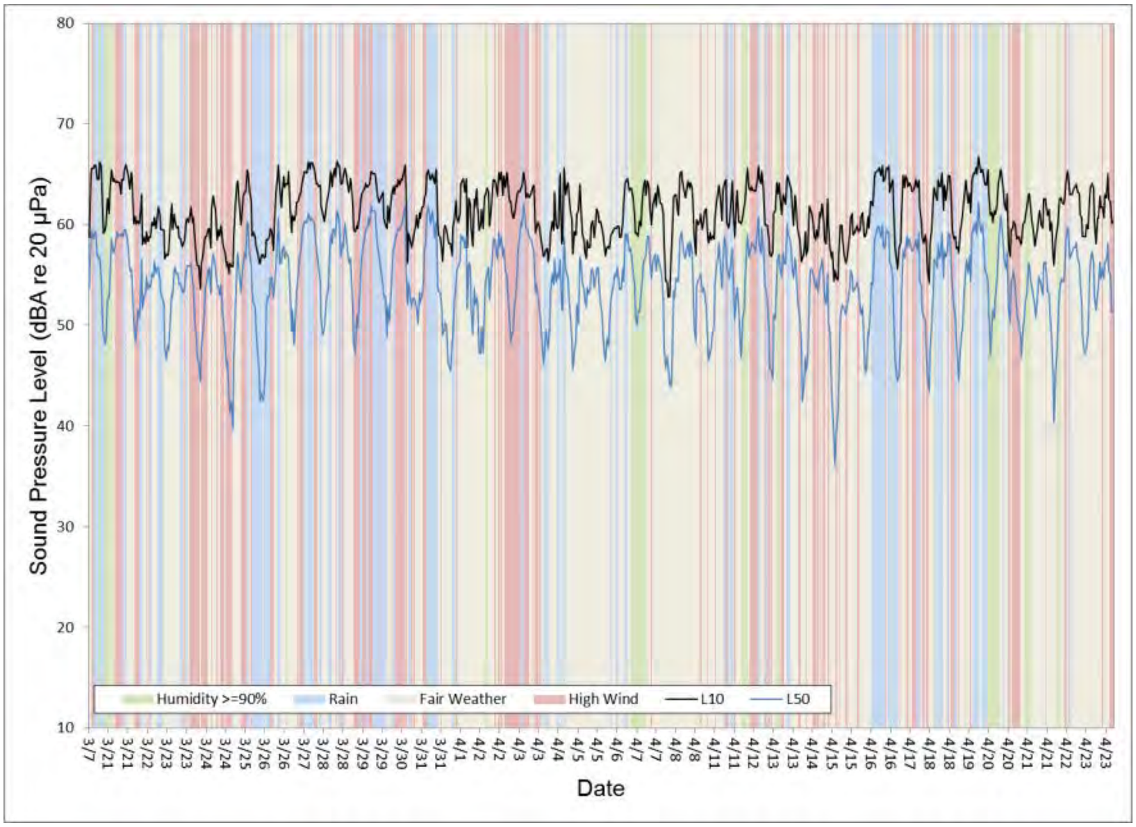
4.9 Monitoring Position 13 – Description and Results

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.

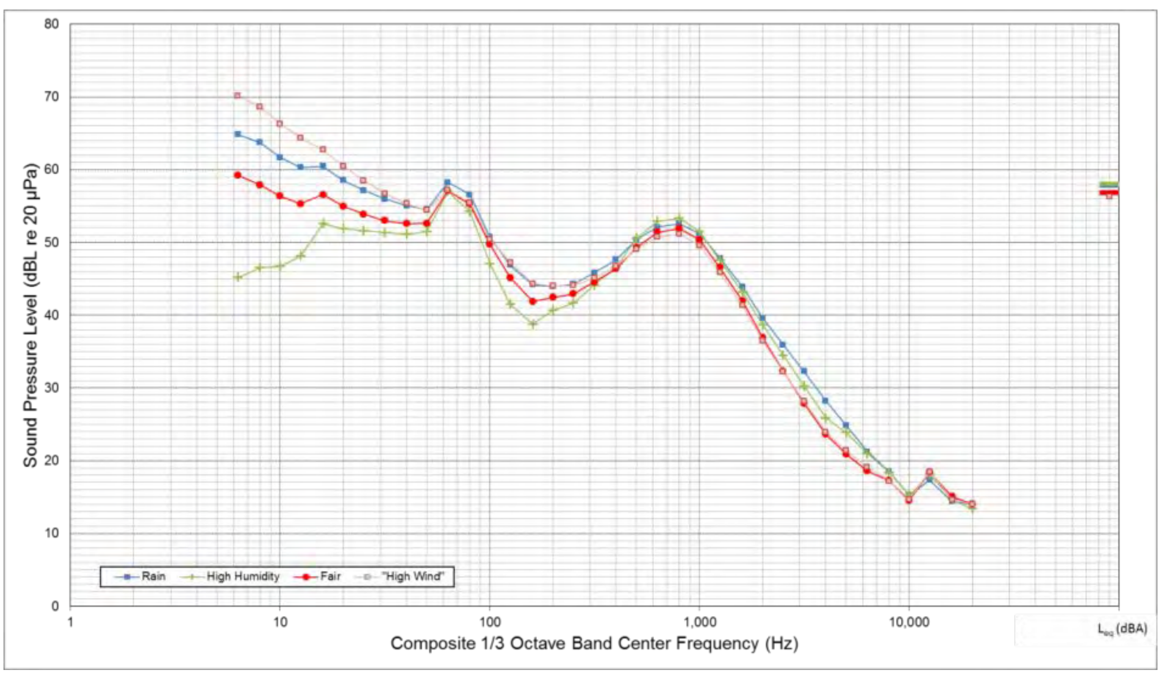
Photograph taken in the direction of the primary residential structure

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

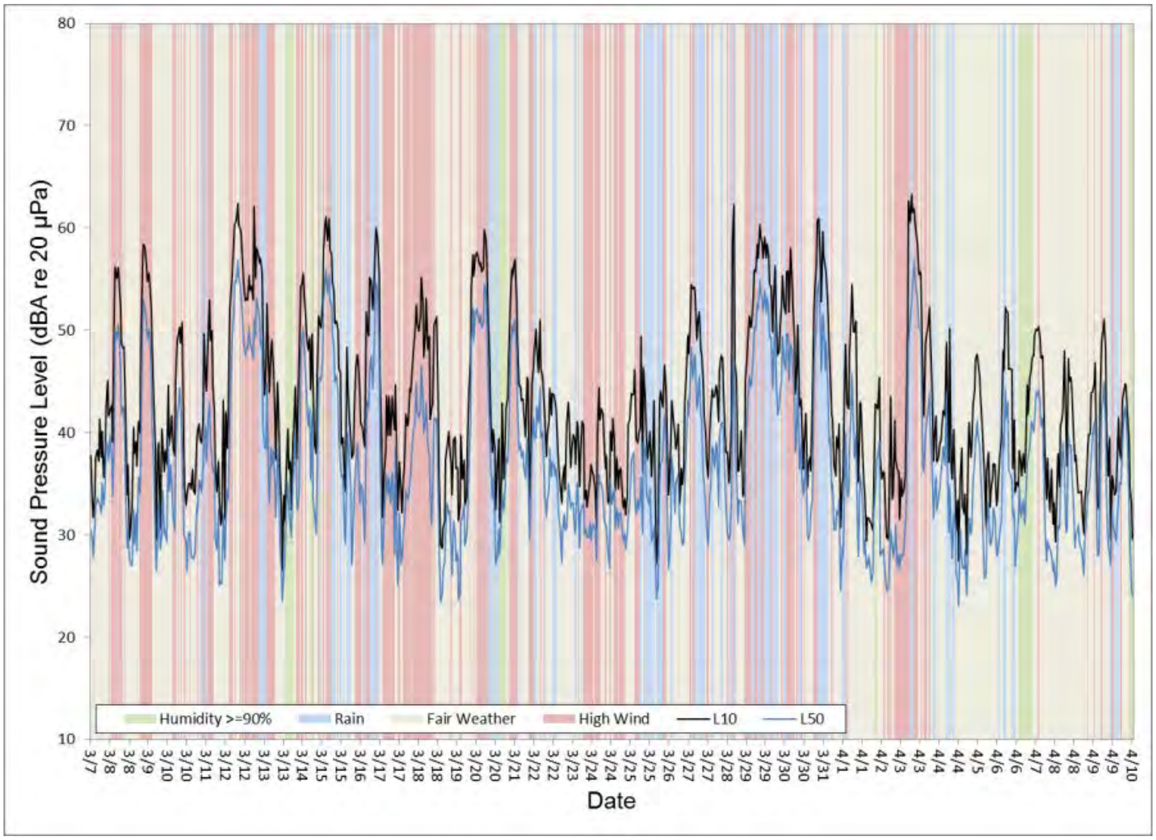
4.10 Monitoring Position 14 – Description and Results

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.

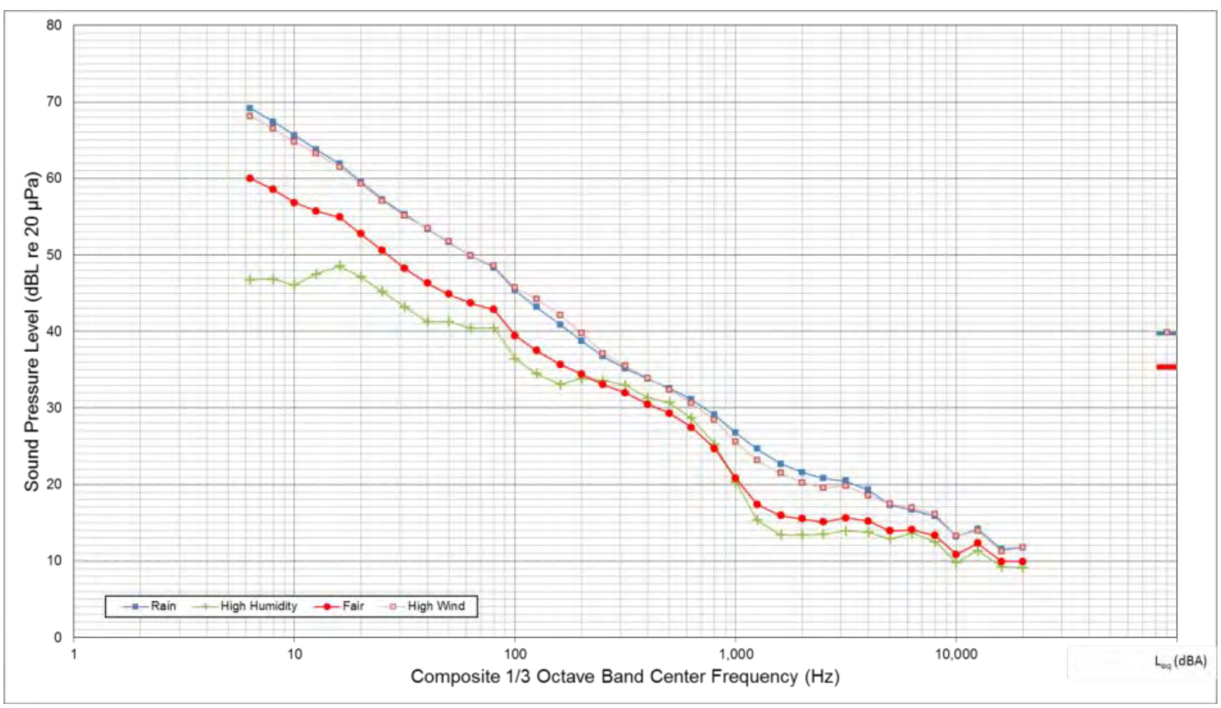
Photograph taken in the direction of the primary residential structure

