

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

**IN THE MATTER OF IDAHO POWER COMPANY'S, PETITION FOR CERTIFICATE OF PUBLIC
CONVENIENCE AND NECESSITY. Docket: PCN 5**

Amended Intervenor Opening Testimony

Greg Larkin

Date: February 1, 2023

Greg Larkin, Intervenor

**59655 Morgan Lake Rd.
La Grande, Oregon 97850
larkingGreg34@gmail.com**

I am an intervenor in the decisions regarding the Certificate of Public Convenience currently being considered. I am an Oregonian directly impacted by the decision regarding the Certificate of Public Convenience. I share concerns with many other landowners who will be subject to Condemnation of their land based upon a decision to issue this Certificate. My comments relate to the PUC charge to “ensure Oregonians have access to safe, reliable and fairly priced utility services that advance state policy and promote the public interest.” I am presenting the following issues which apply to landowners where the transmission line will cross private properties, properties adjacent to the transmission line which will be subjected to indirect impacts of this transmission line as well as citizens of the state who will experience economic and environmental losses due to this development. The following information relates to the failure of Idaho Power to **“justify the costs, the ability of Idaho Power to obtain more reasonably priced renewable energy by supporting developments within Idaho which would not necessitate this transmission line, the fact that it will discourage renewable energy development and conservation in Idaho, the lack of a need or benefit to Oregon citizens and electric customers”**

I am concerned due to the fact that Idaho Power often defers to decisions made

by the Oregon Department of Energy and Energy Facility Siting Council as if they provide documentation that issues are addressed. Since the Oregon Public Utility **Commission is charged with making an independent decision regarding the issues** they are to evaluate, acceptance of decisions which were often inconsistent with the comments received through the public process and reflected narrowing and putting off completion of the requirements of EFSC rules should provide little weight in the PUC decisions.

I am presenting my Testimony in a question and answer format.

Question: Do you believe the B2H Transmission Line promotes the “public interest” required to be determined under OAR 860-025-0035(1)?

No. Idaho Power has spent literally millions of dollars paying public agencies and their legal staffs to promote the development of this line over objections of Oregon citizens, County governments and utility users as a whole.

A review of the public comments provided to the Energy Facility Siting Council regarding the Draft Site Certificate show an overwhelming percentage of the comments objected to this transmission line. The comments included objections due to failing to justify the costs, the ability of Idaho Power to obtain more reasonably priced renewable energy by supporting developments within Idaho which would not necessitate this transmission line, a failure to utilize less

impactful routes, discouraging renewable energy development and a lack of the robust use of conservation in Idaho to address the perceived need. The lack of need or benefit to Oregon citizens and electric customers, a failure to identify and provide mitigation for safety, health, economic and resource impacts. The lack of final or effective management plans to address fire and invasive weeds, or showing compliance a lack of final detailed plans showing compliance with council standards, and a host of additional standards. I concur with the arguments submitted regarding these concerns and submit that the public comments submitted to the Energy Facility Siting Council (EFSC) regarding the costs, less costly options, lack of benefits to Oregon and safety and health concerns be considered as evidence in support of my arguments regarding these issues and documenting the need to refuse to issue a Certificate of Public Convenience until Idaho Power completes the work required to show compliance with areas Council is required to evaluate. The fact that the Public Comments include over 6,000 pages gives an indication that the public has many concerns and most commenters indicated their best interests and needs will not be met by the B2H Transmission line. I am providing a sample of three exhibits supporting this, but there are hundreds more in the 13 page list of comments that are included in the Contested Case Files for the Oregon Department of Energy. Baker County in their

August 22, 2019 letter regarding the Draft Proposed Order state concerns regarding the lack of final plans to determine if standards are being met, Oregon Trail impacts, the undervaluing of private agricultural property and overvaluing of public property as a transmission line route, lack of appropriate mitigation for scenic resource damages which they state is “both large, and largely unmitigated”, the inadequacy and lack of a final invasive weed plan including a failure to require compliance with ORS 569 and the lack of a fire plan that is effective including identifying the multiple risks introduced by the activities, elevated risk, minimal available public services and exaggerated statements regarding the availability of resources through mutual aid agreements (Public Comments from EFSC Draft Proposed Order Hearing – Exhibit 101) The Oregon Department of Transportation commented on the lack of addressing the impacts to four of Oregon’s Scenic Byways and the “ impacts to where these byways could lose the designation with the loss of some of these intrinsic values.” They also stated that the Eastern Oregon Visitor’s Association had participated in early discussions and hearings on the project but felt their participation fell on deaf ears. (Public Comments from EFSC Draft Proposed Order Oregon Department of Transportation, Page 2 – Exhibit 102) Oregon Parks and Recreation Department gave multiple examples of inadequacies in the Historic Properties evaluations

including incorrectly identified resource types, using the lack of information regarding a resource to decide it does not meet a significance criteria, a lack of identifying a resource in the context of the agricultural unit which it is related to, failing to evaluate or failing to determine if resources are eligible. A failure to evaluate all segments of the Oregon Trail including the Meek Cutoff through the use of the Oregon Trail Multiple Property Document or evaluating linear resourced through the use of the Oregon Linear Resources Guidance document. Oregon Parks and Recreation Department, Historic Preservation Office, Comments from the Draft Proposed Order, Exhibit 103) As noted, The Oregon Department of Energy did not require standard accepted methods of evaluation in order to make their determinations. Because of this, relying upon their decisions that there would not be “significant negative impacts” is often not consistent with the results if accepted evaluation methods were used and OPUC should not accept referencing the EFSC information as an indication that there are not significant unmitigated impacts to Oregon resources and citizens.

There have been ongoing public concerns regarding this project for years which were never resolved through the entire siting process. Minutes from the B2H Advisory Committee formed by Union County dated July 28, 2016, Page 2 , Exhibit 104) reference a property owner’s description of the Oregon Trail resources on

her property and the value that should have been assigned them. Bernice Webster stated concerns regarding the failure to preserve historic properties of value to “her family, county, state and nation.” The only consideration that is currently proposed for the Oregon Trail remains on the property is that the transmission line structures will not be placed directly on the ruts. (July 28 Page 3, Exhibit 104) comments from Tom Thompson shared the fact that the public is not aware of routes being considered and stated that his property is currently being damaged by heavy equipment when a current 230 line is being serviced as well as problems with uncontrolled noxious weed issues which threaten native bunch grass sights. (July 28 Page 3, Exhibit 104) Lois Berry shared that she had asked for information from Idaho Power regarding their conservation efforts and “he responded respectfully that they did not have time to respond to this.” Votes by the members of the committee identified priority should be given to why a transmission line was going through Union County given there is already an established corridor in Oregon, Requesting County Commissioners request a supplemental EIS before a final DEIS is issued. Two letters were generated asking that all routes included be analyzed in the DEIS. (Exhibit 104 Last 3 Pages)

Question: Do you believe that the use of the B2H transmission line to transport electricity produced in Oregon to other states should be used to justify the need

for this transmission line by the Oregon Public Utility Commission? OAR 860-025-0035(l)(a)

No. The Oregon PUC should not consider Idaho Power's stated need to utilize the transmission line to purchase and transport renewable energy to out of state retail or wholesale purchasers. The Oregon PUC is charged with determining that **Oregonians** have access to safe, reliable and fairly priced utility services. Oregon electric users will absorb costs of this transmission line which will subject an already economically disadvantaged part of the state with additional economic damages. Additional burdens will result from removing significant portions of land that provide economic benefits to the area and should not include consideration of Idaho Power's desire to increase their revenue through the purchase and sale of energy to other states. There is little or no benefit to this state and a host of costs. For example, the Oregon Department of Energy determined that the loss of land meeting the definition of forest land in Union County would result in a loss of \$40,100 per acre for the 100 year life of the development. For Umatilla County, the department determined that the loss of timber production for forest land would result in a loss of \$38,500 per acre. There continue to be disagreements regarding whether the identification of the amount of forest land in Union County was correctly determined as the

requirements of the LCDC statues were not used for land designated as range or agricultural land. The above figures regarding lost value of timber based upon soils defining forest land are included on pages 265 and 266 of the Site Certificate. The Oregon Department of Energy credited Idaho Power with mitigation of impacts totalling \$21.3 million dollars in economic loss for Union County and \$9.5 million dollars in economic loss in Umatilla County based upon the department's determination of the amount of mitigation that would be provided to landowners of forested land in the two counties but did not require the developer to pay these amounts to the impacted landowners. (Exhibit 105 Pages 265-266 of Final Order on Site Certificate, September 27, 2022.) Reports from landowners indicate that Idaho Power is offering a small percentage of the amount they are credited with providing as mitigation for lost production on private forest lands being taken out of production by the transmission line right of way and requiring landowners to sign non-disclosure agreements so they cannot tell what they are being paid.

Question: Do you believe that there was reasonable consideration given to the alternative of producing energy in Idaho to meet their customer's needs? OAR 860-025-0035(l)(d)

No. Idaho Power would be acting in a more responsible manner and reduce costs

by developing energy resources in the state rather than relying upon Oregon to produce energy to be transported by the B2H Transmission Line to Idaho. In the notice that the Bonneville Power has completed their agreement to remove themselves from being partners in the B2H Transmission Line, they indicate that one advantage for them is the fact that they will be , “ eliminating today’s interim service’s reliance on market purchases that carry cost, availability, and carbon content risks.” (Bonneville Power Agreement with Idaho Power and PacifiCorp Exhibit 106, Page4 Paragraph 3) Bonneville Power considers it a benefit that they will no longer be vulnerable to the risks associated with purchasing power from the market at the same time as Idaho Power is insisting that this is the most economical and reliable method to meet their energy needs. What makes sense would be for Idaho to use available land in the state for energy development.

--Idaho has available land in Idaho for energy developments

A. Idaho includes 83,642 square miles and has a population of 1.84 million people. (Page 1, Microsoft Bing search “how large is Idaho in Square Miles Exhibit 107)

B. Oregon includes 98,466 square miles and has a population of 4.24 million people. (Page 1, Microsoft Bing search “how large is Oregon in Square Miles Exhibit 108)

Idaho is nearly the same size as Oregon with less than ½ the population. Given these numbers, you would expect Idaho to have more land for development of renewable energy than Oregon.

Idaho customers currently pay less for electricity than Oregon customers:

A. Idaho citizens pay 8.17 cents per kWh for their electricity. (Idaho Electric Profile , Table 1 Summary Statistics , EIA Exhibit 109)

B. Oregon citizens pay 8.95 cents per kWh for their electricity. (Oregon Electric Profile 2021 Exhibit 110) Idaho Power wants to compete in a market where energy is costing consumers over 75 cents per kWh more than their customers currently pay and increase the competition and costs for the Oregon customers who currently rely upon that energy market.

Idaho is not actively working to become energy independent:

A. Idaho generates 16,836.473 net Mwh of electricity but sells 25,285.616 net Mwh of electricity. (Idaho Electric Profile 2021, EIA Exhibit 109)

B. Oregon generates 61,016,874 net Mwh of electricity and sells 54,135,205 Mwh of electricity. (Oregon Electric Profile 2021 Exhibit 110)

Question: Is it in the public interest of Oregon Citizens to be utilizing State and Private land and resources to produce energy for Idaho? OAR 860-025-0035(l)(d)

No. Idaho is only producing approximately 30% of the energy they use in state

and importing approximately 70% from out of state. (Idaho Energy Profile, First sentence of Second Paragraph, Page 1, Exhibit 111) On the other hand, Oregon has been a net exporter of electricity every year since 2007. (Oregon Energy Profile, Last Sentence, Page 1, Exhibit 112) Oregon is already making a significant contribution to assisting other states in obtaining renewable energy (EIA State Energy Data System "Oregon Energy Consumption Estimates, 2020" Last Item on Table Net Interstate Flow of Electricity Exhibit 113) Building a transmission line to allow Idaho Power to purchase energy from Oregon will increase competition and cost of energy for Oregon customers and place pressure on Oregon to develop even more renewable energy developments beyond those necessary to meet the needs of Oregon citizens. Relying on energy produced in Oregon is not a reasonable or long term method of addressing Idaho Power's energy needs when there are significant untapped opportunities for in state generation which would provide energy near where it is needed and where the availability of the needed energy can be reliably predicted.

Question: Does Oregon need energy transported to the state on the Boardman to Hemingway Transmission Line during times when local generation is not adequate to meet a short term need? "OAR 860-025-0035(l)(d)

No. Oregon generates an adequate supply of electricity to meet current as well

as future increased needs, and are exporting electricity which could meet future needs without having to build additional energy developments. Oregon's excess power goes to other states by way of the Western Interconnection which is already in place. The Western Interconnection links Oregon's electricity grid to the California grid allowing large interstate electricity transfers between the Pacific Northwest and the Southwest. This Pacific Intertie Direct Current transmission line can move up to 3,220 megawatts of power. While this line was originally intended to move energy south, it is also available and is sometimes used at night and in the winter to meet heating needs in the Pacific Northwest.

(Oregon Energy Profile, February 17, 2022 , First Paragraph, Page 2, Exhibit 112)

Given this seldom used, but available resource for electricity to meet the needs of Oregon Citizens, there is no basis for stating that the Boardman to Hemingway Transmission Line is going to provide a benefit to Oregon consumers by providing electricity from Idaho during these brief times of increased need beyond what is being locally generated. This is even more ridiculous given that Idaho is not producing the electricity, but instead is only acting as a transporter of energy that could be obtained from the already existing Pacific Intertie.

Question: Do you believe that approving a Certificate of Public Convenience will result in creating a disincentive for Idaho to develop local renewable energy

sources and increase the use of Conservation to address need? OAR 860-025-0035(l)(a) and (d)

Yes. It is in the public interest to minimize impacts to land and resources necessary to provide adequate reliable electric service at the least cost. Providing a Certificate of Public Convenience will allow Idaho Power to continue their dependence upon energy that must be moved hundreds of miles at significant costs and line loss. As noted by BPA earlier, the energy being purchased will not necessarily be available when needed and the costs may be unpredictable. It will also support a lackluster support for rooftop solar and conservation since rooftop solar alone could provide 26.4% of the electricity used in Idaho (Solar Power in Idaho Wikipedia, Exhibit 113) . Reliance upon resources outside the state in the long run will result in increased costs to both Oregon and Idaho Consumers and remove Idaho Power from having any control over the cost or access to energy for their customers. Immediate damages and costs will fall nearly entirely upon Oregon landowners and citizens who are facing the loss of private property through condemnation to build an “energy freeway” that will be inflationary and establish an Energy Corridor through important resource areas.

Question: Do you believe that approval of this Certificate will result in additional losses of income and land to Oregon citizens and the state?

Yes. Once a utility corridor is created, it provides access for additional utilities to widen the corridor removing additional land. In addition, the demand to meet out of state energy needs will spur additional energy development that is not needed to meet Oregon customer needs but will further damage Oregon landowners and reduce the states agricultural and forest lands. OAR 860-025-0035(l)(d)

Question: Will it require the generation of more power due to transmitting power long distances over this transmission line as opposed to developing power near where it will be used? OAR 860-025-0035(l)(a) and (d)

Yes. Energy transported for long distances loses capacity and the further it is moved, the greater the loss. The amount of energy that Idaho Power would be required to purchase to meet their projected future need by transporting it on this transmission line compared to local generation would be inflated due to line loss.

Question: Would locally produced power cost less to deliver to Idaho Power customers than that purchased and transported from Oregon on the B2H line? OAR 860-025-0035(l)(d), OAR 860-02-0035(2)(k)(A)

Yes. For example, Idaho Power has a 20 year Purchase Agreement with Jackpot Holdings to purchase solar power from their Idaho solar development for 2.175

cents per kWh.(Renew Economy/ Clean Energy News and Analysis, April 2, 2019 by Joshua S. Hill Exhibit 114) According to Idaho Power's web site, this is more reasonable than any other solar power they are using.