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

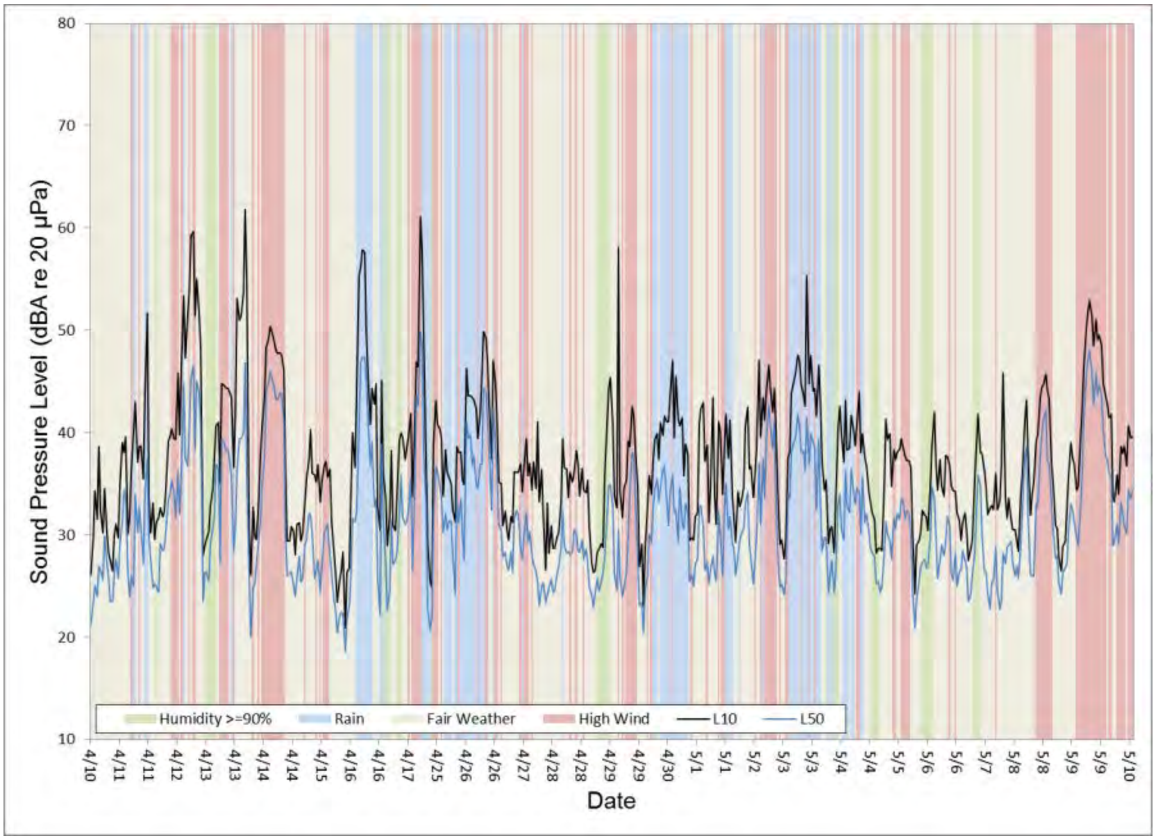
4.11 Monitoring Position 15 – Description and Results

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.

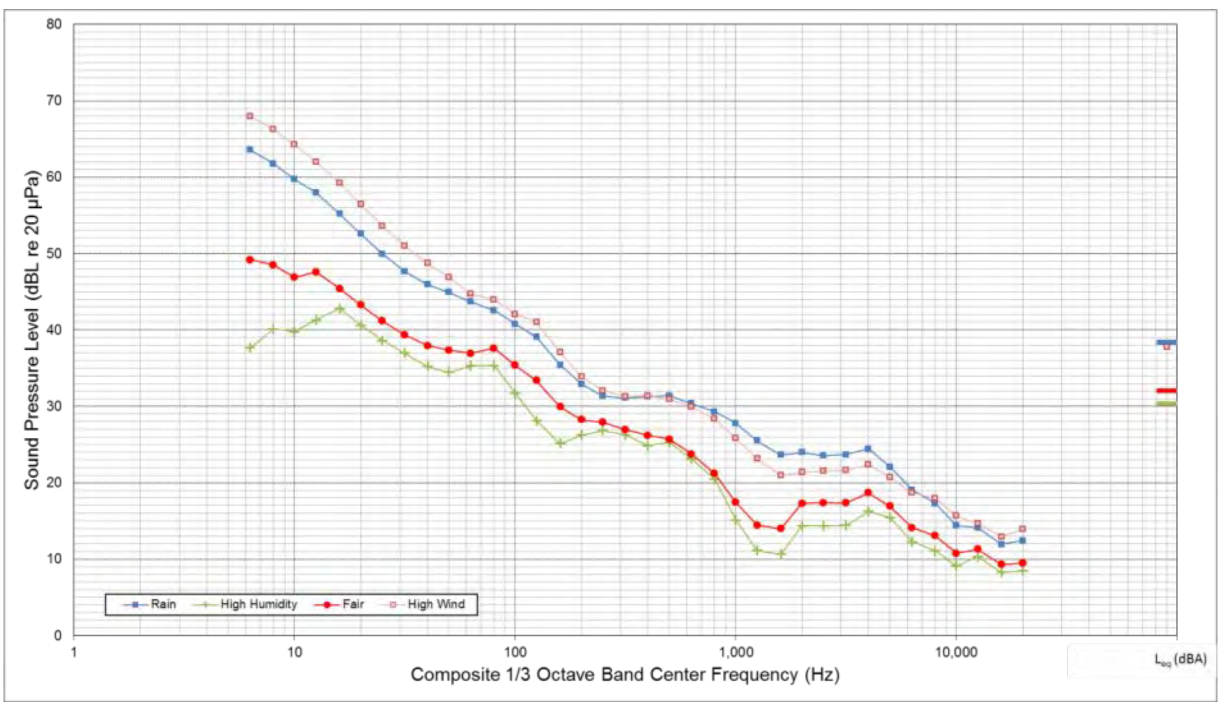
Photograph taken in the direction of the primary residential structure

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

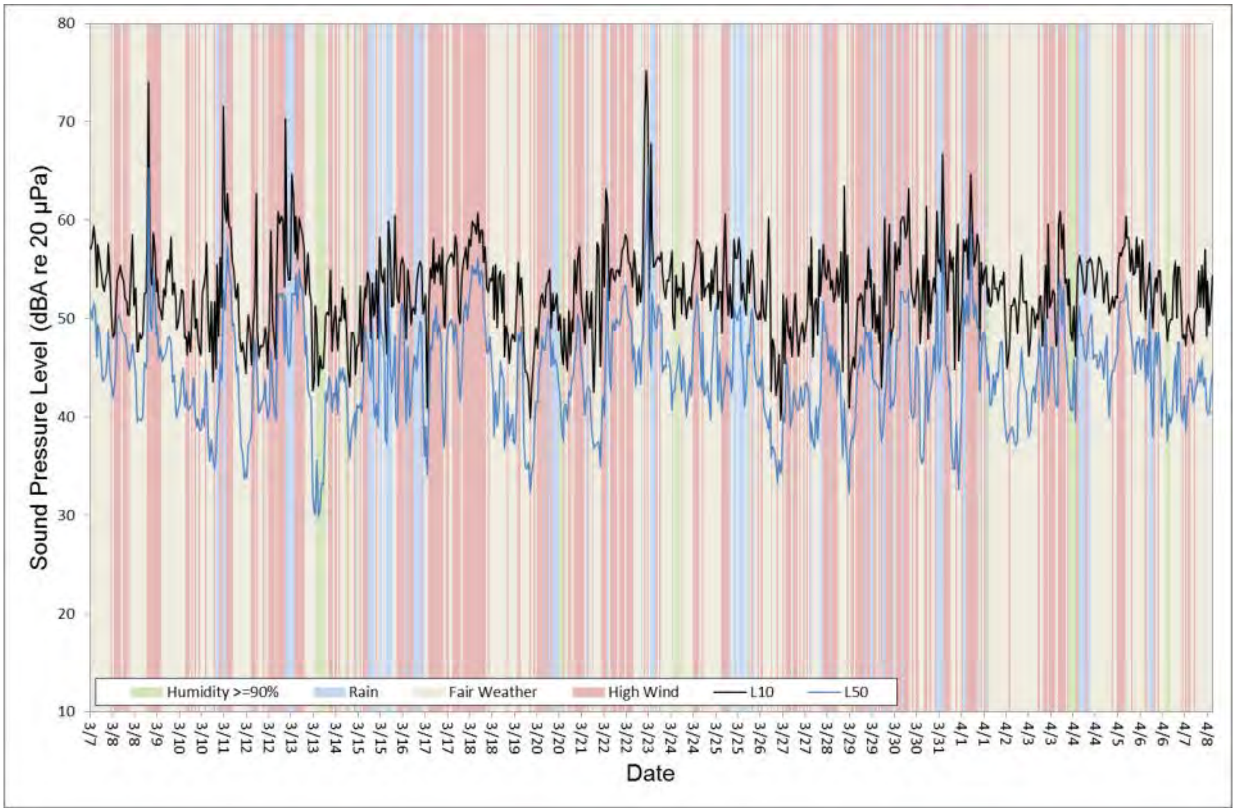
4.12 Monitoring Position 16 – Description and Results

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.

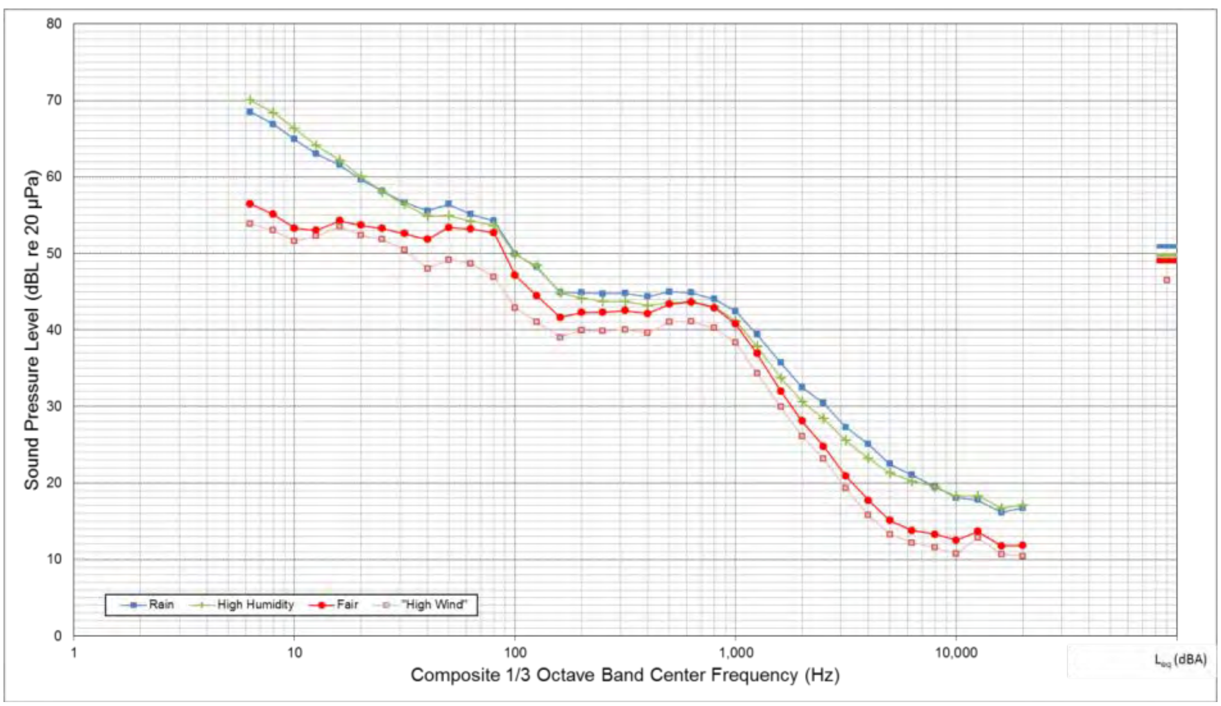
Photograph taken in the direction of the primary residential structure

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

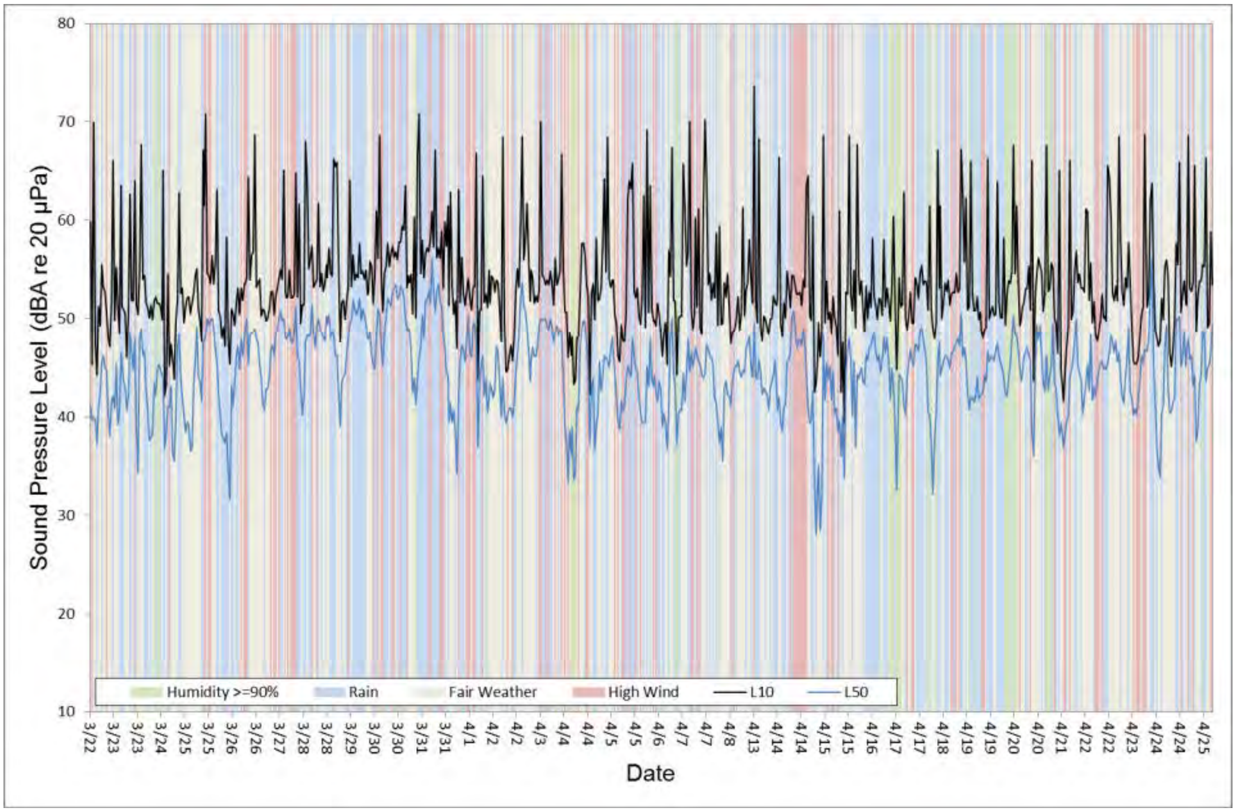
4.13 Monitoring Position 17 – Description and Results

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.

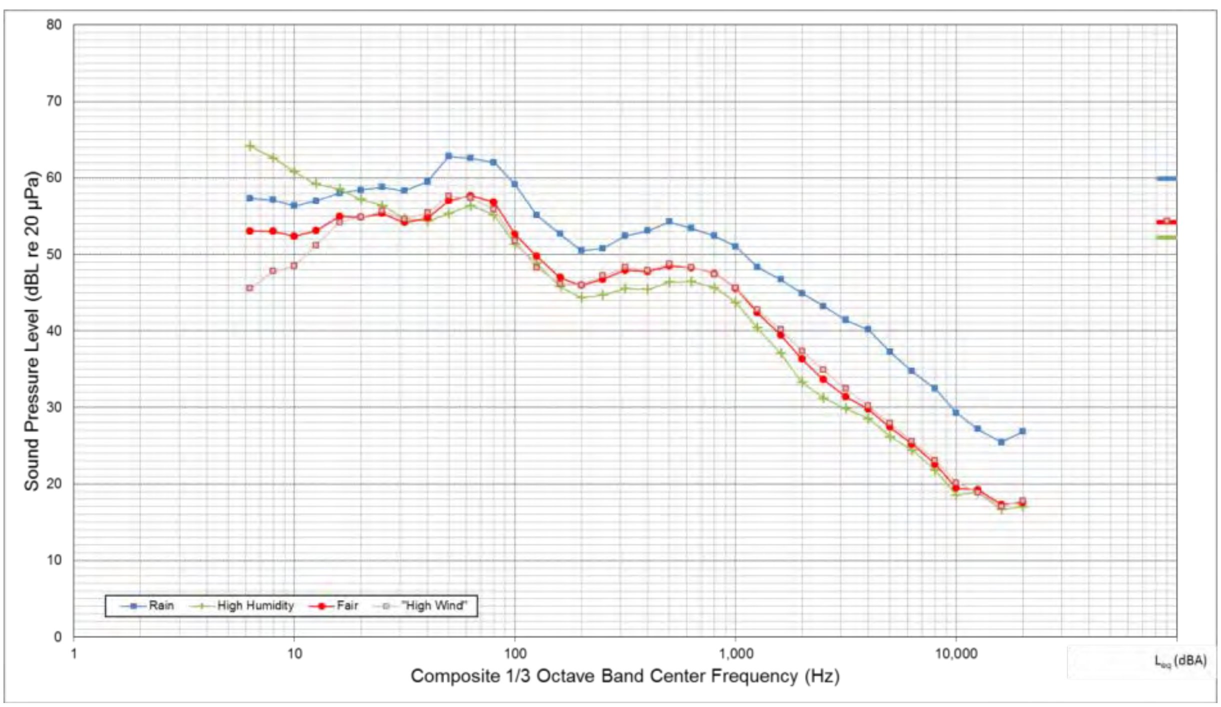
Photograph taken in the direction of the primary residential structure

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

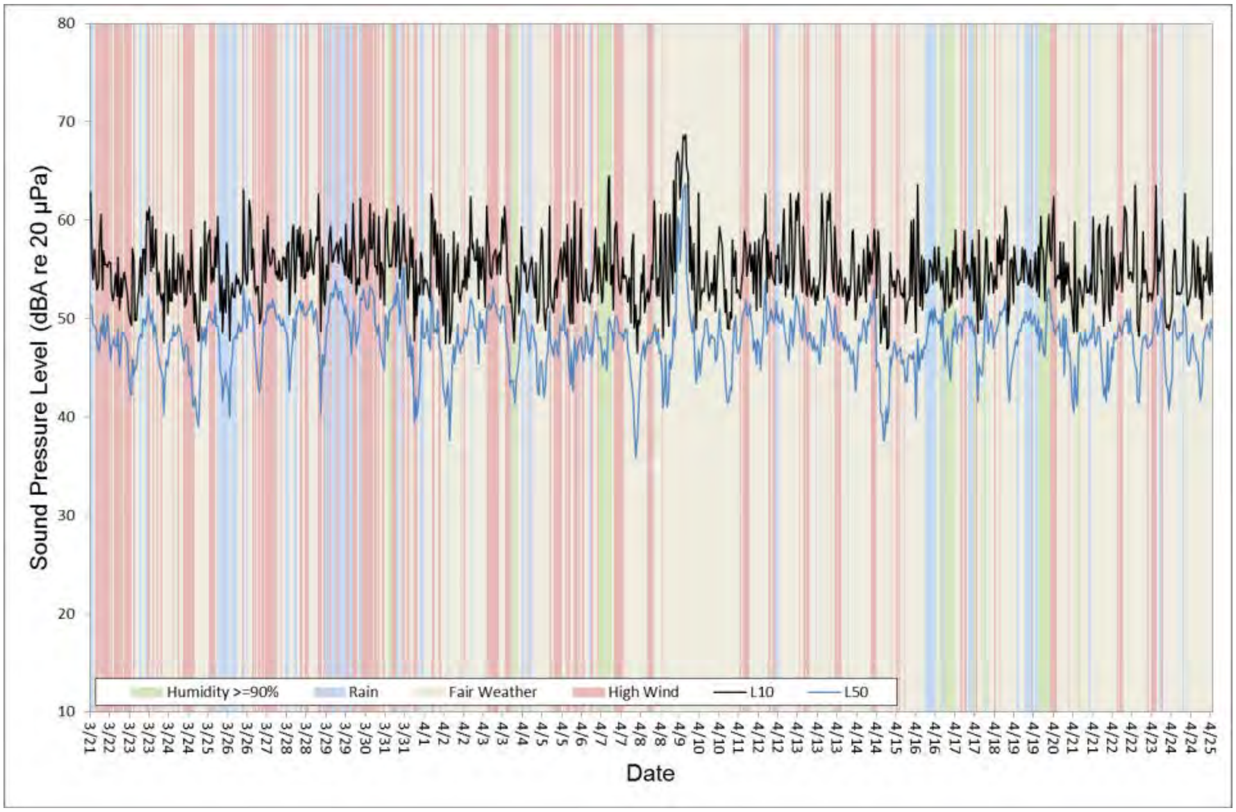
4.14 Monitoring Position 19 – Description and Results

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.

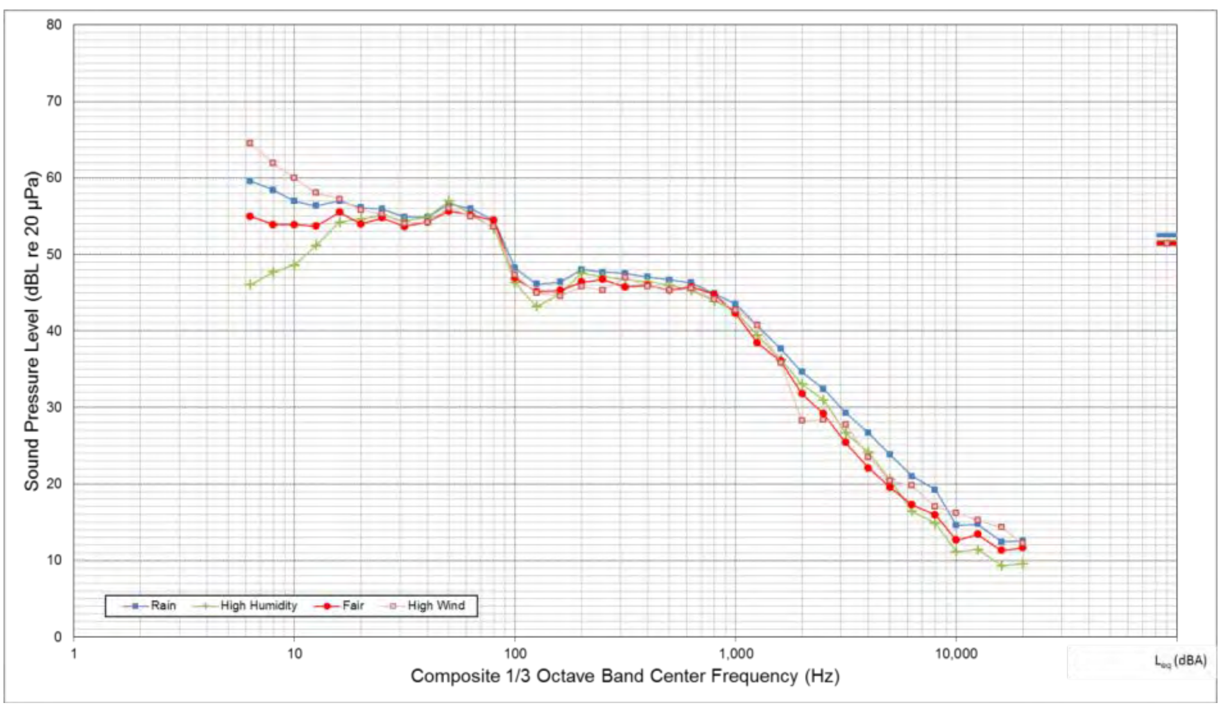
Photograph taken in the direction of the primary residential structure

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

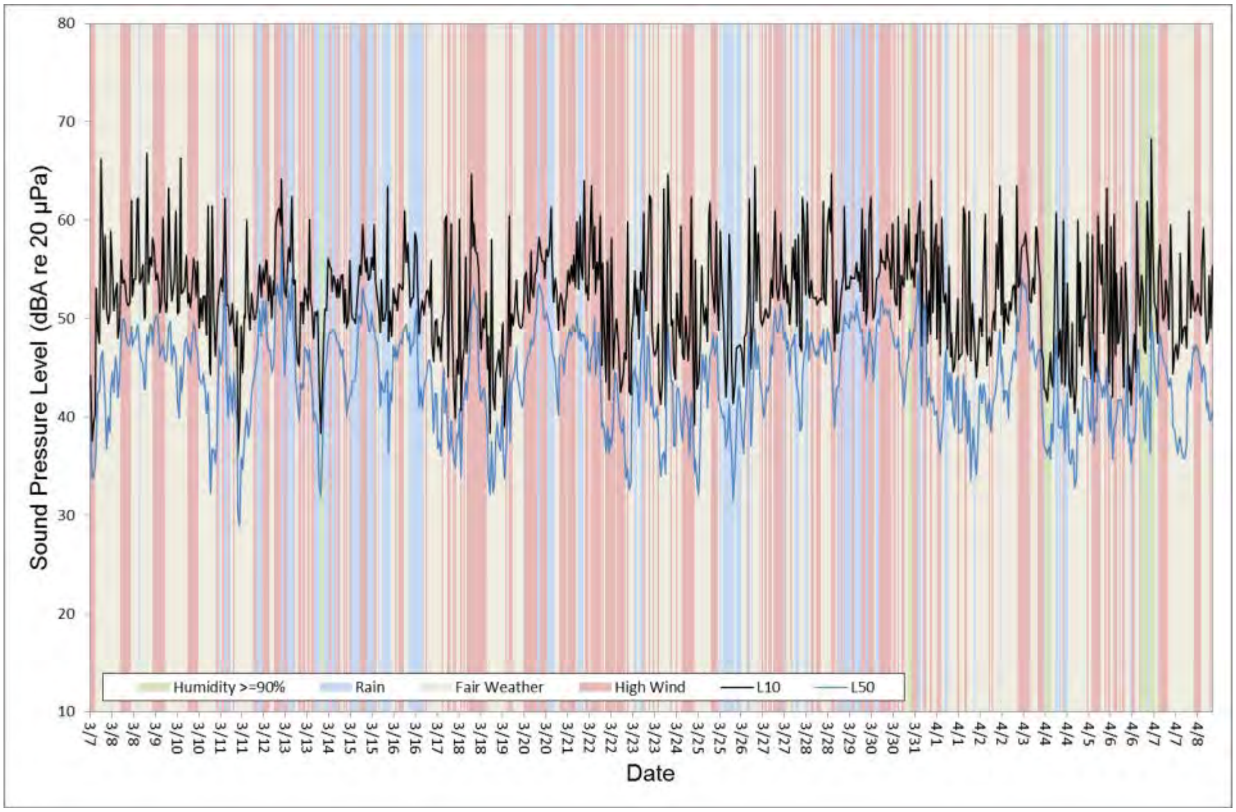
4.15 Monitoring Position 20 – Description and Results

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.