Idaho Power's web site, first line says (Exhibit 115 states, "The declining cost of solar technology, along with tax incentives and other factors, has made solar power more popular in recent years". The declining cost of building solar developments including the benefit of avoiding costs of transporting the energy make it a very practical, low cost and with battery backup, dependable alternative. A1 Solarstore placed Idaho as Number 16 in the list of states regarding the solar potential (Exhibit 116) . In spite of this, the only solar produced in Idaho that Idaho Power currently is using is 120 MW from Jackpot and the solar they are required by the Public Utility Regulatory Policies Act (PURPA) to buy. Idaho Power needs to look to the state where most of their customers live to develop electricity for them.

Similar results for the development of wind energy in Idaho can be obtained from their web site. The company owns one small wind farm, Telocaset in far Eastern Oregon near their Oregon customers. The only other wind power they use is from small developments that they are required by PURPA to purchase energy from. Their web site states that the energy from the Telocaset Wind

development is the cheapest they receive. According to the August 31, 2021 article “See how much of its wind energy potential Idaho Uses” by Edward Bruns/Shutterstock, Stacker, Middle of Page 1 Exhibit 117), Idaho currently produces 973 megawatts of wind energy but has the capacity of producing 212,830 megawatts of wind energy. It appears that Idaho Power is exerting little or no effort directed toward building renewable wind energy resources in Idaho. It appears that Idaho Power is not, in fact, an energy company at all. Their only interest in or contribution to providing energy to customers is a desire to obtain the guaranteed profits obtained by building electricity highways and charging the people who actually produce electricity and their customers for using these energy highways. Idaho Power customers and Oregon citizens are being forced to pay for this transmission line as well as the significant profit that Idaho Power receives and distributes to their stockholders.

Question: Will this transmission line result in safety and health damages to Oregon citizens? (OAR 860-025-0035(l)(b))

Yes. For example, the developer has not completed an assessment of health and safety impacts to the residents who will be exposed to noise, even though Oregon Noise Statutes require this. The BLM preferred route through Union County was rejected by Idaho Power, but appears to result in fewer citizens living in areas

where noise exceedances are predicted to occur. For multiple locations along the planned transmission line route noise level will exceed the state Noise limits contained in the state "Ambient Degradation Standard". Please note that this, along with all my comments are not related to my personal situation, but rather the impacts to the public at large. While the developer is making efforts to personalize the issues, that should not occur until or unless they file an action against me for eminent domain. I am involved in this action due to the impacts to all Oregon landowners who may end up having to address an action asking for Eminent Domain due to the issuance of a Certificate of Public Convenience. I reference myself, along with others as examples of the kinds of impacts that will result should the Certificate be given and the developer use it to require unwilling landowners to be subjected to the negative impacts that will result from the development. I have used myself as an example of the kinds of preexisting health conditions which the developer should have identified for all those living where the State Noise limits will be exceeded prior to making the request for this certificate. I strongly believe that the intrusive requests that Idaho Power is making for information that is not necessary in establishing how any individual may be impacted by the transmission line are an attempt to discourage my willingness to represent the interests of those who will be impacted by the

transmission line should a Certificate of Public Convenience be issued. The only way these requests would be legitimate would be if the Council were to require Idaho Power to obtain a similar level of information regarding the health of all citizens who will be exposed to noise exceeding the state standards.

I am one of an undetermined number of citizens residing in at least 41 residences where the noise limits are projected to exceed the legal limits. I suffer from tinnitus resulting from my previous employment with the railroad. This condition is exacerbated due to the fact that I also have insomnia. Both these conditions can be verified by my medical providers and that is all that Idaho Power should be asking for regarding these issues to establish the fact that mitigation should occur to address the impacts their development will have on the health of all those exposed to noise exceedances. In the event that the Hearings Officer or Commissioners require proof, I will make it available to them and the hearings officer. The decision that is before the commissioners is not whether or not I have these medical conditions. It is whether or not Idaho Power is obligated to determine the health and safety impacts the transmission line will have on all citizens who will be exposed to corona noise as a result of their development. The corona noise predicted to occur at my home will make my residence uninhabitable for me and it may also have that result for others. Idaho Power has

shown that for Union County the average number of days with foul weather which produces corona noise is 22%, as shown on Table X-8, Page X-26 in the Application for Site Certificate, Page 30, Exhibit 118) given the % of days that historically have weather which creates corona noise, the noise at my own home is projected to exceed the DEQ safe noise standard during part of approximately 80 days each year based upon weather predictions.. (Application for Site Certificate, Table X-8 entitled "Daily and Hourly Frequency of Foul Weather) Exhibit 118

My medical records document that my current medical conditions make me particularly sensitive to noise. A lack of sleep can make my tinnitus worse and I am to be "cautious about additional exposure to loud noise, as additional damage to the inner ear may aggravate my tinnitus." I also developed high blood pressure due to the stress that has occurred over the years with the threat of losing my home. I developed heart issues which necessitated me wearing a heart monitor for a period of time during the EFSC Contested Case Process.

Regarding the importance of this issue to the decision regarding the issuance of a Certificate of Public Convenience: It is well documented that elevated noise levels can create a variety of health concerns for individuals (Strategic Health Impact Assessment on Wind Energy Development in Oregon, March 2013, Public Health

Division, Oregon Health Authority, March 2013, Prepared by the Public Health Division, Oregon Health Authority includes Section B on Noise. Exhibit 119) This section provides general information regarding the impacts of noise. It states, “This section begins with an overview of sound and noise, the impacts of noise on human health, and methods to measure and assess community noise.” On Page 25 it states that noise from a lineal object (such as a transmission line) appear to have lower rates of decrease (attenuation) because of the contribution of sound from multiple sources. On Page 28 of this document it indicates that there are three broad categories of health effects from exposure to noise. a. Subjective effects such as annoyance which can mean a significant degradation in the quality of life; b. Sleep, communication and concentration impacts; c. physiological effects such as anxiety, hearing loss and tinnitus. For individuals who already have underlying health issues, the addition of the corona noise will clearly exacerbate existing hearing, tinnitus, sleep and anxiety issues. It appears this developer has made no effort to determine the current health issues of those who will be exposed to noise from this line.

A related issue is that it appears the developer has failed to determine the number of homes and individuals subjected to noise beyond the standards for the Morgan Lake route compared to the BLM Preferred route and whether the people have

preexisting conditions, are either elderly or young since that would increase their sensitivity to noise from the development. It appears to me that there would be far fewer homes exposed. Additional documentation regarding the seriousness of the health impacts being allowed by Idaho Power is included in the "World Health Organization" manual. It recommends that the nighttime noise level be below 40 Decibels.

Question: Will the lack of providing for a safe and healthy environment free from noise above the DEQ standards result in future costs to the Developer not currently budgeted for? (OAR 860-025-0035(I)(d))

Yes. All residences who experience noise above the Oregon Ambient Degradation Standard have the right to pursue civil action against the developer in the County in which they live. They are able to request a jury trial to establish damages. I intend to pursue this future action should I be subject to a condemnation process. I understand there are others who will also be taking this action. I do not believe the costs of future litigation and resulting monetary rewards are being budgeted for by Idaho Power.

Question: Are there other safety and health concerns you have regarding this transmission line? OAR 860-025-0035(I)(B) and OAR 860-025-030(2)(I)

Yes. The developer is not proposing timely monitoring that will assure that safety

issues related to the exposure to energized lines, equipment or metal objects will not critically harm those working or moving around or under transmission lines during the life of the project. Idaho Power is treating this as a responsibility of the landowner who no longer controls the land containing the transmission line. They appear to believe that by providing information regarding the risks to the landowner they have taken care of their responsibility to protect the safety of those at risk due to their development. In considering the issuance of a Certificate of Public Convenience, the PUC should require ongoing monitoring of the transmission line to assure the transmission line is not creating energized items which create safety hazards.

Question: Is that all the safety and health concerns you have?

No. I live in an area that is designated as having an extreme risk of fire. Table 6 of the Wildland-Urban Interface Ranking Summary Page 37 Exhibit 120) shows the Morgan Lake area where I live as having a score of 37 which is it is the highest risk for fire in Union County. Also, The (Union County Environmental and Societal Risk Assessment Exhibit 121) states that the Union County wildfire risk score is high. There is only one road to access or leave my home which parallels the transmission line. The developer is not providing location specific fire management programs that address the high fire hazard areas that exist along

the transmission line route and, in fact, claims that there are no high risk areas along the entire transmission line. The Boardman to Hemingway transmission line will create a significant risk to me and others in high risk areas being crossed by this transmission line without providing methods to address this safety risk. They are planning to rely on existing volunteer fire departments which lack the equipment and manpower to address fires along this development without leaving the communities that support them at risk. Firefighters will be required to travel significant distances often over difficult terrain to the locations of much of the transmission line right of way make response times excessive. Oregon, like other states, is deficient in resources and rely on a shrinking and aging pool of firefighters. Firefighters are needed to respond to fires, as well as medical emergencies. Comments provided during the Energy Facility Siting Process from counties lodged concerns regarding the inadequacy of local firefighting resources, many of which are manned by volunteers, to deal with the increased fire risk associated with this development. There were specific requests regarding the need for equipment and funding for manpower to address this risk. These comments and requests are not being met and the firefighting plan has no provision for this need. (Why there is a Volunteer Firefighter Shortage

<https://www.fireandemfund.com/oin-now/>)

Question: Are Oregon citizens and landowners going to be adequately compensated for impacts of the transmission line and allowing the transmission line to cross their property? OAR 860-025-0030(2)(k)(E)

No. Idaho Power is not planning to provide compensation to Oregon citizens and landowners given the significance and duration of the impacts they will have on Oregon landowners and citizens. Example One: for the Morgan Lake Alternative, Idaho Power is claiming that the \$100,00 payment (\$1,000 per year for the life of the line) is providing mitigation for the impacts to Morgan Lake Park.) (ODOE - Proposed Order on ASC and Attachments 2019-07-02, Page 250 of 10016) This amount is not only ridiculous in relation to the scenic values it claims it covers, but it also fails to provide any mitigation for the recreational or habitat impacts to the park including Twin Lake which is discussed in the Jan 3, 2023 Article by Karen Antell entitled “Protect This Place: Oregon's Twin Lake”

<https://therevelator.or/author/Kantell/> (Exhibit 122) “Idaho Power Responses to comments and Request for additional information on the ApASC from Union County, Page 124 to 126 (Exhibit 123) Idaho Power, lists in their Response to Comments from Union County the fact that the County stated concern regarding the failure of the developer to address Morgan Lake impacts regarding it's value as a Recreation area. This section also documents the fact that Morgan Lake and

Twin Lake included in the Morgan Lake City Park are also of significant value to the greater county and mitigation provided to the City fails to address the damages experienced by additional users who, like myself, do not live within the City Limits of La Grande.

--Example Two: My land is designated as A-4 which in the Union County Ordinance (Union County Zoning, Petitioning and Subdivision Ordinance {UZPSO} Article 5, 5.01 Purpose) is defined as "Forest Land". My land is "Forest Land" that is available for Agricultural use, my Property Tax statements show in error that my land is "Farm Use/ EFU/Vacant and "Farm Use/EFU/Improved". State LCDC rules and Court decisions require Forest land to be determined based upon the soil capacity to produce timber. You must consider how many square feet of timber an acre of soil is capable of producing in one year. The rules specify that all land in combined zones must have a determination regarding soil productivity (capacity) based upon specific resources including the NRCS Soil Conservation Services soil maps. (See the Amended Opening Brief submitted to the Oregon Supreme Court by Irene Gilbert which was not submitted timely and thus was not heard (Exhibit 124)determined to not be timely; sworn statement of Scott Hartell obtained during the EFSC Contested Case process (Exhibit 125) and the Table of Soil Values (Exhibit 126) which Mr. Hartell states in his sworn statement was the

only resource used to determine soil capacity and which contains no soil rating for the soils in the A-4 area being called Agricultural or Range Land.) Based upon their faulty decision regarding what land in Union County is “forest land” by definition, Idaho Power claims they will only impact 525.2 acres of forest land in the Morgan Lake Alternative (Page 195 of Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 27, 2022).

Idaho Power placed a value on the 530 acres of forest land they claim they would cross as a total of \$97,000 or \$182 per acre. The Oregon Department of Energy recalculated the value and determined that forest land had a value of \$401 per acre per year of economic loss and the value over the 100 year life of the transmission line would be \$21.3 million dollars for the loss of 530 acres of forest land. There is a similar disparity in the establishment of value of the forest land in Umatilla County. The council is considering the \$21.3 million dollar amount as mitigation provided to owners of forest land even though Idaho Power is not being required to pay it, and in fact, they are not paying it. Rather than pay property owners based upon the values identified above, Idaho Power is offering ridiculously low values for the use of the transmission right of way. One property owner has calculated the amount of land he will lose at 12 acres which according to the value over the 100 year period would mean the payment should be near

\$481,200 for the loss of potential timber production alone. Idaho Power has offered him \$40,000 for the right of way across his land.

The point is, Idaho Power is offering Oregon Landowners a fraction of the lost value of the land over the life of this transmission line. Most of these landowners do not have attorneys representing their interests, they have never dealt with right of way payments and many believe that they must accept what they are offered. Providing Idaho Power with a Certificate of Public Convenience allows Idaho Power to threaten these vulnerable landowners by saying they must either accept their offer or they will condemn the land. This is taken as a threat by most people and they are afraid to refuse the offer.

Like most landowners in Eastern Oregon, I rely upon my land to provide me with a home, income, and provide for my retirement. My monetary resource is my land and I believe I will lose close to 12 acres. Idaho Power is claiming it is Agricultural land absent the required soil evaluation and absent using the definition in the Union County Zoning, Petitioning and Subdivision Ordinance which states all land in the A-4 zone as "Forest Land. Forest land can be used for a variety of uses including Agriculture, Wildlife, Timber. UCZPSO Section 5 states: The purpose of the Timber-Grazing Zone (A-4) is to protect and maintain **forest lands** for agriculture, grazing, and forest use, consistent with existing and future needs for

agricultural and forest products. The A-4 Zone has been applied to lands designated as Timber-Grazing in the Land Use Plan. “ In spite of the definition contained in the county code, the LCDC rules and statues, and multiple court decisions, Pages 23-31 (Exhibit 123) that the definition of Forest Land is based upon the ability of the soil to produce timber by determining the cubic feet of timber per acre per year that the soil could produce, the Union County Planner allowed Idaho Power to call over 50% of the land in the A-4 designation Agricultural Land. (Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 27, 2022, Table LU-5, Page 196.) By calling my land Agricultural Land, the developer is able to avoid having it evaluated as a conditional use which requires consideration of the resources and lack of fire protection that is mandated for forest land. It also means that there will be no mitigation required to compensate for the habitat damages.

Question: Do you believe that having a transmission line crossing your land will reduce the value of all your land?

Yes. The Appraisal Group One completed an extensive review and compilation of the impacts of transmission lines on real estate values. While some studies found there were no measurable effects, there are a number of recent studies that

indicate the effect is measurable and ranges from a loss of 10% to over 30% of the overall property value. (Valuation Guidelines for Properties with Electric Transmission Lines” by Kurt C. Kielisch, ASA, IFAS, SR/WA, R/W-AC) Exhibit 126 (Paramount Property Analysts, Transmission Lines and Property Value, July 14, 2016) Exhibit 127.

Question: Has Idaho Power disclosed a need and budget for the development that appears to be at all accurate?

No. Idaho Power has only submitted information regarding a need for 25% of the transmission line which includes moving energy out of Oregon to sell on a wholesale basis to out of state customers. They also include an inaccurate statement that the transmission line is needed to move energy from Idaho to Oregon when production of in-state electricity is not meeting Oregon's need.