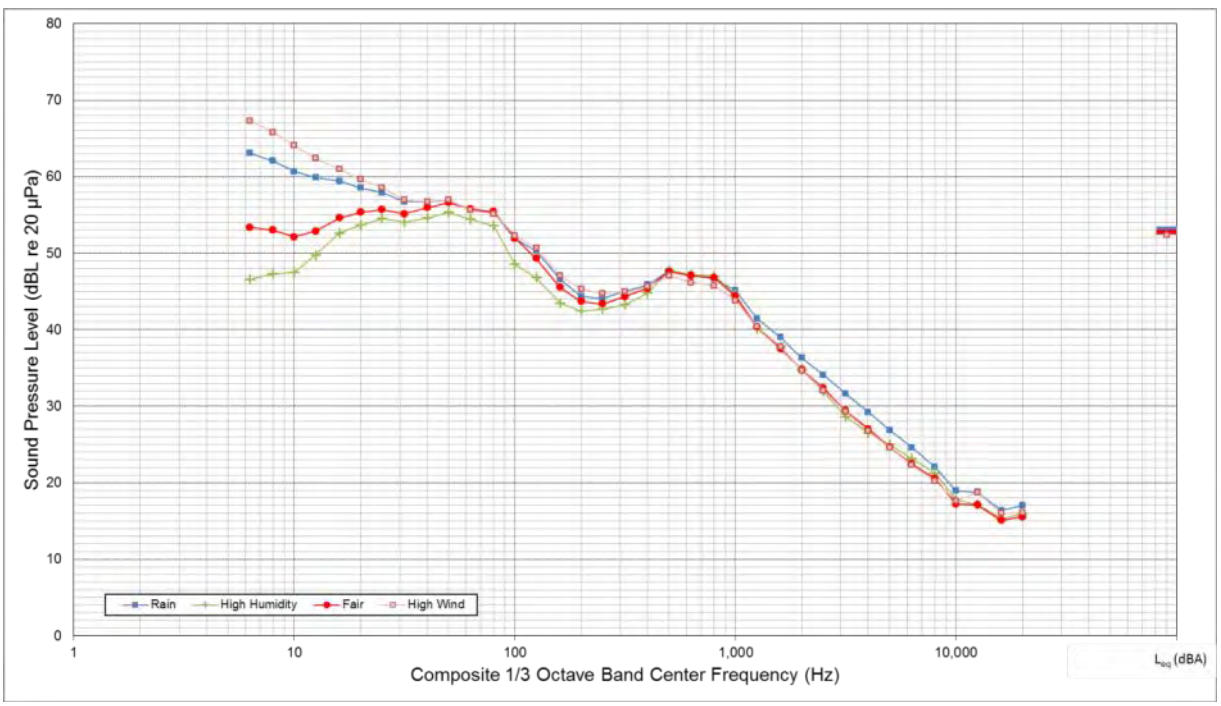
Photograph taken in the direction of the primary residential structure

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

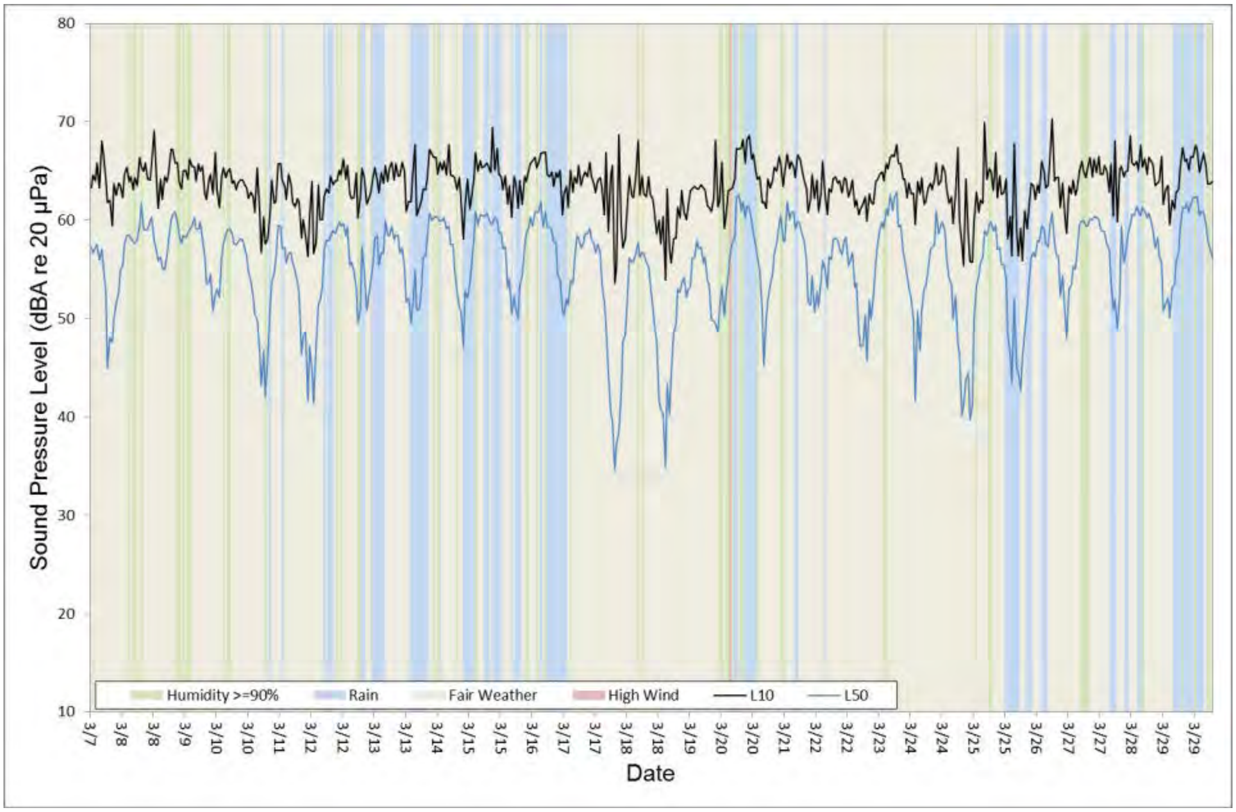
4.16 Monitoring Position 22 – Description and Results

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.

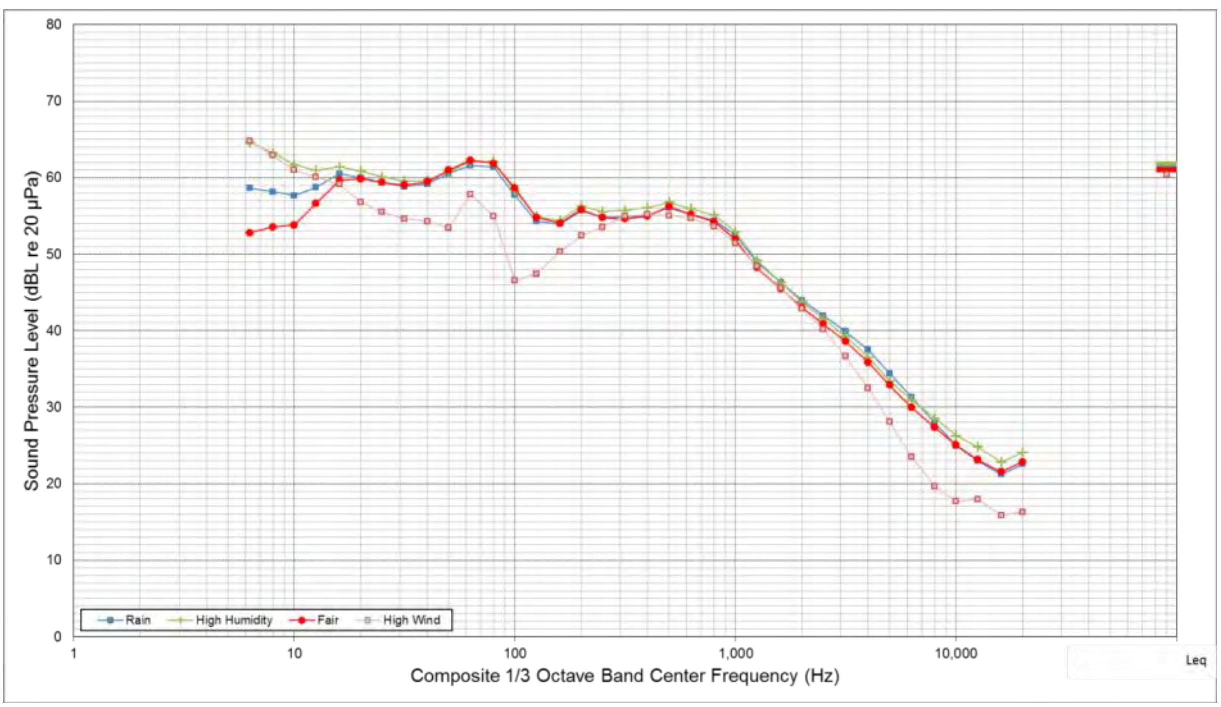
Photograph taken in the direction of the primary residential structure

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

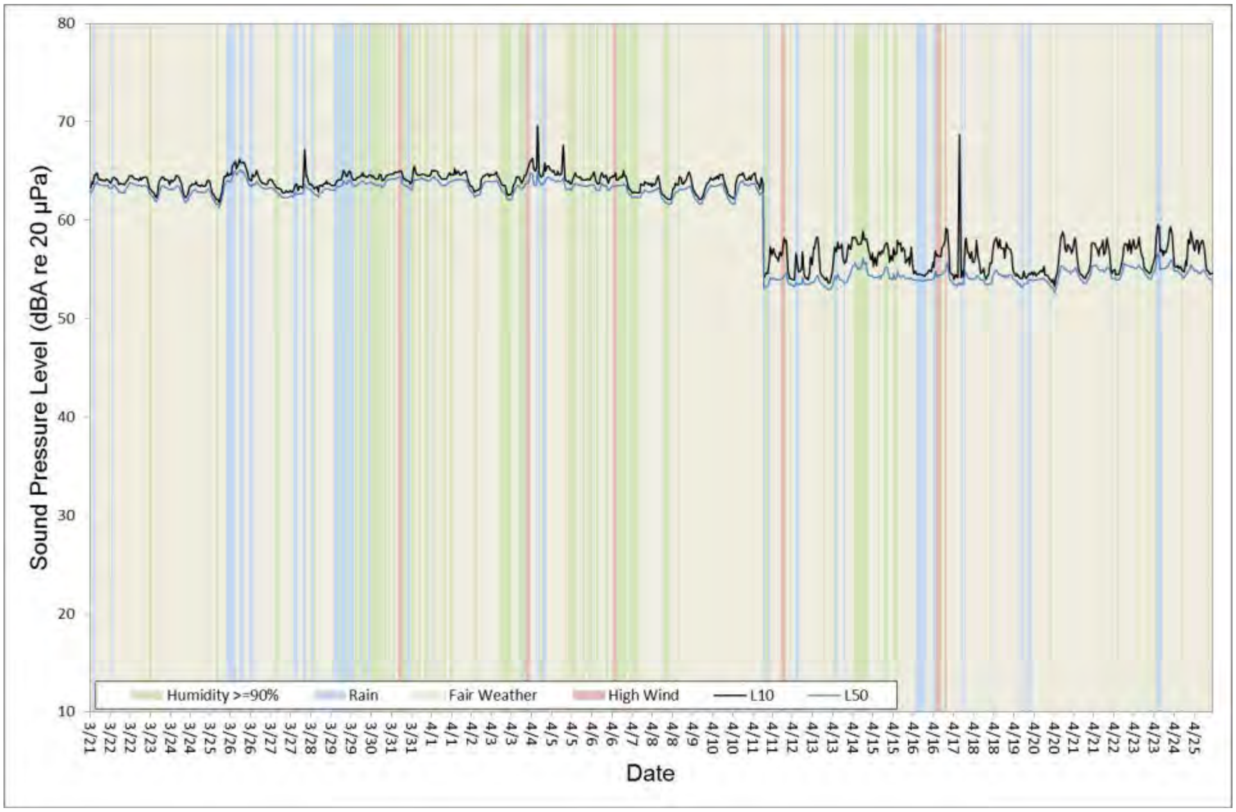
4.17 Monitoring Position 23 – Description and Results

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.