They are now saying they will absorb the costs and use of 50% of the development of the Boardman to Hemingway line with no supporting justification for this need or cost. They are claiming that they can sell part of their share to some other unknown utility in their Non-Binding agreement. That means three things: 1. No one is stepping forward to commit to this cost and use of the transmission line; 2. That virtually any customer who uses electricity may be paying for this transmission line without knowledge of the impact it will have on

their rates and absent any opportunity to object to this line; and 3) Oregon electricity users can be expected to be forced to pay increased costs to compensate for the costs of between 50% and 75% of this transmission line either directly or indirectly with minimal or no benefit from it. The Oregon Public Utility Commission should be considering all Oregon electricity customers as subject to cost increases of an undetermined amount based upon the lack of a realistic budget associated with the construction of the utility line and deny the Certificate of Public Convenience due to the cost and lack of benefits to Oregon citizens.

Question: Has the developer met the requirements of OAR 860-025-0040 for issuance of a site certificate based upon the Energy Facility Siting Council making a determination that the development complies with LCDC statutes and rules?

No. The site certificate was issued prior to the developer completing the Plans required to document eligibility under the rules. Until the plans required to show compliance with LCDC including such items as Fire Protection, Habitat Mitigation, Weed Management, Agricultural Management Plan, Forest Management Plan have been finalized, there is no documentation that the development meets the LCDC goal requirements. **This concern is heightened due to the fact that according to Attachment K-1, Page 37 of the application for this transmission line, Idaho Power is required to provide a copy of the Agricultural Mitigation**

Plan to any agricultural landowner or landowner designee prior to obtaining a Right of Way.

Question: Do you know what the actual impacts will be to Oregon and to your property?

No. Idaho Power has not finalized their planned route so no one can tell where they may be impacted. The developer has already submitted an Amendment to add land to the development in all of the counties being crossed which was not included in the site when the transmission line boundary was approved.

(Amendment 1 to Site Certificate). This includes adding access roads and changing the transmission line route. **There is no way to tell what area is actually going to be covered by a Certificate of Public Convenience at this time.**

It is clear that Idaho Power has not provided the information required by ORS 758.015 and OAR 860-025-0035 related to developing this line in Oregon. The purpose of the line is intended to benefit Idaho Power, Idaho Utility users and unknown other out of state purchasers of energy produced in Oregon. The developer has not provided justification for the need for the transmission line based upon Idaho Power's submissions to the Public Utility Commission which only attempted to justify 25% of the costs and need for the line when in fact, they are now stating they will have ownership of 50%. No other group has filed

Integrated Resource Plans documenting a need for 50% or the capacity of the line.

The PUC staff have gone on record stating that the proposal, including the transmission line; is basically equal to other plans. Some of those plans do not include the transmission line and would avoid the damages and costs to me, other landowners and utility users in Oregon.

Idaho Power has not provided information regarding the ability of existing transmission lines to carry the energy they indicate they need through hardening of existing lines and establishing the true capacity of the lines based upon FERC requirements that renewable energy developments be required to provide a consistent amount of electricity being placed on transmission lines. This necessitates the use of battery backup and other methods to remove the need to reserve line capacity adequate to accommodate the radical changes in energy being placed on existing transmission lines.

The cost figures being provided by Idaho Power are not believable. The costs of every item and employee being used to construct this transmission line have experienced significant increases since 2016. See example for the increased cost of asphalt and cement (Exhibit 128) Idaho Power claims their costs have not increased. This can only be seen as a manipulation of figures to hide the true cost of this transmission line to make it appear to be a reasonable alternative to not

building it. According to the Bureau of Labor Statistics, consumer prices are 1.24 times as high in 2022 as they were in 2016. The inflation rate currently is 7.11% which if it continues, will make the projections even more ridiculous. This developer needs to document what items they considered in their 2016 budget, which of those items continue to be in their budget, or have been removed, what the current costs would be, and project what the costs will be by the time construction actually occurs. What will be shown is that the costs of this transmission line will increase while the costs of locally generated wind and solar energy is decreasing making this project increasingly unjustifiable over even a few years.

I would like to incorporate all my prior comments to Energy Facility Siting Council and the Public Utilities Commission, as well as Kerry Stanley's Noise Study document and testimony.

Due to the need to submit this testimony timely, I am not going to repeat the information that has been submitted by Irene Gilbert in her Comments, Susan Geer, STOP B2H, Susan Fouty, or others who's comments and exhibits support my concerns as listed above. I am incorporating their comments by reference.

At this time I do not have commitments from expert witnesses therefore, I would like to reserve the right to submit this witness testimony prior to the Evidentiary

Hearing.

In order to comply with the procedural schedule, I am testifying to the best of my knowledge at this time. I reserve the right to add additional evidence as I learn more from the data requests or discovery period, up and until the evidentiary record is closed by the ALJ.

I would also request to reserve the right to be represented by an attorney.

I hereby declare that the above statements are true to the best of my knowledge and belief, and I understand that they are made for use as evidence in administrative and court proceedings and are subject to penalty for perjury.

Dated this 1st day of February, 2023.

/s/Greg Larkin

Greg Larkin

CERTIFICATE OF MAILING

On February 1, 2023, I certify that I filed the above Opening Testimony with the Administrative Law Judge via the OPUC Filing Center, for the Docket # PCN-5, and to the following party as noted below.

/s/ Greg Larkin

Greg Larkin

Intervenor, PCN-5

By: U.S. Postal Service:
Greg Larkin
59655 Morgan Lake Road
La Grande, Oregon 97850



1995 11,irrl Str; ..t
Dak...r City, Or...mon 9781-1

August 22, 2019

Kellen Tardaewether, Senior Siting Analyst
Oregon Department of Energy
550 Capitol St. N.E., Salem
Sent via e-mail to Kellen. Tardaewether@oregon.gov

RE: Baker County Comments on the Draft Proposed Order

Ms. Tardaewether and the Energy Facility Siting Council,

These comments on the Boardman to Hemingway Transmission Line Draft Proposed Order issued May 22, 2019 are submitted on behalf of the Baker County of Conuissioners. Please accept these comments into the record for review by the Energy Facility Siting Council.

Baker County's position on the Boardman to Hemingway project remains the same: after reviewing the information submitted by the applicant and the Draft Proposed Order, Baker County continues to believe the project would not be appropriate or suitable in Baker County. The totality of the impact to our landowners, agricultural lands, resources, viewsheds, and tourism values has not been appropriately mitigated through the measures proposed. Furthenmore, Baker Cowlty will not receive a direct benefit from the project; it's analogous to allowing an interstate highway to be built through Baker County without any on or off ramps.

Raker County continues to object to this project. However, in the event the Energy Facility Siting Council were to approve this application, the following matters included in the Draft Proposed Order (DPO) require either further review or amendment, as appropriate:

Section IV Evaluation of Council Standards

- Throughout the DPO, the applicant defers a number of important plans such as weed management, emergency response, transportation, and restoration of agricultural lands to a future date that will come after obtaining a Site Certificate. The deferral of these plans makes evaluating the accuracy of the information or the impact to Baker County nearly impossible, and the sparse information provided as part of the application is insufficient for detennining compliance with the applicable standards. The DPO deals with these deferred plans by generally staling that they will be approved by the ODOE staff with

opportunity to comment by the County. The details of these plans, and Baker County objects to the premise that plans tied to satisfying a review standard can be created outside the process without coordination with the impacted entity or dispute resolution opportunity. Baker County requests that plans impacting Baker County be coordinated with Baker County, either by the applicant or through ODOE staff. If agreement cannot be reached between the applicant, Baker County and the ODOE staff, a dispute resolution process is appropriate and should be outlined prior to the final decision.

- We request that Recommended General Standard of Review 6 on page 53 line 15 under (c) be amended to add local governments be added as follows: *in compliance with all applicable permit requirements or other state agencies and local governments.*

Section IV.E. Land Use

- The Statewide Planning Goals are evaluated beginning on page 216 at line 21 and continues to page 222 at line 22. Goals 1 - 9, then 12 are discussed; Goals 10, 11, 13 and 14 are not evaluated. The proposal discusses housing stock impacts, which would fall under Goal 10; the impacts to various public services and urban communities are discussed, which would fall under Goals 11 and 14; and since this project is an energy project; energy would fall under Goal 13.
- The County setbacks set forth in BCZSO 401(8) apply to all "structures" as defined in BCZSO 108a(B). Recommended Land Use Condition 10 on page 180 attempts to require compliance with these setbacks, but does not use the term "structures." Instead, the language applies the setbacks only to "buildings" and "the fixed bases of transmission towers," on the theory that these are the only kinds of "structures" that will be built in Baker County as part of the project. That may be, but the condition should nonetheless impose the setbacks on all "structures" as defined in the BCZSO, so as to capture any other structures that may not be anticipated as part of the project at this time. Baker County requests that each of clauses a through d of Recommended Land Use Condition 10 should be changed to apply the setbacks to all "structures" as that term is defined in BCZSO 108a(B). This inconsistency was raised in Baker County's comments on the ASC dated December 14, 2018 but not collected in the DPO.
- Since some of the agricultural land restoration measures to be described in the final Agricultural Assessment expressly will take place after construction is complete, Land Use Condition 14 should be amended accordingly to require compliance with the Agricultural Assessment both during and after construction.
- On page 175-177, the criteria and evaluation of the Virtue Fial Oregon trail is discussed. The applicant notes that the resource is included in the Baker County Comprehensive Plan inventory of Historic and Cultural Sites, Structures, Districts, and proposes an intensive level survey to be consistent with the County's standard included in the BCZSO Section 412. However, the criteria in Section 412 require,

At the hearing before the Planning Commission a review will be conducted to determine:

- a. *(If the change will destroy the integrity of the resource.*
 - b. *(If the proposal can be modified to eliminate its destructive aspects.*
 - c. *If any agency or individual is willing to compensate the resource owner for the protection of the resource.*
 - d. *If the resource can be moved to another location.*
- (If, after this review, it is determined by the County) that the integrity of a significant historic/cultural structure or other to allow, allow with conditions, or disallow the proposed change.*

A survey alone, without protection measures explicitly required, does not satisfy the standard. To permit the County to meaningfully evaluate the proposed mitigation for impacts on County-designated historic resources, Historic, Cultural, and Archaeological Resources Condition 2 should be modified to require a copy of the final Historic Property Management Plan be provided to the County (and other SAGs).

- Forgive me if this is due to an oversight on my part, but through reading and a word search, I was unable to find an analysis for the Virtue Flat Mining Area (a County historical resource). This was brought forward in Baker County's comments on the ASC dated December 14, 2018, but appears not to have been corrected in the DPO.
- On page 176-177, with respect to the Flagstaff Hill Monument historic resource designated by Baker County, the DPO merely concludes "the Project will not affect the characteristics that make the monument important," but does not explain what those important characteristics are or how the Project will not affect them. This conclusory statement is insufficient for the County to evaluate whether LPC is justified in deciding to not conduct further analysis of this resource, and was brought forward in our comments on December 14, 2018 but not corrected in the DPO.
- Page 217 includes a description of the applicant's attempts to minimize impacts on agricultural operations, but the current route in the Durkee Valley does not reflect that. Baker County also reiterates its concern, originally expressed in its comment letter dated October 2, 2017, and again on December 14, 2018 that route election near Durkee overemphasized resource values on the BLM property and improperly minimized impacts to nearby private agricultural lands, thereby avoiding BLM property to the maximum extent possible. The proposed route unnecessarily bisects agricultural parcels to the detriment of the landowners despite the fact that alternative routes across those parcels with less adverse impacts are available. Baker County and IPC have reached an agreement in principle to amend the proposed route in the general vicinity of Durkee so that the route, while still on private agricultural lands, has less adverse impacts to Goal 3 values; however, as currently described in the ASC, the proposed route does not implement that agreement. Consequently, Baker County finds that the analysis in the DPO, with respect to the proposed route near Durkee is insufficient to comply with Oregon's protections afforded agricultural land under Goal 3. Additional impacts have been identified in the current proposal that would negatively impact a property owner's (Nygard) domestic water supply, which

is provided by a spring. The amended route discussed above would avoid those impacts, but the current route is likely to be largely detrimental to the landowner's spring.

Section JV.11.J. General Fish and Wildlife Habitat Mitigation Goals and Standards

- Page 282, beginning on line 23, outlines the applicant's plan to address the Fish and Wildlife Habitat standards in OAR 345-022-0060 by finalizing a weed plan currently in draft form. Baker County has a specific interest in the finalization of the weed plan for the purpose of preventing the spread of weeds across the entirety of the project in Baker County, including agricultural lands, right-of-ways, and sensitive sage grouse habitat. As you may be aware, there are serious concerns about the Sage-grouse population in the Baker PAC, and it is a matter of utmost importance to Baker County habitat degradation be prevented.

Allachment P1-5 (Draft Noxious Weed Plan) includes the statement, *"For EFSC purposes, LLC is not responsible for controlling noxious weeds that occur outside of the Project ROW or for controlling or eradicating noxious weed species that were present prior to the Project..."* This statement is contradictory to the Oregon Weed Law identified in ORS 569.390: *"Each person, firm or corporation owning or occupying land within the district shall destroy or prevent the seeding on such land of any noxious weed"*. The remainder of the statement included on page 3 of Allachment p1-5 implies that the applicant intends to comply with ORS 569, however, if an existing weed infestation is identified, it's important that spread is prevented regardless of the outcome or the applicant working with the landowner or land management agency.

The applicant has committed to managing noxious weeds consistent with ORS 569 and the Baker County Noxious Weed Management Plan. Recommended Fish and Wildlife Condition 3, in turn, obligates the applicant to obtain final ODOE approval of its Noxious Weed Plan. Again, the rationale for providing final plans to the County (and other SAGs) applies here- Baker County should have the opportunity to review the final plan to ensure it complies with the Baker County Noxious Weed Management Plan. Fish and Wildlife Condition 6 should be revised accordingly.

LLC has committed to working with the County on this matter, and the County requests this be included as a condition.

Baker County requests the following amendments to Recommended Fish and Wildlife Condition 3, or inclusion of an additional condition:

- o Assurance written into the text of the condition that the spread of existing weed infestations is prevented.
- o Baker County should have the opportunity to review the final plan to ensure it complies with the Baker County Noxious Weed Management Plan
- o A contractor with extensive knowledge of the local weeds and best methods for control is utilized by the applicant.

- o Baker County reiterates its recommendation that a condition or approval be adopted obligating IPC to provide a bond specifically to secure its weed management obligations. This bond should remain in place until 10 years after construction of the project is complete. Weed management is an ongoing obligation during project construction and operation, not just an obligation associated with retirement and decommissioning.

Section IV.J Scenic Resources

An analysis of the scenic resources in Baker County that would be impacted by the project begins on page 357. Approximately fifteen of the scenic resources evaluated are in Baker County, a number of which are significantly visually impacted. Over 70 miles of transmission line are proposed transecting Baker County, the cumulative visual impact is both large, and largely unmitigated. Baker County is known for its scenic quality, and a 500 kV transmission line will be detrimental to those qualities, which will in turn harm both the Baker County tourism industry and the scenic qualities residents enjoy. Baker County disagrees with the statement made in a number of the scenic resources evaluations that there will be impacts, but because other siting choices are not ideal, the scenic resource is not impacted. Other siting factors do not change the scenic impact, and the impacts are not appropriately mitigated.

- Regarding NHOTIC, Baker County agrees with Recommended Scenic Resources Condition 2 as partial mitigation for the visual impact to the Center, especially the proposal for the lower H-frame structures. Baker County is appreciative of the information provided in the errata documents describing the potential impacts of an underground line in the area. It's clear that the impact to landowners would be unacceptable along the proposed route in proximity to the NHOTIC, and the visual impacts would still be significant.

Scenic Resources Condition 2: During construction, to avoid significant adverse impacts to the scenic resources at the National Historic Oregon Trail Interpretative Center, the certificate holder shall construct the facility using tower structures that meet the following criteria between approximately Milepost 145.1 and Milepost 146.6:

a. H-frames;

b. Tower height no greater than 130 feet; and

c. Weathered steel (or an equivalent coating).

Additionally, the certificate holder shall construct the facility using tower structures that meet the following criteria between approximately Milepost 146.6 and Milepost 146.7:

a. H-frames;

b. Tower height no greater than 15 feet; and

c. Weathered steel (or an equivalent coating).

IV.M Public Services

- The listing of fire departments found in Table PS-9 on pages 505 and 506 does not list the Huntington Fire Department, however, it appears the project will be within their response area. Page 193 line 11 notes that a multi-use yard will be within the City of Huntington, other project components appear to be in close proximity. This concern was brought forward in comments submitted on December 14, 2018 but has not been corrected in the DPO.
- Baker County reiterates its concerns expressed in prior comments that the ASC provides insufficient mitigation for fire risk and medical emergencies. With respect to fire, much of the land in Baker County has minimal fire protection available.
- Lines 2-8 on page 508 state that lands that are not within a fire district will be covered by mutual aid. While that may be true under ideal circumstances, in areas outside of a fire district or association, there is no guarantee of fire response. Mutual aid agreements as used in this context are between two fire response organizations who have like resources to 'trade', they are not made to cover lands that don't fall within any jurisdiction's response territory. The assumptions made in the ASC are therefore not accurate, and cannot be utilized to demonstrate compliance with the public services standard because they do not accurately account for the project's impact or the reality of fire response in the project area. Baker County disagrees with the statement that the project will not have significant impacts on fire protection services. The DPO describes precisely why the fire protection impact is significant - most construction will occur during hot and dry weather, when fire risk is highest, in grassland and shrub-dominated landscapes particularly vulnerable to fire. Project construction involves many potential fire-inducing activities including use of motorized vehicles and equipment, welding, refueling and smoking. As we know from the last few summers, fire risk is already elevated in eastern Oregon even without introducing increased fire hazards into remote areas. Given the high fire risk and the minimal available public services, IPC needs a more robust Fire Prevention and Suppression Plan. IPC needs to be required to provide meaningful mitigation for the impact, such as a full complement of fire protection equipment and trained firefighting personnel on site during construction, as well as an emergency plan coordinated with the County Emergency Management staff. This plan must be coordinated with the County and fire response agencies. IPC has committed to working with the County on this matter, and the County requests this be included as a condition.
- Lines 35-36 on page 508 identify calling the nearest fire response agency as part of the protocol for responding to a fire start. Baker County requests this language be updated to state that fire starts will be reported to the appropriate fire dispatch center, the numbers for which will be included in an emergency response plan all onsite project managers carry a copy of at all times, or by calling 911.
- Page 511 lines 9-14 discuss a hazard brought to the applicant's attention about fighting fire near energized power lines, and a statement is included that the applicant will provide firefighting agencies contact information for their dispatch center. Baker County requests this element be explicitly included as a part of the conditions of approval so it is not overlooked.

- Recommended Public Service Condition 5 requires coordination with each County's Planning Department, but the Planning Department is not a representative of fire response agencies. Replacing this language with just "County and impacted fire response agencies" will allow for the appropriate review to take place.
- With regard to medical emergencies, response times to some portions of the project route can exceed one hour, which could then be followed by long travel to a hospital in Baker City, La Grande, Ontario or even Boise depending on the event. To improve response time, IPC should be required to develop a specific Medical Response Plan and have all on-site project managers carry a copy of the plan at all times. The plan should specifically require advance notice to ambulance and life-flight services of active construction locations, and should pre-identify life-flight landing locations near the work zone. If predicted response times are likely to adversely impact an ambulance service provider's ability to provide services, and it's reasonable to believe having an ambulance committed to a call for multiple hours will, IPC is required to mitigate the impact. This plan must be coordinated with the County and medical response providers. IPC has committed to working with the County on this matter, and the County requests this be included as a condition.

If you have any questions or would like further information on Baker County's comments, please contact me by calling 541-523-8219 or by e-mail at hkerns@bakercounty.org.

Sincerely,



Holly Kerns
Planning Director



Oregon

Kate Brown, Governor



550 Capitol St. N.E., 1st Floor
Salem, OR 97301-3737
Phone: (503) 378-4040
Toll Free: 1-800-221-8035
FAX: (503) 373-7806
www.Oregon.gov/ENERGY

TO: Kellen Tardaewether
Oregon Department of Energy
550 Capitol St N.E., 1st Floor
Salem, OR 97301

FROM: Tom Davis, District 14 Operations Coordinator
Oregon Department of Transportation
1390 SE 1st Avenue
Ontario, OR 97914
(541) 823-4017
Thomas.j.davis@odot.state.or.us

DATE: November 23, 2018

RE: Oregon Department of Transportation Agency Report on the Application for Site Certificate for the Boardman to Hemingway Transmission Line

General Comments: In reviewing the previous documents letters were sent out on March 5, 2015 and again on August 31, 2017 these letters are still relevant.

The Oregon Department of Transportation (ODOT) has the responsibility to preserve the operational safety, integrity, and function of state highway facilities. ODOT must also ensure that improvements to the highway system can be accomplished without undue impacts to or damage to utilities within the highway right-of-way. The Department understands that the proposed Boardman to Hemmingway Transmission Line project could or will interface with state highways by crossing the highway, occupying state highway right of way, running parallel to the highway within the right-of-way, or running parallel to the highway just outside of the right-of-way.

Construction that may impact the State right-of-way is subject to Oregon Revised Statute (ORS) 374.305 under which no person, firm or corporation may place, build or construct on any State highway right-of-way, any approach road, structure, pipeline, ditch, cable or wire, or any other facility, thing or appurtenance without first obtaining written permission from ODOT. Idaho Power must also meet the requirements in Oregon Administrative Rule (OAR) 734 Division 051 & 055. Idaho Power is required to consult with ODOT Region 5 to ensure that construction plans reflect stipulations and other requirements therein related to construction and future maintenance.

Generally, concern exists where the proposed location of the facility occupies crosses or connects to state rights of way; or is adjacent to a current or future mining operation on lands owned or controlled by the Agency. ODOT will work with Idaho Power to develop plans and specifications that meet Agency standards for design, construction and maintenance. No work or construction access will be permitted within the 1-84 right of way, but both are generally permitted, with restrictions at all other locations. Permits will be issued by the District office where the impact and work will occur.

Coordination with other utilities will be the responsibility of Idaho Power. ODOT District offices can be of assistance by providing information on current permitted utilities within its right of way.

ODOT's Tourism and Scenic Byway Program Manager, Sandra Hikari asked that we add comments to the Site Certification process about the BH2 project overlapping with or being in the vicinity of four Oregon's Scenic Byways and the impacts to where these byways could lose the designation with the loss of some of these intrinsic values. The Tourism and Scenic Byway Program works closely with and rely on local proponents, namely the Eastern Oregon Visitor's Association (EOVA) to support the individual scenic byways. EOVA has participated in early discussions and hearings on the project but has felt their participation has fallen on deaf ears. The sections that will have a visual or crossing impact are listed in the comment table referencing Attachment C-2.

In Attachment C-2 Proposed Route Location Maps ODOT Geology Unit has reviewed the proposed route and has previously voiced their concerns about material site conflicts with the proposed route. This would be a burden to the agency and add additional cost for future rock productions. These were addressed in our previous reviews and responses but have not been incorporated with the proposed Site Certificate Conditions. We are now also dealing with the listed Sage Grouse habitat which will make it difficult for developing new material sites.

Specific Comments: ODOT Region 5 Geology Unit was asked to review the proposed alignment of the Boardman to Hemingway Transmission Line Route and provide feedback on the impacts to the viability of the Agency's material source network, in Region 5. This summary is in response to the public comment period associated with the "Recommended Site Certification" phase of the transmission line proposal.

A review of the maps provided at <http://www.boardmantohemingway.com/LandownerMaps.aspx> show the following conflicts with the Agency material source network:

B2H alignment goes directly through:

Pine Tree Ridge (OR-23-003-5) (BLM owned, ODOT Controlled)
Durbin Quarry (OR-01-064-5) *mentioned in previous comments
Palmer & Denham (OR-01-037-5) *mentioned in previous comments



Oregon
Kate Brown, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE Ste C
Salem, OR 97301-1266
Phone (503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org



December 6, 2018

Ms. Kellen Tardaewether
Oregon Department of Energy
550 Capitol St N.E., 1st Floor
Salem, OR 97301

RE: SHPO Case No. 08-2232

Boardman To Hemmingway Transmission Line Project (B2H)
Construct powerline from Boardman, OR to Hemmingway, ID
multiple sections, Boardman and Murphy, Morrow/ Umatilla/Union/Baker/Malheur County

Dear Ms. Tardaewether:

Oregon SHPO reviewed the HRA, Inc. Memorandum regarding EFSC Compliance Review for the project referenced above. Please find our comments below, separated by General, Built Environment, and Archaeology.

General Comments:

As a reminder, ODOE served as a concurring party for the Programmatic Agreement (PA) among BLM, USFS, USACE, Reclamation, ACHP, Oregon SHPO, Idaho SHPO, DAHP, CTUIR, NPS, IPC for the B2H undertaking. As such, much of the processes for Determinations of Eligibility (Stipulation III, A-H), Mitigation (Stipulation VII, C,2), and a Historic Properties Management Plan (Stipulation VII, A-F) included in the HRA Inc., memorandum have previously been addressed in the PA (attached). In addition, a Whereas clause included in the PA at the request of ODOE states: "Whereas, it is the position of Oregon Department of Energy (ODOE) that the execution of the PA can assist the Energy Facility Siting Council (EFSC), to which ODOE serves as technical staff, in determining whether the Undertaking complies with EFSC's Historic, Cultural and Archaeological Standard at OAR 345-022-0090 during its review of the site certificate application for the Undertaking; and ODOE is a Concurring Party to this PA".

At least one of the properties evaluated in the Memorandum is on federal land, which would require an agency determination on eligibility. As you are also aware, since this is a Section 106 undertaking, all eligibility determinations will be submitted to SHPO for concurrence by the lead federal agency (BLM).

In addition to Determinations of Eligibility, Mitigation, and the HPMP, the PA additionally addresses conditions proposed in the HRA Inc., Memorandum. Specifically, conditions 1-3 which address pre-construction methods to conduct cultural resources pedestrian surveys which have previously been defined in Stipulation II (A-G) of the PA. Conditions 4 and 5 (development and implementation of an HPMP), as mentioned above, are addressed in Stipulation VII A-F. Conditions 6 and 7 are addressed in Stipulations V A-K and VII C.5.B.

Many resources are misidentified in terms of resource type. Many are identified as "sites" that are ODOE - B2HAPPDoc13-16 ASC Reviewing Agency Comment SHPO Case No. 08-2232_Pouley 2018-12-06. Page 2 of 5



actually structures, or built linear resources, but others are well. These should be properly identified according to the National Park Service standards.

Lack of information regarding the history of a resource should never be used to recommend that a resource does not meet a significance criterion. For example, the resource "Road to Rye Valley" evaluation includes the following statements: "It is unclear who created the road. Therefore, the road does not appear to be associated with a person who played a significant role in our nation's history (Criterion B). The road has been modernized and there is no indication of what the road looked like originally. Therefore, the road no longer embodies the distinctive characteristics of an architectural style or architect or exhibit high artistic value, if it ever did (Criterion C)." No bibliographic materials are identified on the form. These indicate that further research should be done, rather than assuming that no significance exists.

As noted in the Oregon Linear Resources Guidance, irrigation delivery ditches such as that (apparently) identified as "Unnamed Water Conveyance System" (4B2H-EK-44) should be evaluated within the context of the agricultural unit to which it delivers water (usually fields associated with a ranch or farmstead), not in a vacuum. To that end, evaluations of such resources should include identification of the agricultural unit with which it is associated, and analysis of that farmstead or ranch should inform the evaluation of the irrigation system. If the ditch is actually a lateral or sub-lateral of a larger irrigation system (i.e., it delivers water to more than one farm), then the MPD that applies to those systems should guide evaluation (see comment regarding Vale Oregon Irrigation District below).

Built Environment:

Oregon SHPO does not concur with some of the recommendations of eligibility submitted. Several of the resources are identified as "unevaluated", or their eligibility is "undetermined". Our office does not leave historic, built resources that appear in project Areas of Potential Effect (APE) unevaluated, as this does not resolve the questions required by the project regulatory review process, namely, "Is the resource eligible for listing in the National Register of Historic Places (NRHP)", and "Will the project adversely affect any eligible resources?" Resources seeking consensus determinations should default to eligibility until such time as application of all four NRHP criteria for eligibility and the aspects of integrity are made. If no adverse effects are anticipated, regardless of eligibility, but eligibility is not fully explored, the resources should be left as "eligible" until non-eligibility is sufficiently supported by data and analyses.

As noted by HRA, Inc., 71863 Wilson Lane does not have a submitted evaluation form. This form must be completed and provided in order for our office to provide concurrence. In the meantime, the resource should be evaluated as "eligible".

All segments of the Oregon Trail that occur within the APE, including the Meek Cutoff, should be evaluated through the Oregon Trail Multiple Property Document, currently in draft, but expected to be finalized in the coming months.

Linear resources (canals, laterals, roads, trails, railroads, etc.) should be evaluated with reference to the Oregon Linear Resources Guidance document, available on the SHPO website. All linear resource evaluation forms should reference this document explicitly.

All Intensive Level survey documentation/evaluation forms must include a bibliography. Many do not.

All elements of the Vale Oregon Irrigation District should be evaluated according to the Multiple Property Document "Carey and Reclamation Acts Irrigation Projects in Oregon, 1901-1978", available from our website or that of the National Park Service. This MPD has been registered with the Keeper of the National Register.

The resource "Building" (B2H-MA-008) includes in the evaluation the following statement, "The resource's physical characteristics are aboveground and visible, and existing documentary sources discuss little to no significant information about the property. It therefore holds little to no potential to yield information significant to the past and therefore is recommended as not eligible under NRHP Criterion D." This statement appears to suggest that a standing building cannot be eligible under Criterion D, which is not accurate, especially with reference to vernacular architecture, which this building may represent. The fact that little information about it exists in the documentary record does not address the possibility that it could, in fact, provide important information that does not occur in the documentary record, which is in large part the point of Criterion D. While the evaluation of the building as not eligible may be adequately supported by analysis of integrity, the use of the above phrasing is not suitable. Alternatively, if no adverse effect is likely, consensus determination of "eligible" could be made at this time, with no further work required for this project.

If the abandoned irrigation ditch identified as "B2H-MA-043" has been abandoned for 75 years (under state law) or 50 years (under federal law), then the resource should be reported and recorded as an archaeological site.

Archaeology:

Statements such as "a few precontact sites were recommended not eligible due to the lack of potential for buried deposits..." suggests evaluations only considered Criterion D, and further, that important research questions can only be addressed if buried deposits exist. In the same paragraph, it states: "Clarification of the potential for buried deposits at these sites is needed to confirm that they are not eligible". Please note, evaluations must address all four criteria, whether they are archaeological sites, built structures, properties of religious and cultural significance to an Indian tribe, or traditional cultural properties. In addition, important research questions do not only address buried deposits, or intact deposits for that matter. Guidance on NRHP evaluations with examples for each criterion is in NR Bulletin 15. Regarding archaeological sites, according to NR Bulletin 16A, "the integrity of archaeological resources is generally based on the degree to which remaining evidence can provide important information. All seven qualities do not need to be present for eligibility as long as the overall sense of past time and place is evident". To meet the EFSC standard of whether an archaeological site would likely be listed in the NRHP, all four criteria must be addressed, and applied accordingly.