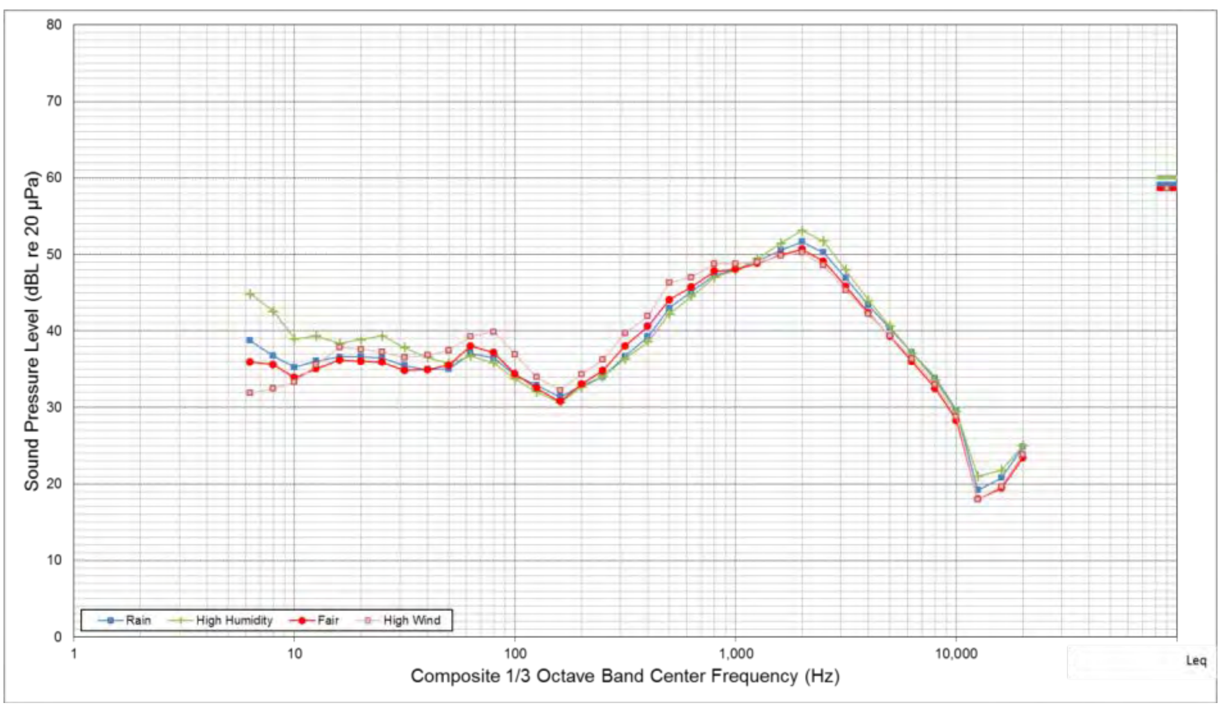
Photograph taken in the direction of the primary residential structure

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

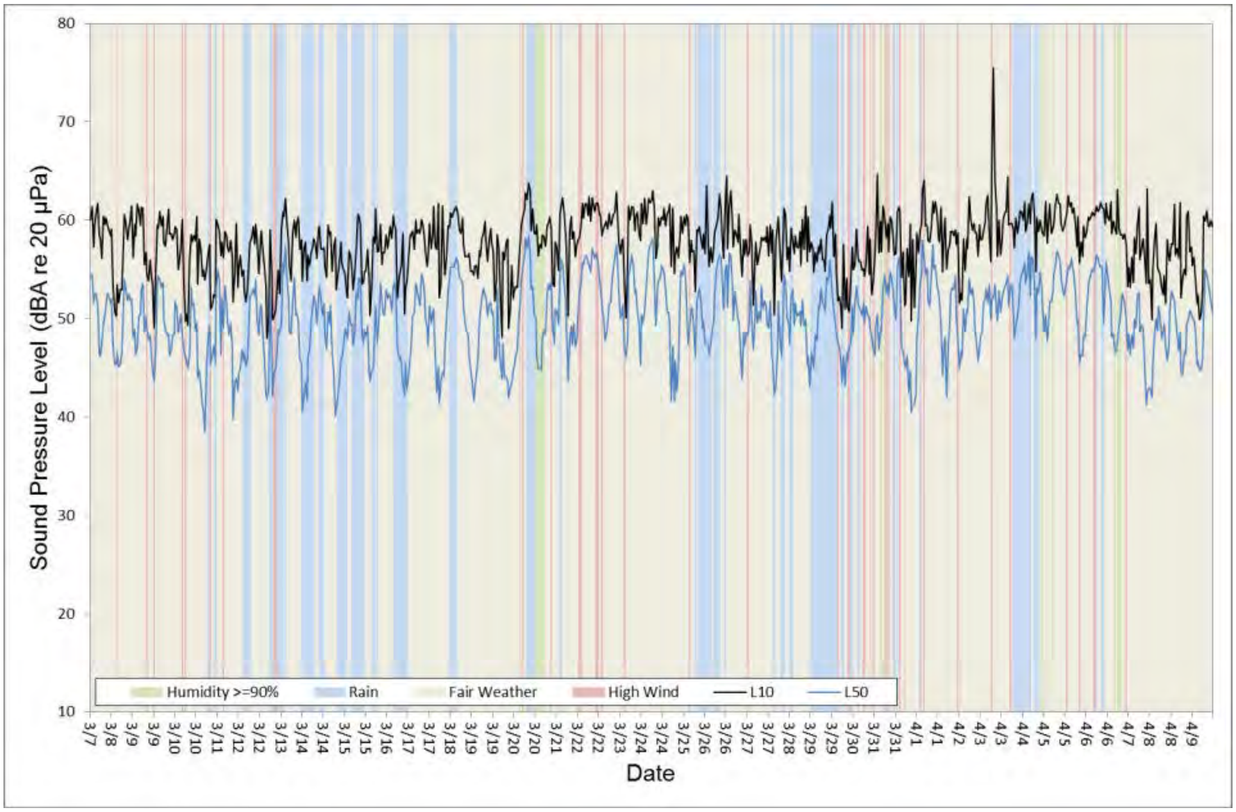
4.18 Monitoring Position 25 – Description and Results

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.

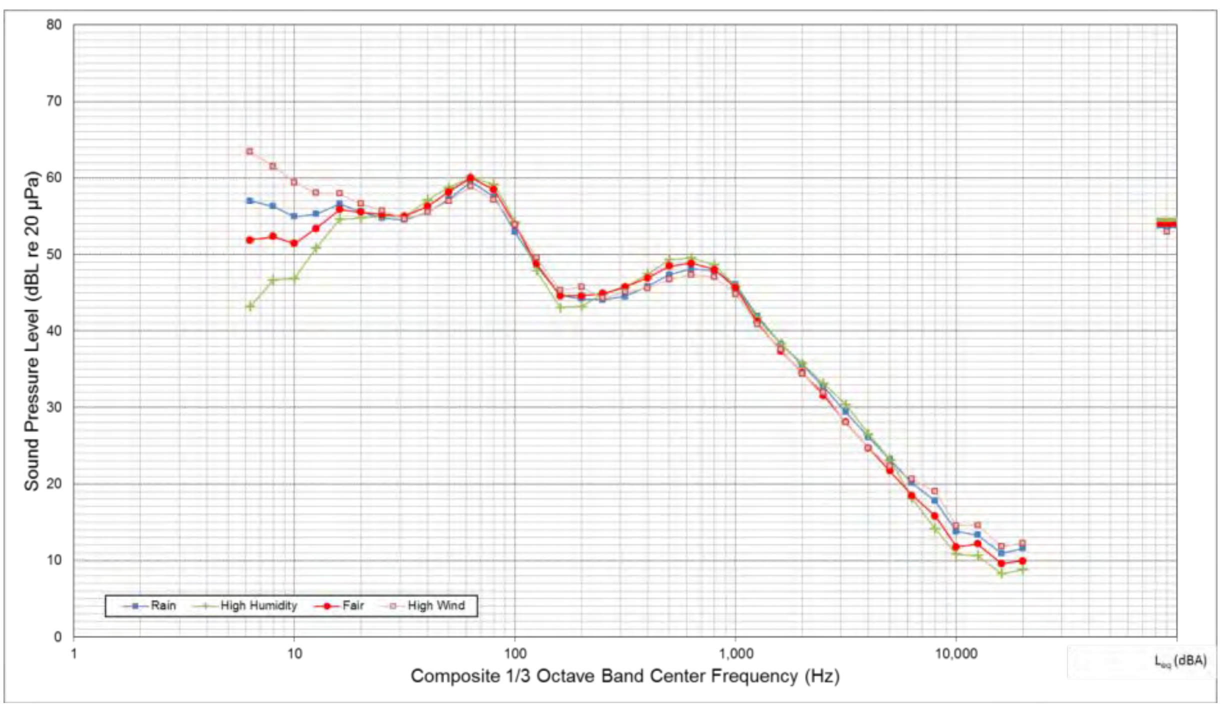
Photograph taken in the direction of the primary residential structure

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

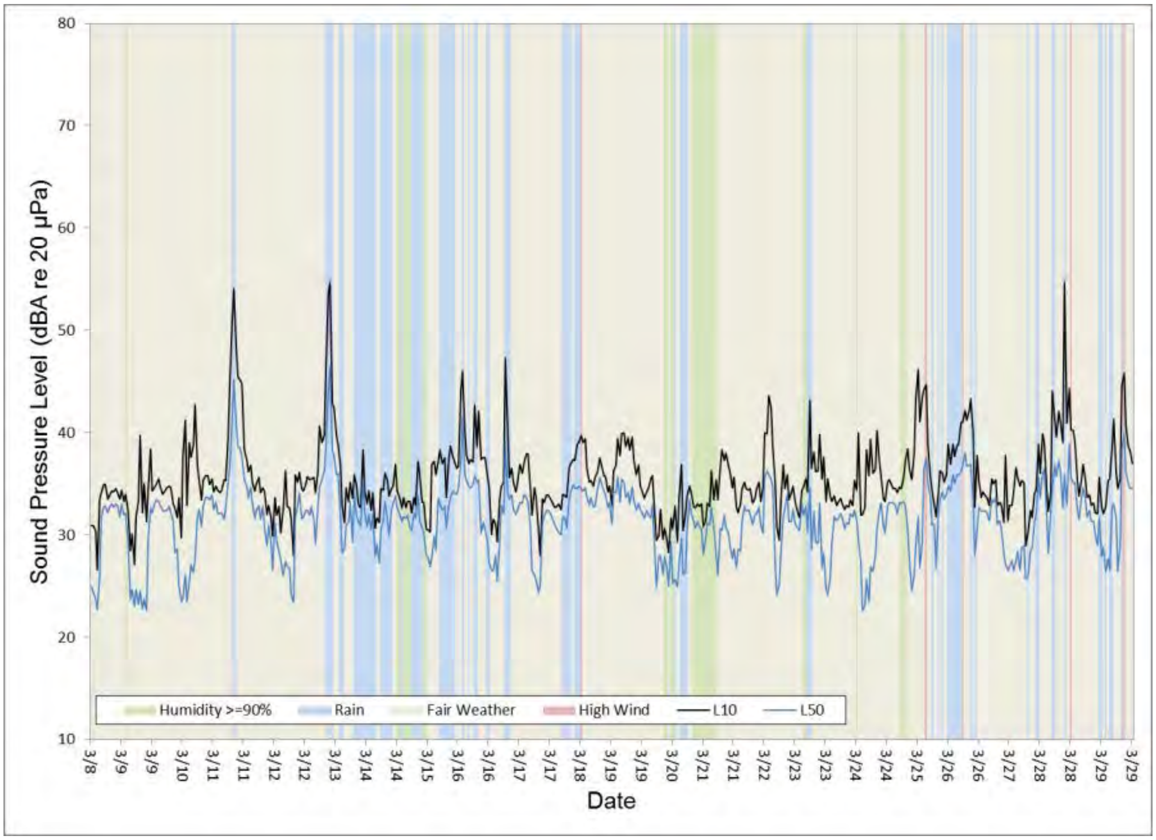
Figure 4-36. Monitoring Position 25 Summary of Measured Sound Pressure Levels