If you have questions about the built environment, or some general comments that relate to the built environment, please contact Jason Allen at Jason.Allen@Oregon.gov. For archaeology, or general comments that relate to archaeology, please feel free to contact me, at your convenience. Thanks.

Sincerely,



John Pouley, M.A., RPA
Assistant State Archaeologist
(503) 986-0675



UNION COUNTY

B2H Advisory Committee

Scott Hartell, Planning Director

1001 4th Street, Suite C

La Grande, OR 97850

PHONE (541)963-1014

FAX (541)963-1039

ITY 1-800-735-1232

B2H ADVISORY COMMITTEE DRAFT A G E N D A

REGULAR SESSION, October 6th, 2016 6:30 P.M. Misener Conference Room 1001 Fourth St., La Grande Oregon

- I. Call to Order**
- II. Approval of Agenda**
- ID. Approval of previous Minutes-July 28, 2016**
- IV. Staff Report & Committee Member Updates**
- V. Public Comment Period**
- VI. Old Business**
 - A. Process for considering Public Comments
 - B. Motion on B2H Costs & Electricity rates impacts (tabled)
 - C. Commissioners August 4, 2016 Letter to BLM
 - D. Follow up on two Motions sent to the County Commissioners from last meeting
 - E. Status of Final EIS
- VII. New Business**
- VIII. Public Comment Period**
- X. Set Next Meeting Date**
- XI. Adjourn**

Purpose of the Committee

1. Gather citizen concerns and comments regarding the B2H Transmission Line.
2. Develop an understanding of the evaluation criteria to be considered by BLM and ODOE.
3. Develop suggested comments based on citizen input and evaluation criteria.
4. Present suggested comments to the Board of Commissioners for potential submission to the BLM and ODOE.



UNION COUNTY B2H Advisory Committee

Scott Hartell, Planning Director

1001 4th Street, Suite C La Grande, OR 97850 PHONE (541)963-1014 FAX (541)963-1039 TTY 1-800-735-1232

Union County B2H Advisory Committee Meeting Minutes-July 28th, 2016

ATTENDANCE: Ted Taylor-Chair, Brad Allen, Terry Edvalson, Anna Baum, Irene Gilbert, Joel Goldstein, Ray Randall, George Mead, Scott Hartell & Darcy Carreiro

Members Absent: Norm Paullus

I. CALL TO ORDER:

Chairman, Ted Taylor opened the meeting at 6:29 p.m.

II. APPROVAL OF AGENDA:

The Agenda was approved as submitted by the Committee.

ID. APPROVAL OF MINUTES- June 30th meeting

George Mead made a motion to approve the minutes from June 30th 2016 as submitted. Irene Gilbert seconded the motion and the June Minutes were approved unanimously.

IV. STAFF REPORT:

Scott did not have any new information to share with the Committee.

V. COMMITTEE & ADMINISTRATIVE BUSINESS:

- A. "Consideration of topics discussed at June 30th meeting", regarding relevance to the Purpose of the Advisory Committee.
- Members had different interpretation of The Purpose and there was discussion among the Committee trying to define this. There was still confusion and need for clarification from the Commissioners of the Purpose of this Committee. Joel stated that Ted Taylor's letter in the Observer was too technical and that he wouldn't be able to understand it if he was general public. The Committee had discussion regarding each of the topics listed. The Committee voted on each topic one at a time by show of hands.

VI. COMMITTEE MEMBER UPDATES:

Irene Gilbert shared what she has been doing with the "Stop B2H Committee" as a member. Specifically she spoke regarding contacting land owners within 1 mile of the possible transmission line.

She shared that the DOE Oversight Committee will meet again August 20th and would like any comments submitted by August 15th. The EFSC is having an emergency meeting July 29th because they would like help reviewing wind energy applications.

Irene has also been trying to determine the dollar amount that Oregon rate payers will be charged with the installation of this line. ODF&W is asking for mitigation details regarding endangered species in the supplemental EIS.

Irene stated that people are asking for Hanley Jenkin's to recuse from any decision making at the EFSC level regarding B2H.

Ray worked on 2 motions that he will submit at the appropriate portion of the meeting. No other Committee members had anything to report at this time.

VII. PUBLIC COMMENT PERIOD:

VIII. OTHER COMMITTEE BUSINESS:

A. Consideration of process for review of Public Comments submitted to the Advisory Committee.

B. Ray proposed and read into record a motion (labeled as #2) to the Committee. Terry Edvalson seconded the motion. The motion passed unanimously by the B2H Advisory Committee.

Ray proposed a second motion (labeled # 1) to the Committee. George Mead seconded it. There was brief discussion. The B2H Advisory Committee voted unanimously on this motion.

Scott will notify the Board of Commissioners on August 1st asking to add these motions to their agenda for the August 3rd meeting. Ted will prepare a cover letter for the motions, sign it as Chair and submit that to the Planning Department.

C. Irene made a motion to "Request that the County Commissioners ask Bonneville Power and Idaho Power for a projection of impacts of rates to be assumed by consumers." With the recommendation of the Committee, Irene moved to table this motion until the next meeting. Ted asked that Irene place the draft motion in writing and submit it to Darcy prior to the next meeting for review of the Committee.

IX. PUBLIC COMMENT PERIOD:

Bernice Webster: Concerned with the history of her families property which would be directly affected by the placement of the line. She gave us history of her portion of land, and how the Oregon Trail goes through her land. That there is a Pioneer camp ground and natural springs that make it possible for her to rent some as pasture. Her late husband was very proud of this piece of land. He personally took hundreds of hikers on their portion of this property to see the Oregon Trail. After her husband passed away, she found a list of all of the people he took for hikes and planned to take in the future. She stated that her family continues to hike, camp and enjoy it often. The Bonneville Power line already runs through her property. Bernice thinks that we owe it to her family, county, state and nation. She thinks that this property should be preserved. She did give Idaho Power permission to survey her land and she regrets that decision now. Her property is between Morgan Lake Road and Deal Canyon Rd.

Charlie Gillis 601 N Avenue, LaGrande, OR 97850: He wants everyone to know that Idaho Power destroyed the Idaho salmon run and grossly diminished the Oregon

salmon runs significantly by the development of the fish lattice. He wants everyone to know who we are dealing with.

Irene asked Charlie about his research on FERC regarding protection. He is in contact with the Senators office librarians and is currently working on this. He is still struggling to contact an actual person at the State. He will bring any information he receives to the next meeting.

Tom Thompson: Land owner that already has the 230 route on his property up Ladd Canyon. He shares Ray's concerns that alternative routes are still on the table that we are not aware of publically. He deals with heavy equipment damage to his property when the current 230 line is serviced. He deals with noxious weed issues already. The power company has introduced forms of cheat grass and other weeds. He could lose some bunch grass sights that are in good shape in the next 10-15 years if this continues or increases. Tom would like the Glass Hill alternative to be added back into consideration. He would like the Committee to narrow the scope on 2-3 that they are considering. He asked for clarification from the Committee with the NEPA process. Terry asked if he was asked to survey Tom's property, Tom said yes. Terry asked Scott what lines are still being considered. Scott said that any line that they are studying/surveying. Scott said as a co-operating agent; there is certain information that he can release and some information that he cannot. Tom doesn't understand how a Federal group can be the "decision maker" on private land. He told Idaho Power that they couldn't survey the property.

Lois Barry, 60688 Morgan Lake Road LaGrande, OR 97850: Lois provided clarification to Terry, that she had requested information from Idaho Power for conservation statistics. She clarified that she had offered, at the last meeting, that she had submitted a request letter to Jeff at Idaho Power, he responded respectfully that they did not have time to respond to this. So she simplified her query and sent a letter to Scott as well. She then received a link that directed her to a 12 page report, 5 pages of statistics from Idaho Power. She stated that Energy Trust has a 128 page annual report, meaning, in summary, Idaho Power is doing about 1/3 of the conservation work that Energy Trust does. She encourages this Advisory Committee to review these portfolios available online. She will reach out and do more research and report back to this Committee with any information she collects. She thinks that Idaho Power is doing business the "same ole" way and other energy utilities are changing and elaborating. Terry asked if dam removal was in any of the Idaho Power portfolios. She said no there was actually mention of another dam being placed. She feels like this line does not need to be built and if it is, it will cost rate payers a significant amount of money. Lois thanked Terry for asking for citations to be attached with her bullet point letters she has submitted.

X. NEXT COMMITTEE MEETING DATE

The next regular Committee meeting will be September 22nd, 2016 at 6:30 pm in the Earl C. Misener Conference Room.

The Following items will be on the Agenda, under Committee Business for the next meeting.

XI. ADJOURN

Ted adjourned the Union County B2H Advisory Committee meeting of July 28th, 2016 at 8:48 pm.

Respectfully submitted,

Darcy Johnson Carreiro
Senior Department Specialist II

Consideration of Topics Discussed at June 30, 2016 Meeting Regarding Relevance to the Purpose of the Advisory Committee

Tabulation of Votes Taken at the July 28, 2016 Meeting of the B2H Advisory Committee

Topic	Relevant to Purpose		
	YES	NO	ABSTAIN
Request statistics on energy conservation from IPC	3	4	1
Become more familiar with content of DEIS	6	0	2
Assess appropriateness of routing any transmission line through Union County, given there is an established transmission corridor in Oregon	6	1	1
Understand protections given to landowners by federal agencies for economic and other loss	1	4	3
Develop more comprehensive ways to announce and provide information on Committee meetings	4	0	4
Request our Board of Commissioners to coordinate fully with Boards in other affected counties	5	2	1
Become familiar with City of La Grande's plans for new water storage facility, hydropower generation, and transmission of electricity into the city	4	4	0
Review Google map from IPC that shows access roads, laydown areas, and other features of the B2H line	6	1	1
Send recommendation to our Board of Commissioners requesting a Supplemental EIS be issued by BLM before the current DEIS is finalized	4	2	2
Send letters to landowners on and one mile either side of the agency proposed route to provide better notice of BLM/IPC plans and their impacts	0	2	6



UNION COUNTY
BOARD OF COMMISSIONERS

STEVE McCLURE, Commissioner
MARK D. DAVIDSON, Commissioner
JACK HOWARD, Commissioner

MAILED 8-4-16
Greg Larkin/100
Greg Larkin/104
Page 7

1106 "K" AVENUE LA GRANDE, OR 97850 PHONE (541) 963-1001 FAX (541) 963-1079 TTY 1-800-735-1232

August 4, 2016

Bureau of Land Management
Vale District Office
Attn: Don Gonzales
100 Oregon St.
Vale, OR 97918

Dear Mr. Gonzales:

Members of the Union County Advisory Committee on the Boardman to Hemingway (B2H) Transmission Line are unsure that all potential routes through Union County and their environmental impacts have been analyzed in the Draft Environmental Impact Statement (DEIS). They believe it is possible that some effects of these routes are not bounded in the analysis supporting the DEIS.

Please assure us that, even though potentially new routes could be considered, all of the environmental impacts have been included in the DEIS analysis, and therefore no supplemental analysis needs to be conducted.

Since our B2H Advisory Committee does not have cooperating agency statutes please keep this in mind when responding.

Sincerely,

Jack Howard
Chairman

L

Boardman to Hemingway (B2H) Advisory Committee
Union County Planning Department
1001 4th Street, La Grande, OR 97850
541-963-1014

An Advisory Committee to the Union County Board of Commissioners
Brad Allen, Anna Baum, Terry Edvalson, Irene Gilbert, Joel Goldstein
George Mead, Norm Paullus, Ray Randall, Ted Taylor (Chairman)

July 29, 2016

Honorable Jack Howard, Chairman
Union County Board of Commissioners
1106 K Ave.
La Grande, OR 97850

Dear Chairman Howard:

At a scheduled meeting on July 28, 2016 the Advisory Committee on the Boardman to Hemingway (B2H) Transmission Line Project approved the following Recommendation and Statement. The votes on both actions were unanimous, with eight members present and voting. Given the time sensitive nature of these matters, we request that the Board of Commissioners consider them at your next meeting.

Recommendation on Supplemental Environmental Impact Statement

We recommend that the Union County Board of Commissioners contact the Bureau of Land Management (BLM) to request that BLM initiate a Supplemental Environmental Impact Statement (EIS). This Supplemental EIS is needed because there are transmission route segments on two routes in Union County that have not yet been analyzed by the BLM through the Draft EIS (DEIS) process. It is imperative that the new segments of routes receive the same scrutiny as all other portions of the proposed B2H route. It is the only way to permit the opportunity to inform the public and allow for public response and testimony. This must be done prior to the release of the Final EIS (FEIS). We further recommend that our Board of Commissioners notify the other counties who could be impacted by B2H to inform them of this Union County action and notify our two U.S. Senators.

Statement on Work Session with Other Affected Counties

We encourage the Union County Board of Commissioners to contact the County Commissioners of Malheur, Baker, Umatilla, and Morrow counties to propose a joint work session to determine if there are mutual concerns or mutual interests that may arise from the proposed B2H transmission line.

Honorable Jack Howard, Chairman
July 29, 2016

-2-

Please contact me by phone at 541-963-9397 or 541-786-7146 or by email at jayhawkted@gmail.com if you have questions, comments, or concerns.

Sincerely,

Original signed by Ted Taylor

Ted Taylor
Chairman

Cc:
S. Burgess, Union County Administrator
S. Harten, Union County Planning Director
VD. Carreiro, Union County Planning Department (official file)
B2H Advisory Committee Members

1 NRCS soil data, and to the extent the data was not available, made conservative assumptions
2 that the land should be classified as forest land.

3
4 Based on the above-described approach, and record of consultation with Union and Umatilla
5 Planning Departments to accurately identify and account for forest zoned lands within the
6 analysis area, the Council finds that the methods are valid for assessing potential impacts to
7 forest practices.

8
9 *Potential Impacts to Accepted, and the Cost of Accepted, Farm/Forest Practices*

10
11 As presented in the ASC, the applicant identifies that accepted farm practices in forest-zoned
12 lands within Union and Umatilla counties include range and pasture uses, exclusively. Potential
13 impacts from proposed facility construction and operation to these accepted farm practices
14 include temporary and permanent disturbance, changes in land use patterns, population
15 density or growth rate, and the related effects of those changes on agriculture.

16
17 As presented in the ASC, the applicant identifies that accepted forest practices in forest-zoned
18 lands within Union and Umatilla counties include long-term forest management for sawtimber,
19 pole-sized trees, and reproduction. Potential impacts to these accepted forest practices from
20 right-of-way clearing; road construction, repair and use; and, slash abatement during proposed
21 facility construction include: increased operating risk to future timber harvesting within a tree
22 length of the proposed transmission line; loss in tree volume along the edges of the
23 transmission line corridor; increased wildlife risk; increased risk of unauthorized use of land due
24 to increased access from new roads (see Attachment K-2, Section 3.6.1). In some areas, the
25 transmission line may separate blocks of forest land, which has the potential to impact access
26 or the ability of landowners to perform forest practices. The results of this analysis identified
27 that approximately 245.6 acres and 530 acres, totaling 776 acres, of forested lands within
28 Umatilla and Union counties, respectively, could be permanently impacted by the proposed
29 facility.

30
31 Based on the removal of approximately 776 acres of land from timber harvest production, the
32 applicant quantifies the estimated harvest value to then assess potential economic impacts
33 from the proposed facility. Potential impacts to the cost of accepted forest practices is then
34 based on the economic impact of the proposed facility. The applicant identifies the following
35 facts, obtained from a 2013 report issued by the Oregon Forest Resources Institute, to support
36 the analysis:²³⁴

- 37
38
 - Union County # Forested Acres = 899,000 acres
 - Value of Forestland Economic Base = \$163,700,000
- 39

²³⁴ Based on the Department's website review, Oregon Forest Resources Institute is an educational organization created in 1991 by Oregon Legislature, to advance public understanding of forests, forest management and forest products. Available at: <https://oregonforests.org/>.

- 1 ○ Value of Economic Base = \$182/acre
- 2 ○ 530 acres lost x \$182/acre = \$97,000 lost plus or minus
- 3
- 4 • Umatilla County # Forested Acres = 715,000 acres
- 5 ○ Value of Forestland Economic Base = \$354,200,000
- 6 ○ Value of Economic Base = \$495/acre
- 7 ○ 246 acres lost x \$495/acre = \$120,000 plus or minus
- 8

9 The preliminary ASC was submitted in 2013, aligning with the reference date of the Oregon
10 Forest Resources Institute information source. However, due to the extended time interval
11 (2013 – 2020) of the ASC review, the Department was not able to locate an electronic version of
12 the referenced 2013 information source. Based on the Department’s review, electronic
13 information available from the Oregon Forest Resources Institute provides the following 2017
14 facts (see source references in footnotes):

- 15
- 16 • Union County # Forested Acres = 791,000 acres²³⁵
- 17 ○ Value of Forestland Economic Base = \$317,500,000²³⁶
- 18 ○ Value of Economic Base = \$401/acre
- 19 ○ 530 acres lost x \$401/acre = \$212,530/yr economic loss
- 20 ○ \$212,530/yr x 100 yrs = \$21.3 million economic loss, over 100 years
- 21
- 22 • Umatilla County # Forested Acres = 572,000 acres²³⁷
- 23 ○ Value of Forestland Economic Base = \$220,100,000²³⁸
- 24 ○ Value of Economic Base = \$385/acre
- 25 ○ 246 acres lost x \$385/acre = \$94,710/yr economic loss
- 26 ○ \$94,710/yr x 100 years = \$9.5 million economic loss, over 100 years
- 27

28 Based on the Department’s evaluation of Oregon Forest Resources Institute’s 2017 timber
29 harvest and economic base data by county, as presented above, potential impacts to the cost of
30 accepted forest practices from the proposed facility include an annual economic revenue loss of
31 \$212,530 and \$94,710 in Union and Umatilla counties, respectively; and, based on the 100 year
32 (or more) estimated useful life of the proposed facility, a long-term loss of \$21.3 million and
33 \$9.5 million in Union and Umatilla counties, respectively. The applicant notes that the actual
34 value of a particular landowner’s timber would be valued based on a timber appraisal
35 completed at the time of land acquisition. As further described below, in addition to the land

²³⁵ Information source available at: <https://knowyourforest.org/sites/default/files/documents/Union-state-economic-19.pdf>. Accessed April 29, 2020.

²³⁶ See Table A21, p. 101 in report available at: <http://theforestreport.org/wp-content/uploads/2019/07/OFRI-2019-Forest-Sector-Economic-Report-Web.pdf>. Accessed April 29, 2020.

²³⁷ Information source available at: <https://knowyourforest.org/sites/default/files/documents/Umatilla-state-economic-19.pdf>. Accessed April 29, 2020.

²³⁸ See Table A21, p. 101 in report available at: <http://theforestreport.org/wp-content/uploads/2019/07/OFRI-2019-Forest-Sector-Economic-Report-Web.pdf>. Accessed April 29, 2020.

1 acquisition process, which would provide compensation for the economic loss of timber harvest
2 area, the applicant proposes mitigation measures to minimize potential impacts to, and the
3 cost of, accepted forest practices.²³⁹
4

5 To evaluate the significance of the removal of land from timber harvest potential, the applicant
6 assesses the quantity of forest land lost compared to total forest land available (in acres), per
7 county, resulting in approximately 0.07 and 0.4 percent loss in Union and Umatilla counties,
8 respectively. The Department's evaluation of impact significance is presented after the
9 evaluation of applicant proposed mitigation.
10

11 *Proposed Mitigation for Potential Impacts to Accepted Forest Practices*

12

13 As presented in ASC Exhibit K Attachment K-1, the applicant proposes to finalize an Agricultural
14 Mitigation Plan, which would include measures to restore impacted agricultural lands to its
15 former condition, compensate landowners for damages and/or impacts to agricultural
16 operations caused as a result of proposed facility construction, micro-siting the towers to avoid
17 agricultural areas, instituting weed control measures, preventing soil erosion, and other
18 measures, all of which are consistent with the Council's OAR 345-001-0010(33) definition of
19 mitigation.
20

21 The applicant represents that it would implement logging best management practices, including
22 seasonal restrictions, wildlife habitat restrictions, and riparian restrictions.
23

24 Relating to seasonal restrictions, the applicant states that it may restrict the hours of operations
25 during fire season, and that it may require water trailers on site, fire watches after operations,
26 and may restrict "spark emitting operations." The applicant also represents that it may
27 implement restrictions during "freeze-thaw" conditions that could arise during the spring.
28 During a spring thaw, use of roads would cause significant damage and reconstruction cost;
29 however, the applicant represents that the duration of spring thaws are generally short.
30

31 Relating to wildlife habitat restrictions, the applicant represents that proposed Fish and Wildlife
32 Conditions adequately mitigate potential harm to fish and wildlife habitat. The Council adopts
33 these Conditions in Section IV.H *Fish and Wildlife Habitat* of this order. These conditions
34 require, in pertinent part, the restriction of ground disturbing activities within elk or mule deer
35 range between December 1 and March 31; the restriction of ground disturbing activities within
36 certain areas around nesting bird species and during specific spring months; that biological
37 surveys occur during avian migratory season, and that the applicant submit mitigation protocols
38 for approval to the Department, which describes actions that would be implemented to avoid
39 harming non-raptor bird species and their nests; that mitigation protocols be submitted if a

²³⁹ Public comments received on the record of the DPO questioned the information relied upon by the applicant to evaluate economic loss from acres removed from timber harvest production potential. B2HAPPDoc8-1 All DPO Comments Combined-Rec'd 2019-05-22 to 08-22: Molly Eekhoff, 8/21/19, 138-139; Tamson Ross, 8/22/19, 373; Carol Lauritzen, 8/14/19, 1342; Gilbert, et a.



Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

POWER SERVICES

January 9, 2023

In reply refer to: P-6

To parties interested in B2H and Southeast Idaho Load Service:


This notice announces that the Bonneville Power Administration, Idaho Power, and PacifiCorp have concluded negotiations on final agreements that memorialize and effectuate the Boardman to Hemingway, or B2H, with Transfer Service plan of service to southeast and southern Idaho loads. The proposed plan of service would deliver significant benefits for BPA and its customers, including essential congestion relief and removal of the dependence on conditional firm point-to-point service; consolidation of network integration transmission service from a single transfer service provider for all of BPA's deliveries to southeast and southern Idaho loads; and improved costs compared with today's interim service approach.

BPA now proposes to execute the contracts for the B2H with Transfer Service plan of service. Before making a final decision to execute the contracts, BPA is providing regional stakeholders with more information about the contracts and an opportunity to comment.

Attachment A includes background information, an overview of the contracts that BPA is proposing to execute for the B2H with Transfer Service plan of service, and information for how to submit comments.

We look forward to continued discussions with regional stakeholders on this important topic.

Sincerely,

 Digitally signed by KIM THOMPSON
Date: 2023.01.09 10:01:57 -08'00'

Kim Thompson
Vice President, NW Requirements Marketing

 Digitally signed by MICHELLE MANARY
Date: 2023.01.09 10:00:24 -08'00'

Michelle Manary
Vice President, Transmission Marketing

Attachments

ATTACHMENT A

Updated BPA Letter to the Region re: B2H and Southeast Idaho Load Service

I. Background

In a Letter to the Region dated January 18, 2022 (“2022 Letter”), BPA announced its signature of a non-binding term sheet (“Term Sheet”) that clarified and updated BPA’s role in Idaho Power and PacifiCorp’s potential future construction of their new transmission line from Boardman, Oregon to Hemingway, Idaho (the “Boardman to Hemingway Project” or “B2H”). The 2022 Letter provided background on the B2H negotiations, the history of BPA’s load service to the six preference customers in Idaho (“Southeast Idaho Load Service” or “SILS customers”), and challenges with the current interim plan of service to these customers’ loads. BPA explained how the proposed B2H project could provide BPA a long-term plan of service for the SILS customers that includes BPA taking network transfer service from Idaho Power (“B2H with Transfer Service”). BPA also explained the related challenges associated with BPA’s long term service to the 15 preference customers in Southern Idaho, many located near Burley, Idaho, and the benefits that the B2H with Transfer Service plan of service provides to these customers. BPA noted that Idaho Power, PacifiCorp, and BPA intended to negotiate binding contracts to memorialize and effectuate the B2H with Transfer Service plan of service. The 2022 Letter and the Term Sheet are available at [Southeast Idaho Load Service - Bonneville Power Administration \(bpa.gov\)](https://www.bpa.gov/Southeast-Idaho-Load-Service-Bonneville-Power-Administration).

BPA is pleased to share that negotiations have concluded. BPA now proposes to execute binding contracts for the B2H with Transfer Service plan of service. Before making a final decision to execute the contracts, BPA is providing regional stakeholders with more information about the contracts and an opportunity to comment. BPA is also conducting appropriate National Environmental Policy Act (“NEPA”) processes before making a final decision.

Under the B2H with Transfer Service plan of service, BPA’s role as permitting partner and potential future partial owner of the B2H project would be removed from the B2H ownership structure. BPA would transfer its B2H permitting interest share to Idaho Power in a Purchase, Sale, and Security Agreement. Idaho Power and PacifiCorp would jointly own and construct the B2H project pursuant to separate agreements between them. To serve the SILS customers’ loads, BPA would enter into a network integration transmission service agreement (“NITSA”) with Idaho Power under its Open Access Transmission Tariff (“OATT”) for service to the five SILS customers in the Goshen area and a second NITSA for service to Idaho Falls. These NITSA’s would provide BPA with a single leg of network integration transmission service (“NITS”) from Idaho Power to deliver resources from the BPA transmission system to the SILS customers’ various points of delivery.

To facilitate Idaho Power’s ability to serve the SILS customers’ loads as network loads, PacifiCorp would transfer assets to Idaho Power in an agreement between PacifiCorp and Idaho Power. This asset transfer allows the SILS customers’ loads currently served on PacifiCorp’s southeast Idaho transmission system to be served fully on Idaho Power’s transmission system. In consideration of PacifiCorp transferring assets to Idaho Power and with other stipulations, BPA would provide point-to-point (“PTP”) transmission service in central Oregon to PacifiCorp

through the redirect of existing PTP service paired with a conversion of legacy scheduling rights in central Oregon to PTP service. Additionally, BPA would provide Idaho Power with PTP service to the B2H interconnection at the proposed BPA Longhorn substation near Boardman, Oregon. PacifiCorp and Idaho Power would take and pay for the PTP services pursuant to BPA's OATT and rate schedules. BPA would also enter into contracts with Idaho Power and PacifiCorp associated with the B2H interconnection at the proposed BPA Longhorn substation.

For BPA, the construction of B2H by Idaho Power and PacifiCorp in conjunction with the transfer of assets between Idaho Power and PacifiCorp means that BPA would receive firm network transmission service for its SILS customer loads using only one wheel of transmission beyond the BPA transmission system (as opposed to two wheels, which is part of the current interim plan of service). By stepping out of the B2H ownership structure, BPA also avoids the complexity and foregone revenue of other previously considered plans of service.

This letter announces the final terms of the B2H with Transfer Service plan of service. Section II describes the agreements that BPA proposes to execute. Section III provides an explanation of BPA's business case for this plan of service, including the quantitative and qualitative benefits. Key benefits include elimination of today's reliance on conditional firm PTP service for deliveries of BPA resources to the SILS customers' loads, migration of SILS customer loads to firm network transmission service, financial benefits of having a single wheel of transmission for service to the SILS customer and incremental revenues from new PTP sales, congestion relief that benefits BPA's deliveries for all Southern and Southeast Idaho customers, and eliminating today's interim service's reliance on market purchases that carry cost, availability, and carbon-content risks.

Finally, this letter initiates the start of a public comment period that will conclude on February 9, 2023. Section IV provides information for how stakeholders may submit comments. BPA will answer stakeholder questions and discuss aspects of the business case associated with the B2H with Transfer Service plan of service at the January 23, 2023, workshop. BPA intends to make a final decision regarding whether to execute the agreements for the B2H with Transfer Service plan of service in a Closeout Letter to the region on or about March 23, 2023.

II. Final Terms for the B2H with Transfer Service Plan of Service

A. Arrangements to effectuate long-term firm transfer service for the SILS customers' loads

Under the B2H with Transfer Service plan of service, BPA would not become an owner or participate in the construction of the B2H project. Instead, BPA would sell its B2H permitting interest share (around 24%) and its right to future ownership in B2H to Idaho Power. Together with Idaho Power's existing rights to the B2H project, this sale of BPA's permitting interest would allow Idaho Power to fund construction and hold a 45.45% ownership share in the B2H project. PacifiCorp would continue to fund construction and hold a 55.55% ownership share in the B2H project.

To serve the SILS customers' loads after the B2H project is constructed, BPA would purchase long-term firm NITS from Idaho Power. Currently, service to the SILS customers' loads uses transmission facilities that are owned by PacifiCorp. In order to facilitate Idaho Power's ability to serve the SILS customers' loads entirely from its transmission system after the B2H project is constructed, PacifiCorp would transfer an ownership interest to Idaho Power in the PacifiCorp facilities that are presently used to serve BPA's SILS loads (the "asset exchange"). In addition, BPA would pay Idaho Power \$10 million upon execution of the NITSAs as security for Idaho Power's construction of the B2H project to provide BPA with the NITS service. The security would allow Idaho Power to provide assurances to its regulatory bodies that its retail rate payers were insulated from risk associated with Idaho Power purchasing BPA's share of the B2H permitting interest.

Following execution of the Term Sheet, Idaho Power and BPA merged the terms for the sale of BPA's permitting interest and the NITSA security payment into a single agreement, the Purchase, Sale, and Security Agreement, because the subject matters were interrelated. The key provisions of the Purchase, Sale, and Security Agreement, NITSAs, and agreements between Idaho Power and PacifiCorp needed to serve the SILS loads are described below. If BPA's final decision is to proceed with the B2H with Transfer Service plan of service, BPA would execute these agreements concurrent with issuing the Closeout Letter.

1. Purchase, Sale, and Security Agreement

In the Purchase, Sale, and Security Agreement, BPA would transfer its permitting interest share to Idaho Power in exchange for payment to BPA for the costs BPA incurred towards permitting the B2H project (around \$30 million). BPA would also pay Idaho Power the \$10 million security payment. The payment for the value of the permitting interest and the security is the Purchase Price. The agreement sets forth the requirements associated with the reimbursement of the Purchase Price to address the risks and uncertainties associated with Idaho Power taking on a larger ownership share in the B2H project and constructing a major new transmission line to provide BPA with NITS service.

If Idaho Power successfully completes construction and energization of the B2H project by the milestones in the Purchase, Sale, and Security Agreement, Idaho Power would return the \$10 million security to BPA within 60 days of energization of the B2H project. The remaining amount of the Purchase Price would be paid in installments based on a 20 year payment schedule. The first installment of the Purchase Price payment would begin 10 years after B2H is energized, provided that BPA takes the NITS service from Idaho Power during those 10 years. Additionally, during those 10 years of NITS service, BPA's NITS loads must reach 400 MW or more on the hour of Idaho Power's transmission system peak on a twelve-month rolling average basis. If BPA's NITS loads do not reach the 400 MW threshold during the initial 10 years of service, Idaho Power would begin repaying BPA the Purchase Price on the next year after the 400 MW threshold is met.