4.19 Monitoring Position 27 – Description and Results

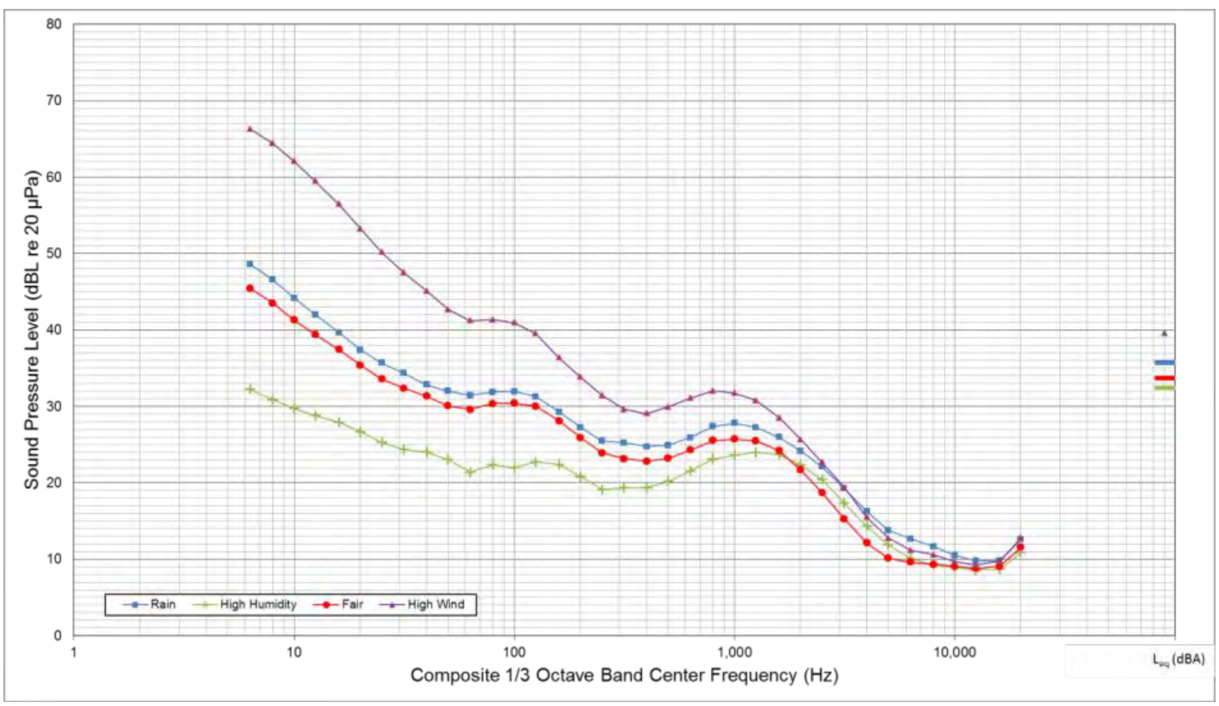
MP-27 was located on open space/BLM-managed lands near the Owyhee Reservoir adjacent to a residence approximately 9.4 miles southwest of the Adrian, Oregon, along Segment 5 (Malheur County). Access to the adjacent residence was restricted by the landowner so field engineers located the MP in a similar 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

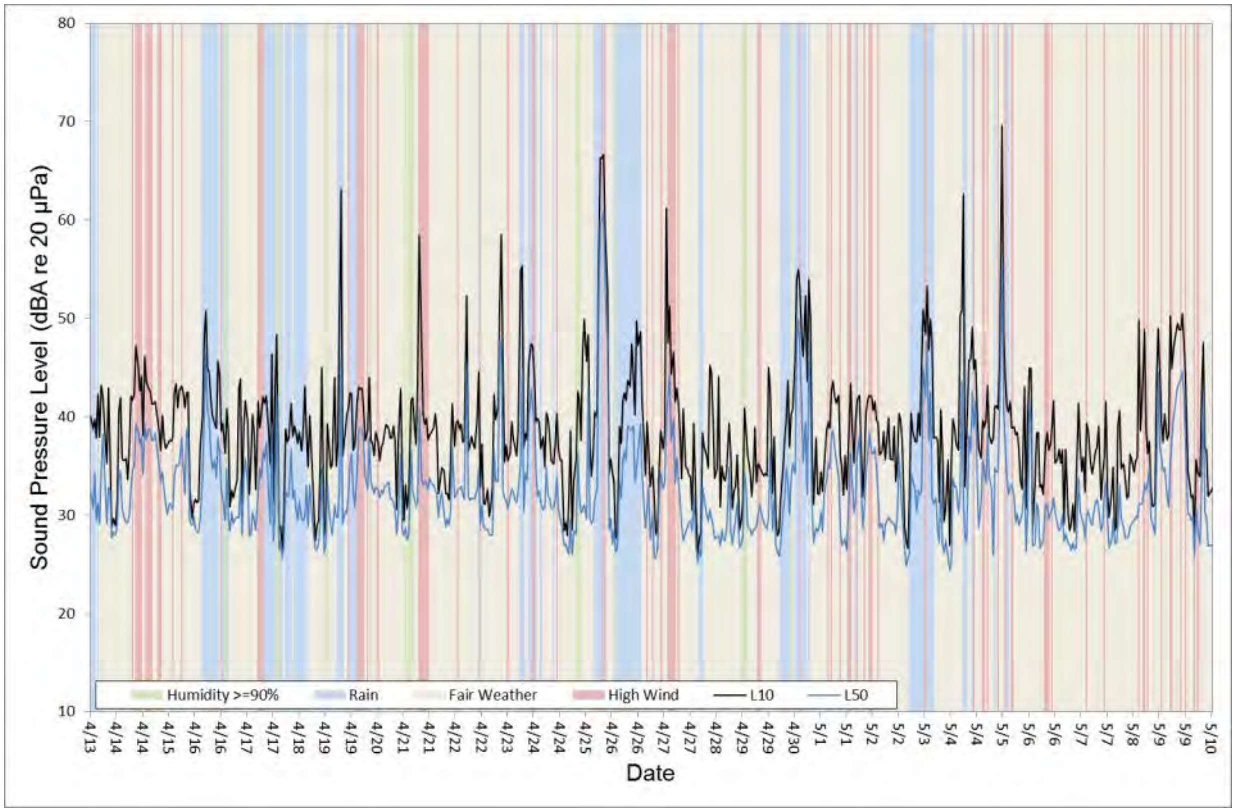
4.20 Monitoring Position 28 – Description and Results

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.

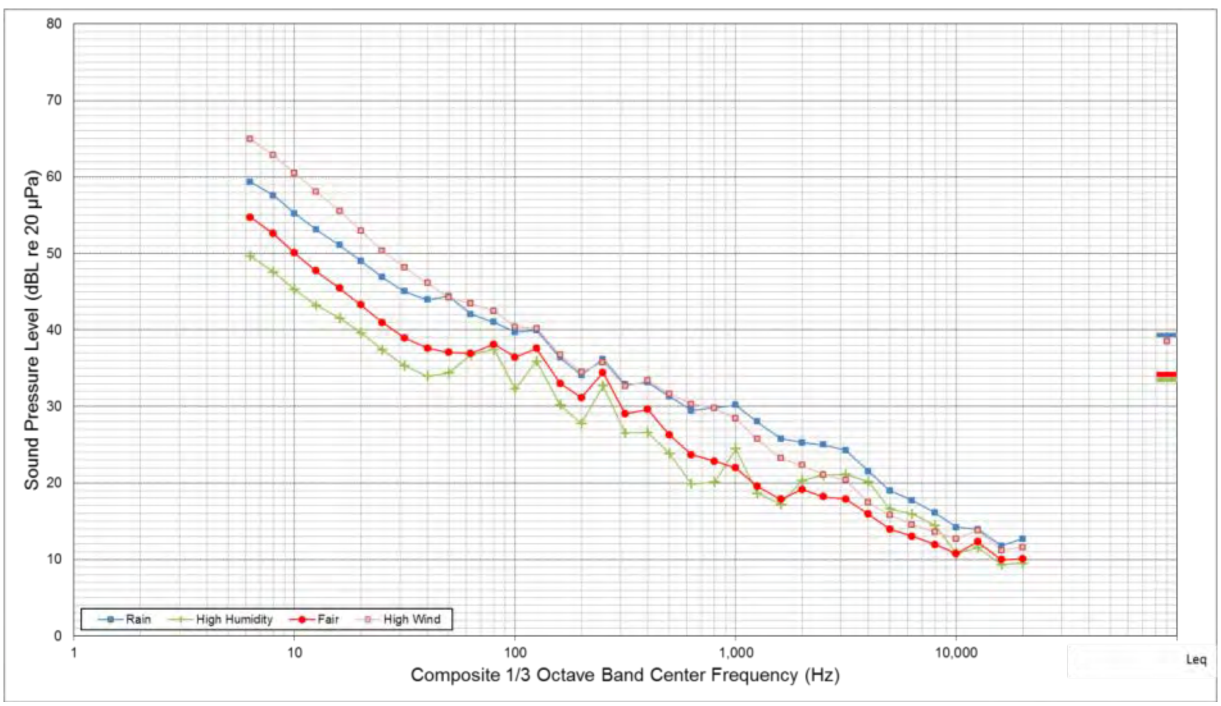
Photograph taken in the direction of the primary residential structure

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

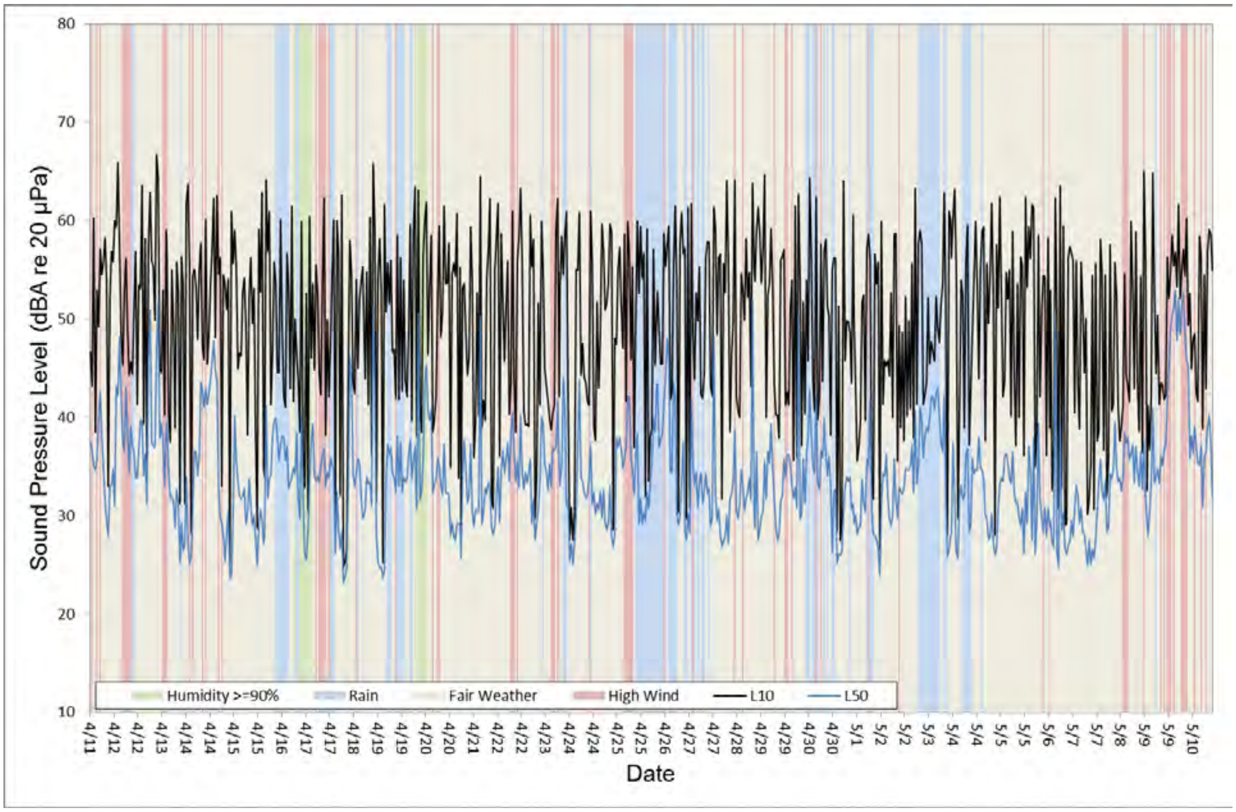
4.21 Monitoring Position 30 – Description and Results

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.