The Purchase, Sale, and Security Agreement also addresses reimbursement of the Purchase Price to BPA if problems arise with Idaho Power completing construction and energization of the B2H project:

- If Idaho Power does not receive the necessary governmental authorizations and, as a result, cannot complete the B2H project to provide NITS service to BPA, Idaho Power would not be obligated to pay the Purchase Price to BPA. BPA is agreeing to accept this financial risk because Idaho Power would be funding a higher percentage of B2H costs in order to provide BPA with NITS service under the B2H with Transfer Service plan of service.
- If Idaho Power does not receive governmental authorization by January of 2025, and has not commenced construction by January of 2026, or other timeline as mutually agreed to by BPA and Idaho Power, BPA would have the option to terminate the NITSAs. The option to terminate the NITSAs allows BPA to pursue an alternative plan of service for the SILS loads if there is substantial risk that the B2H project would not be completed.
 - If BPA exercises the option to terminate the NITSAs and Idaho Power ultimately receives governmental authorizations and completes the B2H project, Idaho Power would return the security to BPA and pay the remaining amount of the Purchase Price. If Idaho Power does not complete the B2H project, then Idaho Power is relieved of the obligation to pay BPA the Purchase Price.
 - If BPA does not exercise the option to terminate the NITSAs and Idaho Power ultimately completes the B2H project, then Idaho Power would pay BPA the Purchase Price based on the installment payment schedule described above.
- If Idaho Power receives all necessary governmental authorizations by January of 2025, but decides to no longer proceed with constructing and energizing the B2H project, Idaho Power would return the security to BPA. Additionally, Idaho Power must attempt to market the transferred permitting interest. Idaho Power would then pay BPA for its proportional share of the sale proceeds.

The Purchase, Sale, and Security Agreement generally reflects the deal and structure envisioned in the Term Sheet. The 400 MW limit is a new term that the parties negotiated after execution of the Term Sheet to allow Idaho Power to provide assurances to its regulatory bodies that its retail ratepayers were insulated from risk associated with Idaho Power purchasing BPA's share of the B2H permitting interest. The Term Sheet also contemplated that Idaho Power would return security amounts as credits offsetting BPA's NITSA bills. The Purchase Price payments will be independent of the NITSA billing.

2. NITS Agreements with Idaho Power

For the B2H with Transfer Service plan of service, BPA would enter into two new long-term firm NITSAs with Idaho Power. One new NITSA would provide for service to the Goshen area customers (Lower Valley, Soda Springs, Fall River, Lost River, and Salmon River) ("Goshen NITSA"). A second new NITSA would provide service for Idaho Falls ("Idaho Falls NITSA"). The Goshen and Idaho Falls NITSAs, together with the asset exchange between Idaho Power and PacifiCorp, would allow BPA to deliver energy to the SILS customers' loads from BPA's

transmission system on a single leg of firm network transmission service across Idaho Power's system as opposed to relying on the conditional firm service under the interim plan of service. Finally, BPA would update three existing NITSAs that support service to BPA's Southern Idaho customers.

Service under the Goshen and Idaho Falls NITSAs would commence after two conditions precedent are satisfied. First, Idaho Power must complete construction and energization of the B2H project. Second, Idaho Power and PacifiCorp must exchange assets sufficient to enable Idaho Power to deliver resources from the BPA transmission system across the Idaho Power system on a single leg of transmission to the SILS customers' loads (see subsection 3 below). Commensurate with the asset exchange, the SILS customers' loads under the Goshen NITSA would move from the PacifiCorp Balancing Authority Area to the Idaho Power Balancing Authority Area. Arrangements for the Idaho Falls NITSA are described below.

After these conditions precedent are met, service under the Goshen and Idaho Falls NITSAs would commence upon energization of B2H, or a later date if specified by the Federal Energy Regulatory Commission (Idaho Power must obtain regulatory approval from the Commission for the NITSAs). Service under the NITSAs would terminate on July 1, 2046, and could be rolled over for additional terms consistent with Idaho Power's OATT.

The NITSAs also include an assignment provision that would allow BPA to request assignment of some or all of the service under the NITSA to the wholesale customers that are served by the NITSA. Idaho Power may not unreasonably withhold its consent to such assignment, provided the wholesale customer qualifies as an Eligible Customer consistent with Idaho Power's OATT and assumes BPA's rights and obligations under the assigned NITSA.

Idaho Falls would be served under a separate NITSA because of its unique supply arrangements with other parties. Idaho Falls currently purchases BPA's slice/block product and is responsible for managing its hourly balancing needs. Idaho Falls contracts with Utah Associated Municipal Power Systems ("UAMPS") for this balancing service, which UAMPS provides under a legacy transmission service agreement with PacifiCorp to balance the Idaho Falls load in the PacifiCorp Balancing Authority Area. Due to this unique arrangement and after discussion with Idaho Falls, BPA determined that it was reasonable to negotiate a separate NITSA for Idaho Falls. One of BPA's objectives in negotiating the Idaho Falls NITSA was to ensure that there was no impact to the existing relationship between Idaho Falls and UAMPS, or the legacy agreement between UAMPS and PacifiCorp. Accordingly, the Idaho Falls NITSA would only serve the portion of Idaho Falls load served by BPA resources.

With regard to the updates to existing NITSAs, BPA has three existing NITSAs with Idaho Power. BPA uses these NITSAs to serve 15 preference customers, including the customers in the Burley area, and to deliver reserve power to the United States Bureau of Reclamation and irrigation customers. Idaho Power has identified transmission constraints associated with serving increased loads under these NITSAs. One of the key benefits associated with the completion and energization of the B2H project is that B2H increases the capacity on Idaho Power's system that could be used to serve future load growth for these customers. After B2H is energized, these existing NITSAs would be updated to include a new B2H point of receipt that BPA can use to

deliver resources from the BPA transmission system to BPA's customers located on Idaho Power's system.

3. Agreements between Idaho Power and PacifiCorp

As noted above, concurrently with BPA executing the Purchase, Sale, and Security Agreement to divest BPA of any interest in the B2H project, Idaho Power and PacifiCorp would enter into agreements for the continued funding of the B2H project, including permitting, preconstruction, and construction (with Idaho Power funding 45.45% of all further costs associated with the B2H project). Idaho Power and PacifiCorp would also enter into other agreements necessary for ownership and the ongoing operation and maintenance of the B2H project. In addition, Idaho Power and PacifiCorp would proceed with obtaining all state and federal regulatory approvals applicable to them.

With regard to the asset exchange that is a key feature of the B2H with Transfer Service plan of service, Idaho Power and PacifiCorp would enter into an agreement to transfer Goshen area assets from PacifiCorp to Idaho Power. In many instances, these assets are already jointly owned by Idaho Power and PacifiCorp, so the asset exchange would adjust the ownership share of the jointly owned facilities to increase Idaho Power's share. The asset exchange would commence upon the energization of B2H and the NITSAs between BPA and Idaho Power.

BPA is not a party to the agreements between Idaho Power and PacifiCorp. If BPA's final decision is to proceed with B2H with Transfer Service, Idaho Power and PacifiCorp would execute the contracts they would be party to concurrent with BPA executing the contracts that BPA would be party to. Questions or comments about the agreements between Idaho Power and PacifiCorp or about the permitting and construction of the B2H project should be directed to Idaho Power and PacifiCorp. For more information about Idaho Power and PacifiCorp's B2H transmission line project, please visit [Boardman to Hemingway - Idaho Power](#).

B. Transmission Agreements with PacifiCorp and Idaho Power

Under the B2H with Transfer Service plan of service, BPA would provide PTP transmission service to PacifiCorp and Idaho Power pursuant to BPA's OATT and rate schedules. Additionally, BPA would enter into other transmission arrangements with Idaho Power and PacifiCorp related to the interconnection of the B2H project with the proposed BPA Longhorn substation. This section describes these transmission arrangements.

1. BPA providing PTP service to PacifiCorp

The 2022 Letter explained that, in consideration for PacifiCorp transferring its Goshen assets to Idaho Power, BPA and PacifiCorp would evaluate options for BPA to provide PacifiCorp with 680 MW of firm PTP service at or near the 230kV side of the Ponderosa substation (Ponderosa 230) in central Oregon. BPA's evaluation would be consistent with BPA's OATT and business practices and would consider a 2021 joint study. The preferred option included conversion of PacifiCorp's legacy bidirectional scheduling rights over BPA's Buckley-Summer Lake line to PTP service. The transmission capacity associated with the conversion would be combined with

PacifiCorp requesting to redirect existing PTP service. PacifiCorp would pay for the PTP service pursuant to BPA’s OATT and posted transmission rates. The second, back-up, option involved changes to how PacifiCorp scheduled the legacy bidirectional scheduling rights with other limitations.

As noted above, the Term Sheet provided that BPA’s evaluation would take into consideration a 2021 joint study performed by BPA, Idaho Power, and PacifiCorp as well as two series capacitor projects identified in the study that Idaho Power and PacifiCorp intended to install. For one of the projects, Idaho Power and PacifiCorp would install a series capacitor around the midpoint of the B2H line and develop a remedial action scheme (“Midline Series Capacitor Project”). For the other project, PacifiCorp would upgrade the existing series capacitor at the Meridian substation or install an electrically equivalent series capacitor (“Meridian Series Capacitor Project”). The joint study demonstrated that these series capacitor projects would improve performance of the transmission system with B2H in service and would allow BPA to accommodate the PTP service PacifiCorp sought as compared to the existing system configuration. The Midline and Meridian Series Capacitor Projects enhance system stability and allow flows to be shifted from more constrained transmission facilities to less constrained parallel facilities. Both of these factors help to optimize the utilization of the overall transmission system. The 2021 joint study provides useful information, but does not serve as a replacement for PacifiCorp submitting transmission requests and BPA evaluating those requests consistent with BPA’s OATT and applicable business practices. Therefore, the Term Sheet specified that PacifiCorp would need to submit transmission service requests so that BPA could do the OATT evaluation.

Following execution of the Term Sheet, BPA and PacifiCorp aligned on the details for the PTP redirect requests that would be paired with the conversion of the legacy scheduling rights under the preferred option. The second, back-up option was determined to be unworkable and did not receive further consideration. In April and June, 2022, PacifiCorp submitted the PTP redirect requests over BPA’s OASIS. The following table describes the requests:

Parent (Existing) Reservation	Redirect Reservation
70 MW from Garrison 500 to Buckley 500	70 MW from Garrison 500 to Ponderosa 230
70 MW from McNary 230 to Buckley 500	70 MW from McNary 230 to Ponderosa 230
200 MW from Big Eddy 500 to Buckley 500	200 MW from Big Eddy 500 to Ponderosa 230
120 MW from Ponderosa 500 to Ponderosa 230	120 MW from Summer Lake 500 to Ponderosa 230
190 MW from Ponderosa 500 to Pilot Butte 230	190 MW from Summer Lake 500 to Pilot Butte 230
30 MW from Ponderosa 500 to Pilot Butte 230	30 MW from Summer Lake 500 to Pilot Butte 230

BPA evaluated the redirect requests consistent with its OATT and the standard evaluation processes, which are described in BPA’s business practices including the Transmission Service Request Evaluation Business Practice. BPA’s standard evaluation processes take into consideration existing obligations and higher queued requests. BPA evaluated the availability of

capacity to accommodate the conversion of the scheduling rights to PTP service based on the existing bidirectional capacity over the Buckley-Summer Lake line that PacifiCorp has been scheduling under the legacy contract (340 MW in the north-to south direction and 340 MW in the south-to-north direction). In order to pair the conversion with the redirect requests, BPA applied this bidirectional capacity to the redirected service. BPA then considered whether there were other impacts to the transmission system not reflected in the redirect and conversion analysis. Finally, BPA's consideration took into account the 2021 joint study and the installation of the series capacitor projects.

BPA concluded that the PTP service (the preferred option) can be accommodated with stipulations that are consistent with the Term Sheet. The PTP stipulations include the energization of the B2H project to include the Midline Series Capacitor Project, the installation of the Meridian Series Capacitor Project pursuant to a construction agreement between PacifiCorp and BPA, the transfer of the Goshen area assets between PacifiCorp and Idaho Power, and the commencement of BPA's Goshen and Idaho Falls NITSAs with Idaho Power.

Accordingly, BPA is proposing to execute several agreements with PacifiCorp concurrent with the issuance of the final decision in the Closeout letter. The PTP agreements with PacifiCorp reflect the service shown in the Redirect Reservation column of the table above and include conditions precedent to reflect the PTP stipulations. After the conditions precedent have been met, the service would commence upon energization of B2H. BPA also would execute an amendment to the legacy agreement with PacifiCorp to remove PacifiCorp's bidirectional scheduling rights upon commencement of the PTP service (as noted, this amendment reflects the conversion to the PTP service). PacifiCorp is required to file the amendment to the legacy agreement with the Commission for approval. Finally, BPA would execute a construction and coordination agreement with PacifiCorp which sets forth PacifiCorp's obligations to design, coordinate with BPA, and install at its sole expense the Meridian Series Capacitor Project.

Following the February 8, 2022 workshop, several stakeholders asked how the proposed PacifiCorp transmission service would affect the constrained transmission system in central Oregon. Customers also asked whether BPA was considering additional upgrades in central Oregon as part of the B2H negotiations and, if so, whether there was an opportunity for BPA's customers to share the costs and benefits for those upgrades. As BPA explained in its April 1, 2022, response to the workshop comments, the conversion paired with the redirected service does not affect the transmission service BPA provides to other customers in central Oregon. As described above, BPA evaluated the service consistent with its business practices which take into account existing obligations and higher queued requests. Further, the 2021 joint study undertaken by BPA, PacifiCorp, and Idaho Power identified the Midline and Meridian Series Capacitor Projects as upgrades that would improve system performance with B2H in service. However, these projects and the B2H project do not increase the capacity available to BPA's other customers in central Oregon.

2. BPA providing PTP Service to Idaho Power

The 2022 Letter explained that, in lieu of a previously considered asset exchange between BPA and Idaho Power under the B2H with Asset Swap proposal, Idaho Power would acquire 500 MW

of PTP service from BPA for delivery of northwest resources to the B2H connection at the proposed BPA Longhorn substation. Before execution of the Term Sheet, Idaho Power submitted a transmission request seeking this service. BPA evaluated the request as part of the 2021 TSEP Cluster Study. Following the study, BPA determined that the request could be accommodated with stipulations. The stipulations include the energization of the B2H project and the interconnection of the B2H project to the proposed BPA Longhorn substation (see subsection 3 for discussion about the proposed B2H interconnection). Idaho Power would pay for the PTP service pursuant to BPA's OATT and posted transmission rates. BPA is proposing to execute the PTP agreement with conditions precedent reflecting these stipulations concurrent with the issuance of the final decision in the Closeout letter.

3. B2H Interconnection to the Proposed BPA Longhorn Substation

The northern terminus for the B2H project and the point of interconnection with BPA's system would be BPA's proposed Longhorn substation near Boardman, Oregon. The 2022 Letter explained that to facilitate the B2H interconnection at the proposed BPA Longhorn substation, BPA, Idaho Power, and PacifiCorp would develop line and load interconnection and related funding and construction agreements. In February of 2022, Idaho Power as project manager for the B2H project, submitted a line and load interconnection request (L0515) for the B2H interconnection. BPA is currently studying this request, which will include environmental review, and intends to offer additional agreements and make decisions on design, advance funding, and construction in accordance with BPA's line and load interconnection business practice.