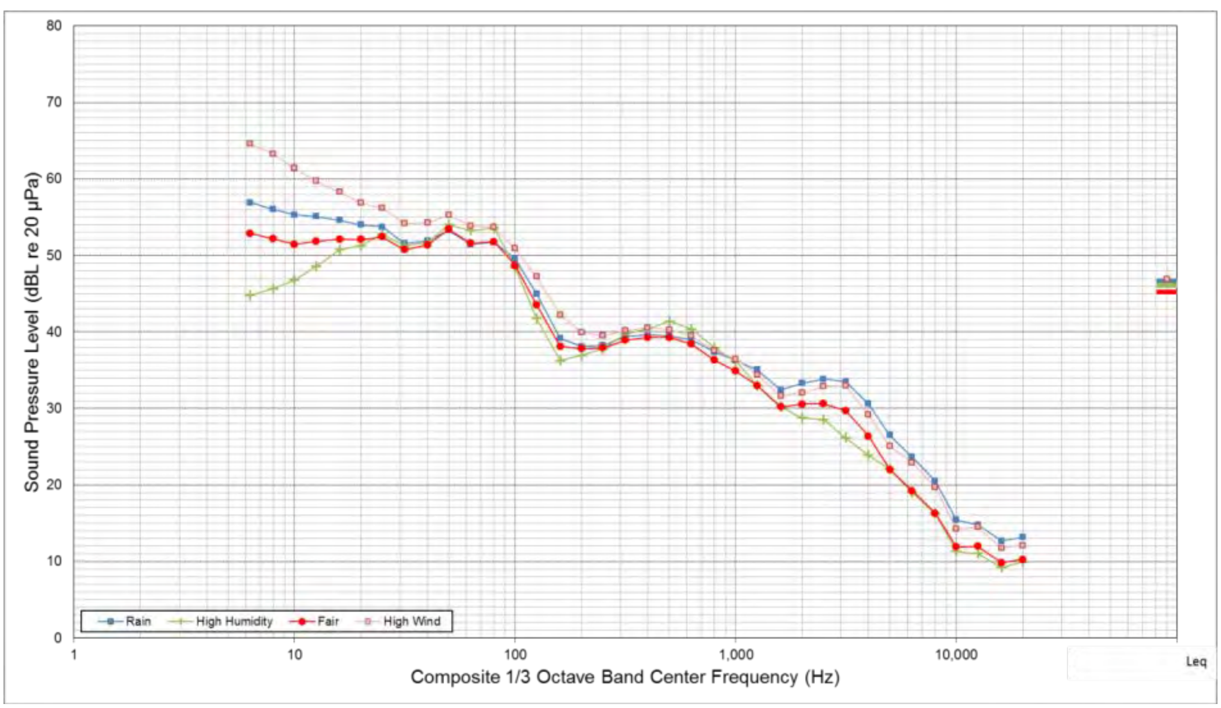
Photograph taken in the direction of the primary residential structure

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

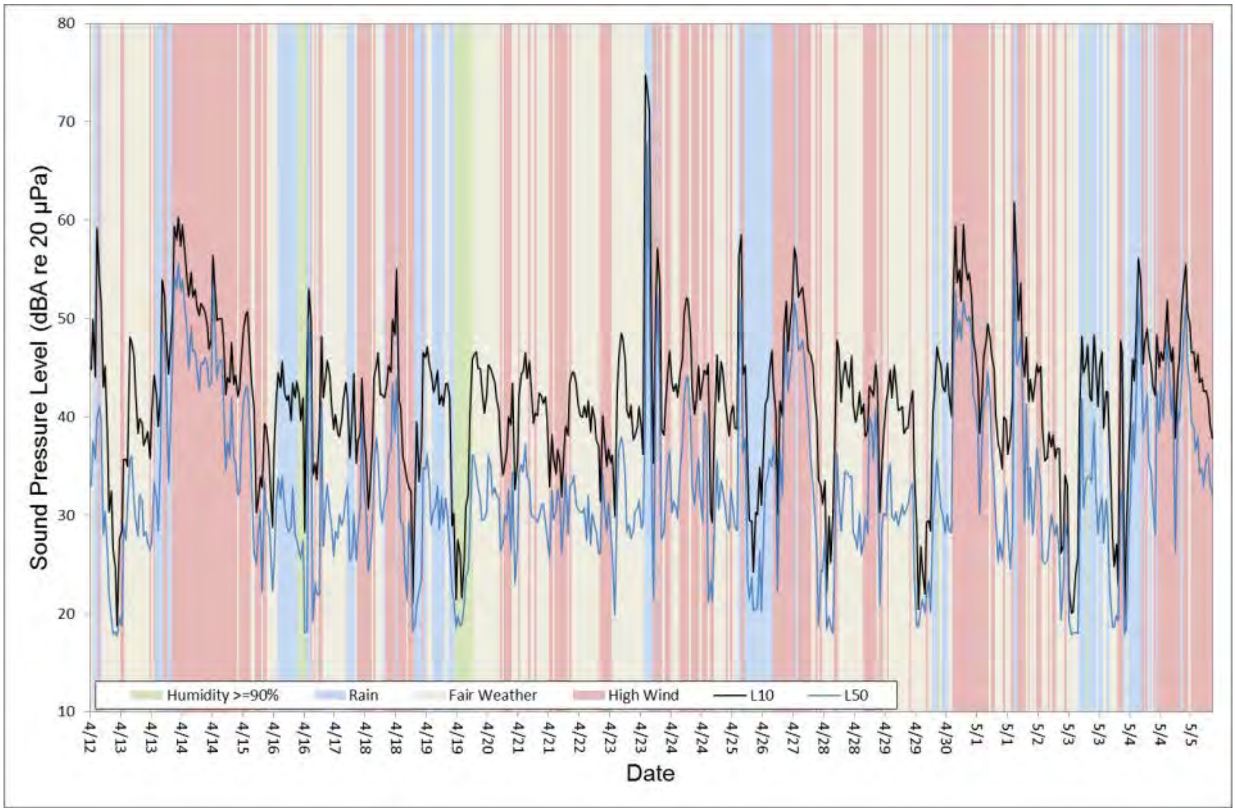
4.22 Monitoring Position 31 – Description and Results

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.

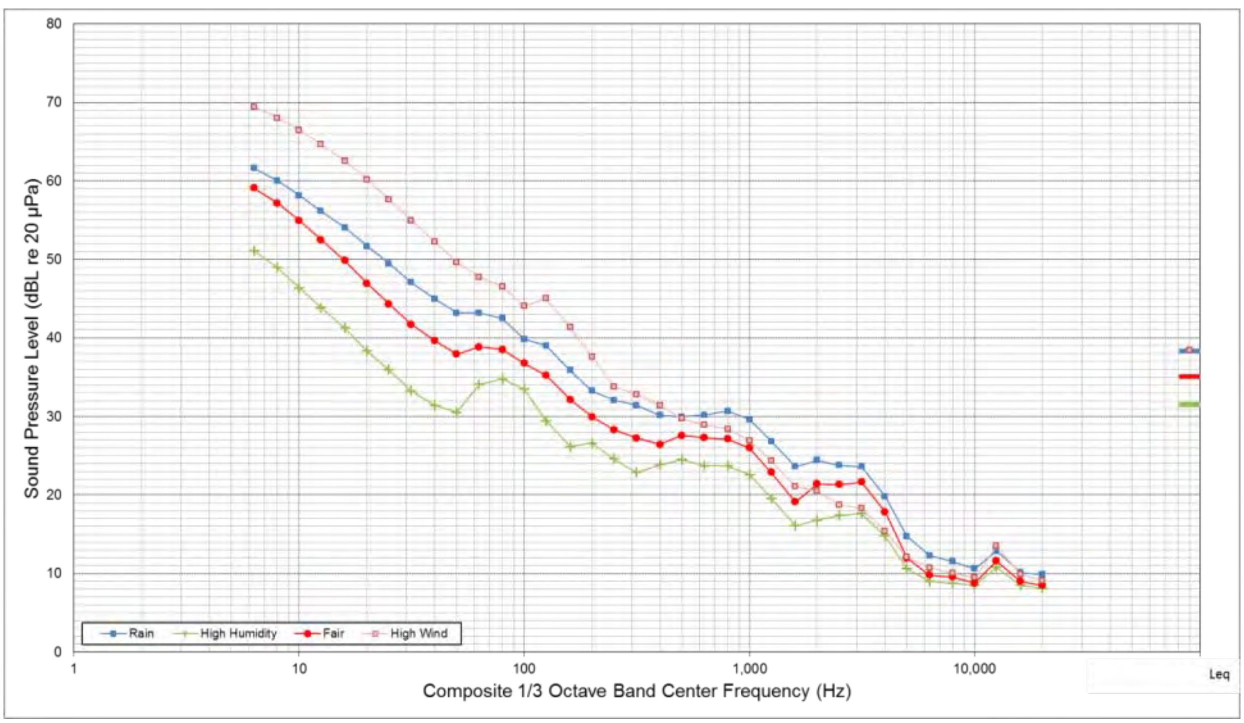
Photograph taken in the direction of the primary residential structure

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: [signature]

THE MODAL SHOP INC. A PCB GROUP CO.

The Modal Shop, Inc.
3149 East Kemper Road
Cincinnati, OH 45241
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(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.

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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:	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.

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.

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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.

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.

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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

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

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

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

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:	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.

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

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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

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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.

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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 PRM831-019135

Signed: Ron Harris
Technician: Ron Harris

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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.

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.

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Tested with PRM831-019136

Signed: Ron Harris
Technician: Ron Harris

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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

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Tested with PRM831-019223

Signed: Ron Harris
Technician: Ron Harris

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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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Tested with PRM831-019224

Signed: Ron Harris
Technician: Ron Harris

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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

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Tested with PRM831-019225

Signed: Ron Harris
Technician: Ron Harris

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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

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Tested with PRM831-019226

Signed: Ron Harris
Technician: Ron Harris

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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

Temperature: 24 ° Centigrade

Relative Humidity: 36 %

Affirmations

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Tested with PRM831-019227

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Technician: Ron Harris

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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.

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Tested with PRM831-019228

Signed: Ron Harris
Technician: Ron Harris

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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

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Tested with PRM831-019230

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.

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Tested with PRM831-019232

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-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-5
TABULATED SUMMARY OF ACOUSTIC MODELING RESULTS BY RECEPTOR LOCATION

Attachment X-5: Tabulated Summary of Acoustic Modeling Results by Receptor Location

Note: An incremental increase presented as (-) signifies that the future increase as a result of the project is expected to be <1 dBA when considered cumulatively with the baseline condition. The (-) was also used for locations where a baseline has not been documented by measurement due to the extended propagation distances between the project and NSA which greatly reduces the potential for any adverse noise impacts. The incremental increase is obtained by first logarithmically adding the Project Received Sound Level to the Late Night Baseline Sound Pressure Level. The resulting value then has the Late Night Baseline Sound Pressure Level subtracted from it to give 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 the following tables are reported in whole decibels.

Tabulated Summary of Modeling Results – Proposed Route

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
							Easting	Northing				
1	32	43	Residence	1,919	Segment 5	Malheur	453,529	4,900,442	MP-31	25	33	+9
2	33	43	Residence	1,482	Segment 5	Malheur	453,921	4,901,060	MP-31	25	33	+9
3	34	39	Residence	311	Segment 4	Baker	473,678	4,921,255	MP-25	46	42	+2
4	36	39	Residence	377	Segment 4	Baker	473,610	4,921,457	MP-25	46	41	+1
5	39	39	Residence	528	Segment 4	Baker	474,055	4,921,728	MP-25	46	31	-
6	40	38	Campground Facility	30*	Segment 4	Baker	473,350	4,924,035	MP-25	46	40	+1
7	41	38	Campground Facility	82*	Segment 4	Baker	473,378	4,924,102	MP-25	46	39	+1
8	42	38	Campground Facility	180*	Segment 4	Baker	473,396	4,924,241	MP-25	46	42	+1
9	44	38	Residence	649	Segment 4	Baker	472,750	4,925,780	MP-23	63	32	-
10	52	38	Residence	541	Segment 4	Baker	470,610	4,927,460	MP-22	51	35	-
11	53	38	Residence	491	Segment 4	Baker	470,983	4,927,473	MP-23	63	42	-
12	55	38	Residence	1,469	Segment 4	Baker	470,447	4,927,699	MP-22	51	34	-
13	59	38	Residence	1,873	Segment 4	Baker	471,784	4,930,139	MP-30	33	19	-
14	63	36	Residence	2,043	Segment 4	Baker	463,971	4,938,571	MP-30	33	31	+2
15	66	36	Residence	2,171	Segment 4	Baker	460,877	4,942,573	MP-30	33	30	+2
16	67	35	Residence	1,016	Segment 4	Baker	457,334	4,943,597	MP-19	45	37	+1
17	68	34	Residence	1,928	Segment 4	Baker	452,311	4,947,967	MP-30	33	30	+2
18	85	26	Residence	1,082	Segment 3	Union	428,330	4,994,572	MP-14	36	37	+4
19	91	25	Residence	669	Segment 3	Union	424,119	4,998,514	MP-13	49	41	+1
20	98	23	Cabin/Residence	1,197	Segment 3	Union	410,416	5,015,531	MP-11	31	35	+6
21	100	23	Residence	2,220	Segment 3	Union	410,654	5,015,745	None	-	31	<10
22	106	20	Residence	1,666	Segment 3	Union	393,171	5,029,402	MP-11	31	34	+5
23	107	19	Residence	1,502	Segment 3	Union	391,084	5,032,153	MP-11	31	35	+6
24	108	19	Residence	1,837	Segment 3	Union	390,861	5,032,259	MP-11	31	34	+5
25	111	19	Residence	1,938	Segment 3	Union	390,956	5,032,288	MP-11	31	33	+4
26	118	18	Residence	1,207	Segment 2	Umatilla	384,896	5,038,241	MP-9	37	36	+3
27	120	17	Residence	275	Segment 2	Umatilla	374,300	5,038,250	MP-8	41	44	+5
28	123	17	Residence	636	Segment 2	Umatilla	377,967	5,038,280	MP-9	37	41	+6
29	124	15	Residence	2,178	Segment 2	Umatilla	361,520	5,038,572	MP-28	31	29	+2

Tabulated Summary of Modeling Results – Proposed Route

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
							Easting	Northing				
30	127	17	Residence	2,365	Segment 2	Umatilla	374,073	5,038,890	MP-8	41	30	-
31	128	18	Residence	1,909	Segment 2	Umatilla	379,730	5,039,276	MP-9	37	33	+1
32	130	15	Residence	1,308	Segment 2	Umatilla	362,074	5,039,769	MP-28	31	34	+5
33	131	15	Residence	1,098	Segment 2	Umatilla	359,561	5,041,875	MP-7	40	35	+1
34	132	15	Residence	1,607	Segment 2	Umatilla	359,234	5,041,897	MP-7	40	33	+1
35	136	15	Residence	1,341	Segment 2	Umatilla	360,005	5,042,654	MP-7	40	33	+1
36	142	14	Residence	1,266	Segment 2	Umatilla	354,499	5,043,196	MP-6	33	34	+3
37	146	8	Residence	1,102	Segment 2	Umatilla	310,628	5,053,676	MP-5	32	34	+4
38	150	8	Residence	2,384	Segment 1	Morrow	308,096	5,053,762	MP-5	32	26	+1
39	151	8	Residence	2,152	Segment 1	Morrow	308,167	5,053,802	MP-5	32	27	+1
40	152	8	Residence	2,286	Segment 1	Morrow	308,069	5,053,818	MP-5	32	26	+1
41	163	4	Residence	2,083	Segment 1	Morrow	282,863	5,056,927	None	-	29	<10
42	164	4	Residence	1,915	Segment 1	Morrow	281,013	5,056,933	None	-	29	<10
43	167	3	Residence	1,030	Segment 1	Morrow	269,422	5,059,080	MP-2	34	35	+3
44	168	3	Residence	1,102	Segment 1	Morrow	269,431	5,059,154	MP-2	34	34	+3
45	169	3	Residence	101	Segment 1	Morrow	268,892	5,059,211	MP-2	34	47	+13
46	176	2	Residence	1,315	Segment 1	Morrow	268,790	5,061,553	MP-2	34	33	+3
47	220	36	Residence	941	Segment 4	Baker	461,459	4,940,797	MP-20	41	37	+2
48	223	35	Residence	2,358	Segment 4	Baker	458,951	4,942,050	MP-30	33	30	+2
49	227	34	Residence	1,965	Segment 4	Baker	448,178	4,948,130	MP-17	42	33	+1
50	255	21	Campground Facility	2,076	Segment 3	Union	402,695	5,021,223	None	-	27	<10
51	256	21	Campground Facility	2,161	Segment 3	Union	402,722	5,021,184	None	-	28	<10
52	257	21	Campground Facility	2,125	Segment 3	Union	402,712	5,021,145	None	-	27	<10
53	258	21	Campground Facility	2,211	Segment 3	Union	402,738	5,021,134	None	-	28	<10
54	259	21	Campground Facility	2,240	Segment 3	Union	402,747	5,021,162	None	-	28	<10
55	260	21	Campground Facility	2,279	Segment 3	Union	402,759	5,021,159	None	-	28	<10
56	261	21	Campground Facility	2,247	Segment 3	Union	402,749	5,021,129	None	-	28	<10
57	262	21	Campground Facility	2,319	Segment 3	Union	402,771	5,021,152	None	-	28	<10
58	263	21	Campground Facility	2,388	Segment 3	Union	402,794	5,021,107	None	-	28	<10
59	265	20	Cabin	1,036	Segment 3	Union	393,869	5,029,058	MP-11	31	39	+9
60	266	19	Residence (Questionable)	1,272	Segment 3	Union	391,099	5,032,083	MP-11	31	37	+7
61	270	16	Residence	1,915	Segment 2	Umatilla	365,325	5,039,729	MP-28	31	28	+2
62	279	16	Residence	2,115	Segment 2	Umatilla	362,779	5,038,549	MP-28	31	30	+3
63	283	15	Residence	1,426	Segment 2	Umatilla	358,898	5,042,100	MP-7	40	34	+1
64	285	15	Residence	898	Segment 2	Umatilla	359,584	5,042,759	MP-7	40	37	+2
65	288	15	Residence	2,250	Segment 2	Umatilla	356,060	5,043,452	MP-6	33	29	+2

Tabulated Summary of Modeling Results – Proposed Route

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m) Easting	UTM Coordinates (m) Northing	Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
66	299	8	Residence	1,285	Segment 1	Morrow	309,911	5,054,655	MP-5	32	33	+4
67	436	35	Residence	1,312	Segment 4	Baker	458,023	4,943,038	MP-19	45	35	-
68	457	38	Campground Facility	125*	Segment 4	Baker	473,385	4,924,166	MP-25	46	38	+1
69	461	4	Residence	2,217	Segment 1	Morrow	276,773	5,055,580	None	-	28	<10
70	467	5	Residence	2,342	Segment 1	Morrow	287,586	5,054,426	None	-	28	<10
71	513	17	Residence	1,725	Segment 2	Umatilla	374,163	5,037,490	MP-8	41	32	+1
72	575	38	Campground Facility	174*	Segment 4	Baker	473,392	4,924,259	MP-25	46	42	+2
73	584	4	Residence (Questionable)	2,004	Segment 1	Morrow	282,871	5,056,903	None	-	29	<10
74	590	13	Residence	1,899	Segment 2	Umatilla	344,952	5,045,212	MP-6	33	30	+2
75	745	23	Cabin	2,142	Segment 3	Union	414,263	5,009,326	None	-	32	<10
76	748	36	Residence	1,007	Segment 4	Baker	461,433	4,940,790	MP-20	41	37	+1
77	949	15	Residence	2,624	Segment 2	Umatilla	356,003	5,041,815	MP-6	33	26	+1
78	951	15	Residence	2,542	Segment 2	Umatilla	356,067	5,043,541	MP-6	33	27	+1
79	1062	8	Residence	2,552	Segment 2	Umatilla	310,209	5,054,923	MP-5	32	28	+1
80	1221	15	Residence	2,598	Segment 2	Umatilla	361,570	5,038,442	MP-28	31	27	+1
81	1301	36	Residence	2,571	Segment 4	Baker	463,967	4,938,376	MP-30	33	28	+1
82	1415	52	Residence	2,470	Segment 5	Malheur	484,633	4,844,659	MP-27	33	28	+1

*Distance from Receptor to the Transmission Line (ft)

Tabulated Summary of Modeling Results – Longhorn Alternative

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m) Easting	UTM Coordinates (m) Northing	Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
83	631	58	Residence	1,643	Segment 1	Morrow	301,705	5,069,809	MP-3	31	32	+3
84	642	58	Residence	85	Segment 1	Morrow	301,693	5,069,246	MP-3	31	47	+16

Tabulated Summary of Modeling Results – Glass Hill Alternative

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m) Easting	UTM Coordinates (m) Northing	Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
50	255	21	Campground Facility	2,076	Segment 3	Union	402,695	5,021,223	None	-	13	<10
51	256	21	Campground Facility	2,161	Segment 3	Union	402,722	5,021,184	None	-	13	<10
52	257	21	Campground Facility	2,125	Segment 3	Union	402,712	5,021,145	None	-	14	<10

Tabulated Summary of Modeling Results – Glass Hill Alternative

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
							Easting	Northing				
53	258	21	Campground Facility	2,211	Segment 3	Union	402,738	5,021,134	None	-	14	<10
54	259	21	Campground Facility	2,240	Segment 3	Union	402,747	5,021,162	None	-	14	<10
55	260	21	Campground Facility	2,279	Segment 3	Union	402,759	5,021,159	None	-	14	<10
56	261	21	Campground Facility	2,247	Segment 3	Union	402,749	5,021,129	None	-	14	<10
57	262	21	Campground Facility	2,319	Segment 3	Union	402,771	5,021,152	None	-	14	<10
58	263	21	Campground Facility	2,388	Segment 3	Union	402,794	5,021,107	None	-	14	<10
75	745	23	Cabin	2,142	Segment 3	Union	414,263	5,009,326	None	-	9	<10

Tabulated Summary of Modeling Results – Flagstaff Alternative

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
							Easting	Northing				
85	71	33	Residence	642	Segment 4	Baker	441,403	4,951,092	MP-16	41	39	+2
86	72	33	Residence	1,154	Segment 4	Baker	440,872	4,951,166	MP-16	41	36	+1
87	78	31	Residence	1,640	Segment 4	Baker	440,273	4,963,747	MP-15	27	35	+9
88	80	30	Residence	2,286	Segment 4	Baker	440,057	4,965,541	MP-15	27	31	+5
89	82	30	Residence	875	Segment 4	Baker	439,993	4,967,946	MP-15	27	38	+11
90	83	30	Residence	1,259	Segment 4	Baker	439,860	4,968,035	MP-15	27	35	+9
91	523	33	Residence	2,207	Segment 4	Baker	439,265	4,951,957	MP-16	41	31	-

Tabulated Summary of Modeling Results – Malheur South Alternative

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
							Easting	Northing				
92	700	74	Cabin/Residence (Questionable)	1,098	Segment 5	Malheur	481,079	4,835,783	MP-27	33	38	+6

Tabulated Summary of Modeling Results – Willow Creek Alternative

NSR Sequential Number	Receptor ID	Attachment X-1 Map Number	Receptor Status	Distance from Receptor to the Transmission Line Site Boundary (ft)	Project Transmission Line Segment	County	UTM Coordinates (m)		Associated Monitoring Position	Late Night Baseline Sound Pressure Level (dBA)	Project Received Sound Level (dBA)	Incremental Increase (dBA)
							Easting	Northing				
93	711	66	Residence	2,135	Segment 5	Malheur	463,372	4,895,030	MP-31	25	29	+6
94	714	66	Residence	1,075	Segment 5	Malheur	463,146	4,894,251	MP-31	25	35	+10
95	717	66	Residence	1,705	Segment 5	Malheur	462,830	4,893,727	MP-31	25	32	+8
96	718	66	Residence	2,240	Segment 5	Malheur	462,629	4,893,466	MP-31	25	31	+7
97	719	66	Residence	856	Segment 5	Malheur	463,057	4,893,302	MP-31	25	39	+14
98	720	66	Residence	1,581	Segment 5	Malheur	463,965	4,893,069	MP-31	25	32	+8
99	1334	65	Residence	2,571	Segment 5	Malheur	464,879	4,894,327	MP-31	25	24	+3
100	1341	66	Residence	2,467	Segment 5	Malheur	464,152	4,892,805	MP-31	25	27	+4