BPA is not making a final decision to construct the proposed Longhorn substation as part of B2H with Transfer Service decision. Prior to Idaho Power's B2H interconnection request L0515, Umatilla Electric Cooperative ("UEC") submitted a load interconnection request (L0482) ("UEC project") and the construction of the proposed Longhorn substation has been identified as a need for the UEC project. At this time, the UEC project is further along in the study process than the proposed B2H interconnection. BPA has completed the technical studies for the UEC request and is currently in the process of completing environmental review of the potential impacts to the human and natural environments (*e.g.*, physical, biological, and cultural resources) under NEPA. The NEPA documentation for the UEC interconnection request will be made available to the public on BPA's website. After BPA completes the environmental studies, which is expected in February, 2023, BPA will make a final decision about the construction of the Longhorn substation in response to the UEC interconnection request. Accordingly, BPA's decision to construct the proposed Longhorn substation would be in response to the UEC request and would not be driven by the final decision for the B2H with Transfer Service plan of service.

While BPA's final decision to construct the Longhorn substation will be in response to the UEC request and not the B2H with Transfer Service plan of service, BPA would design the proposed Longhorn substation to accommodate the B2H interconnection request and other future interconnection requests. Equipment specific to the UEC project and the B2H interconnection request, such as an additional 500 kV terminal for the proposed B2H interconnection, 500/230 kV transformers, and a 230 kV yard for the UEC project, would be designed, funded, and developed in accordance with BPA's line and load interconnection business practice. BPA

anticipates allocating advance funding responsibilities between the UEC project and the B2H interconnection in accordance with BPA's line and load interconnection business practices. Consistent with the Term Sheet in recognition of the benefits exchanged, BPA would require advance funding from the B2H project, subject to repayment through transmission credits on OATT service, for costs associated with the B2H interconnection at the proposed BPA Longhorn substation.

4. Removal of a segment of BPA's Boardman-to-Ione transmission line

A portion of BPA's Boardman-to-Ione 69-kV transmission line is located in a right-of-way crossing the U.S Navy's ("Navy") Naval Weapons Systems Training Facility Boardman Property in Umatilla County, Oregon. BPA uses this line to serve Columbia Basin Electric Cooperative, Inc. ("Columbia Basin"). Idaho Power and PacifiCorp need a segment of this right-of-way for B2H construction. For B2H to be constructed on the right-of-way, BPA's Boardman-Ione transmission line must be removed first. Additionally, BPA would need to find an alternative to serve Columbia Basin.

In 2019, BPA decided to enter into an amended Boardman-to-Ione transmission line land use agreement with the Navy to allow for the removal of the line from the Navy property so that the B2H project could repurpose a segment of the right-of-way, with the remaining segment to be removed to the benefit of cultural and natural resources in the area. See Bonneville Power Administration, Record of Decision, Boardman-to-Ione 69kV Transmission Line (May 13, 2019), available at <https://www.bpa.gov/-/media/Aep/efw/nepa/active/boardman-to-hemingway/board-ione-lua-nepa-rod-05-13-2019-final.pdf>. BPA's decision was contingent on multiple considerations, including BPA entering an agreement with Idaho Power and PacifiCorp to ensure that BPA would be reimbursed in full for all costs associated with removing the Boardman-to-Ione line and providing an alternative to service Columbia Basin's load. In the event the B2H project is not constructed, BPA will retain its right-of-way on the Navy property.

On March 18, 2020, BPA, Idaho Power, and PacifiCorp executed an agreement for PacifiCorp and Idaho Power to pay or reimburse BPA for its costs associated with removing and replacing the Boardman-to-Ione line if the B2H project is constructed. BPA's costs include providing replacement service for Columbia Basin's loads, which would include studies and design, environmental review, building a step down substation, tap line and tap, and other necessary construction or reconfigurations to accommodate the removal. These reimbursement commitments were acknowledged in the section of the Term Sheet describing Idaho Power and PacifiCorp's intent for the B2H construction funding agreement. The commitments have also been incorporated into agreements with Idaho Power, as project manager for B2H, associated with BPA's removal and replacement of the Boardman-to-Ione line.

With regard to BPA finding an alternative to serve Columbia Basin, BPA intends to request transmission service from UEC to serve Columbia Basin's load. As an initial step, BPA has submitted a line interconnection request to UEC. This request starts the process for BPA to construct a new step down substation and transmission facilities to connect the UEC end point of service to Columbia Basin's system. At this time, BPA is siting, designing, and studying these proposed facilities. As planning progresses, BPA would conduct environmental review of the

potential impacts to the human and natural environments that could be expected from implementing the Boardman-to-Ione line relocation. As noted above, pursuant to the March 18, 2020, agreement, BPA will recover costs associated with the Boardman-to-Ione line relocation from PacifiCorp and Idaho Power. Energization of the proposed alternative service would need to be completed by spring of 2025, to allow time to remove the old line and build the new B2H line by spring of 2026.

5. Operational agreement with Idaho Power and PacifiCorp

The 2022 Letter described BPA, Idaho Power, and PacifiCorp's intent to develop an operational agreement covering various facilities and agreements that affect Path 14 (Idaho to Northwest, the WECC transmission path that will include B2H), Path 75 (Hemingway-Summer Lake 500kV), and the Northwest AC Intertie. Following execution of the Term Sheet, BPA, PacifiCorp, and Idaho Power prioritized negotiation of the contracts described above. Negotiation of the operational agreement will begin this winter.

C. Assignment Agreement with PacifiCorp

The 2022 Letter explained that BPA currently purchases 200 MW of conditional firm PTP service from Idaho Power to wheel power over Idaho Power's system for ultimate delivery to SILS customers on PacifiCorp's system. With the construction of the B2H project, the NITSAs, and associated asset exchanges between Idaho Power and PacifiCorp, BPA will no longer need to procure these conditional firm PTP services. The 2022 Letter described BPA's intent to assign its conditional firm PTP service agreements on Idaho Power's system to PacifiCorp, subject to certain stipulations. Prior to the assignment, BPA would submit redirect requests to the points of receipt and points of delivery selected by PacifiCorp. PacifiCorp would be responsible for all costs associated with the redirect and assignment. This redirect and assignment is to PacifiCorp's benefit for the B2H deal, but would not result in any increased costs to BPA.

Following execution of the Term Sheet, BPA and PacifiCorp negotiated a Letter Agreement setting out the terms for the future redirect and assignment of BPA's conditional firm PTP service. BPA is proposing to execute the Letter Agreement concurrent with issuing the final decision in the Closeout Letter. Pursuant to the Letter Agreement, BPA would submit redirect requests pursuant to Idaho Power's OATT for the two conditional firm service agreements on Idaho Power's system. BPA would request the redirected service to commence following the energization of B2H and commencement of BPA's NITSAs with Idaho Power. PacifiCorp would reimburse BPA for all study costs and fees assessed by Idaho Power.

Following Idaho Power's evaluation of the redirect requests, PacifiCorp would determine if the redirected service, including any conditions Idaho Power might assess, is acceptable to PacifiCorp. If the service is acceptable to PacifiCorp, then BPA would confirm the requests and assign the redirected reservations to PacifiCorp. If PacifiCorp determined that the redirected service was not acceptable, then BPA would withdraw the requests and, if directed by PacifiCorp, submit alternative redirect requests. If B2H is energized and BPA's NITSAs have commenced but PacifiCorp has not yet accepted assignment of the conditional firm PTP service agreements, PacifiCorp would reimburse BPA for all rates and charges that Idaho Power assesses to BPA for the two 100 MW conditional firm PTP service agreements, until such time as the service is assigned to or waived by PacifiCorp.

III. Business Case for the B2H with Transfer Service Plan of Service

The 2022 Letter described BPA's business case for the B2H with Transfer Service plan of service at a high level, noting that the proposal would provide a firm, stable, and long-term transmission path to deliver resources from the BPA transmission system to the SILS customers' loads at an economical cost. During the February 8, 2022, workshop, BPA explained that the estimated benefits of B2H with Transfer Service is a 35% to 52% improvement in net present value ("NPV") over the interim plan of service. Now that contract negotiations are complete, BPA has updated the assumptions in the business case. This letter provides an overview of BPA's business case.

Quantitatively, BPA analyzed the costs associated with the B2H with Transfer Service plan of service and the current interim plan of service using a NPV methodology over a 30-year horizon and with a discount rate of 2.81%. Notably, there are significant uncertainties associated with the assumptions used for a 30-year period. Therefore, BPA evaluated numerous rate, cost, and revenue assumptions to determine a range of cost savings that could be expected over a 30-year period. On average over 30 years, the B2H with Transfer Service plan of service yields an estimated cost of around \$520 million. Over that same time period, the continuation of the current interim plan of service yields an estimated cost of around \$1.24 billion. Accordingly, the B2H with Transfer Service provides an estimated \$720 million of cost savings as compared to the interim plan of service.

Each of the scenarios evaluated in the business case includes significant complexity, with many factors driving cost, savings, and relative value. However four primary drivers account for the majority of the significant financial benefit associated with the B2H with Transfer Service plan of service over the current interim plan of service. First, the B2H with Transfer Service plan of service eliminates the need to acquire two legs of transmission that BPA currently uses to serve the SILS customers' loads. Eliminating one leg of transmission yields an expected value of approximately \$250 million in cost savings over the 30-year period.

Second, Idaho Power is expected to have lower rates for NITS as compared to PacifiCorp's rates for NITS under the interim plan of service. As such, taking NITS from Idaho Power is expected to have a lower cost compared to the PacifiCorp NITS costs BPA anticipates if BPA were to continue the current interim plan of service. BPA's analysis of Idaho Power's expected rates took into account projected increases following its construction of B2H, as well as the implications of such rate increases on BPA's costs under the existing NITSAs for service to

BPA's other preference customers in southern Idaho. The NITS service from Idaho Power is expected to yield approximately \$190 million in cost savings over the 30-year period.

Third, BPA expects \$45 million in lower overall Energy Costs over the 30-year period by reducing BPA's reliance on market power in the vicinity of the SILS customers.

Lastly, the B2H with Transfer Service plan of service yields incremental revenue for BPA associated with 500 MW of PTP service that BPA would provide to Idaho Power. This PTP service is estimated to yield an expected value of approximately \$200 million in revenue over a 30-year period.

BPA also expects \$40 million in the recovery of sunk cost (the sunk cost is the Purchase Price for the sale of BPA's permitting interest, which includes the payment of the \$30 million BPA incurred towards permitting plus the \$10 million security). BPA anticipates the costs associated with purchasing transmission service from UEC to serve Columbia Basin's load to be modest.

In addition to these quantitative financial benefits, BPA expects other substantial benefits. As noted above, BPA's current interim plan of service relies on a leg of transmission over Idaho Power's system that is "conditional firm" PTP service. Conditional firm PTP service is a type of transmission service that can be curtailed more readily under certain system conditions. The conditions associated with this service are reviewable by Idaho Power every two years, increasing the risk of additional conditions for curtailment of BPA's PTP service over time. With Idaho Power's construction of B2H, BPA would receive long-term firm network transmission to serve its southeast Idaho loads. Network transmission is redispatched rather than curtailed like PTP, substantially reducing BPA's risk of service to its loads.

Additionally, the increase in transmission capacity across Idaho Power's system from the construction of B2H would enhance BPA's ability to serve its other existing preference customers currently served by NITSAs over Idaho Power's transmission system. BPA uses these existing NITSAs to serve 13 preference customers in the Burley, Idaho area, Oregon Trail Electric Cooperative in eastern Oregon, and the City of Weiser in western Idaho. BPA also uses an existing NITSA to deliver reserve power from the federal system to the United States Bureau of Reclamation and irrigation customers. The completion of the B2H project would create capacity on Idaho Power's system that could be used to serve the load growth of these existing customers. Accordingly, potential transmission system congestion on federal power deliveries to these customers over Idaho Power's system would be alleviated.

The B2H with Transfer Service plan of service also reduces BPA's reliance on market power in the vicinity of the SILS customers. The current interim plan of service has BPA sourcing market power from the desert Southwest, which carries with it resource adequacy considerations and negative implications for the carbon content of BPA's fuel mix. Reduced market reliance alleviates these negative effects and generally reduces BPA's cost risk in a region where resource retirements loom and BPA has already observed reduced liquidity.

Additionally, while providing PacifiCorp with PTP service in central Oregon would not result in additional revenues for BPA because it reflects the redirect of existing PTP service that

PacifiCorp currently pays for, that aspect of the B2H with Transfer Service arrangement works to achieve BPA's strategic objectives of converting legacy service to standard OATT service. Idaho Power and PacifiCorp would also fund the series capacitor projects that improve system performance when B2H is in service. Lastly, the B2H with Transfer Service plan of service avoids the complexities and complications of joint ownership and asset swaps originally considered in the B2H with Asset Swap proposal (a description of the B2H with Asset Swap proposal was provided in the 2022 Letter).

IV. Public Process and Next Steps

BPA is proposing to proceed with the B2H with Transfer Service plan of service and execute binding contracts with Idaho Power and PacifiCorp. Public participation and input on the B2H with Transfer Service plan of service is important to BPA. Before BPA makes a final decision, BPA is seeking public comment through February 9, 2023. Comments should be submitted [here](#). BPA will hold a workshop to answer questions about the B2H with Transfer Service plan of service on January 23, 2023. Please find details of that workshop [here](#). BPA is also conducting appropriate NEPA processes. If BPA decides to proceed, BPA will issue a Closeout letter to the region on or about March 23, 2023, describing its reasoning and responding to comments.

If BPA's final decision is to proceed, BPA would execute the Purchase, Sale, and Security Agreement, the two NITSAAs with Idaho Power, the PTP agreements and other related transmission agreements with PacifiCorp and Idaho Power, and the Letter Agreement with PacifiCorp concurrent with issuing the Closeout letter to the region. The decision to execute agreements associated with the proposed B2H interconnection to the BPA Longhorn substation and the removal and replacement of BPA's Boardman-to-Ione transmission line would be in accordance with BPA's line and load interconnection processes.

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Idaho State in Western United States

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1. Idaho · Area

83,642 sq miles

Google

how large is oregon in square miles



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Oregon / Area

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Oregon - Wikipedia

Oregon, 98,381 sq mi (254,806 km²) · 95,997 sq mi (248,849 km²) · 2,384 sq mi (6,177 km²)
2.4%

Majority of Malheur County: UTC-07:00 ... Before statehood: Oregon Territory

U.S. House delegation: 4 Democrats; 2 Repuh... Largest city: Portland

History · Oregon State University · Portland, Oregon · Oregon City, Ore.

https://statesymbolsusa.org/national-us/uncategori?NJ

U.S. States by Size in Square Miles

States by Size in Square Miles; 7, Nevada, 109,800; 8, Colo do, 100,730; 9, Wyoming, 97,105; 10, Oregon, 96,003.

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https://worldpopulationreview.com/states/how-big

How Big is Oregon? - World Population Review

Oregon is a beautiful state, but just how big is Oregon? Oregon is over 98,000 square miles.

This means that Oregon is larger than Washington but smaller than ...

https://worldpopulationreview.com/state-rankings/st...

United States by Area - World Population Review

Oregon (Total area: 98,379 square miles) Wyoming (Total area: 97,813 square miles)

https://www.netstate.com/states/tables/top-50

50 States in Square Miles from NETSTATE.COM

Rank	State	Total sq miles	Land sq miles	Water sq miles
1	Alaska	656,424	570,374	86,051
2	Texas	268,601	261,914	40,001
3	California	163,707	155,973	11,190

Map of Oregon

Oregon

US state

Oregon is a state in the Pacific Northwest region of the United States. Oregon is a part of the Western United States, with the Columbia River delineating much of Oregon's northern border with Washington, while the Snake River delineates much of its eastern boundary with Idaho. Wikipedia

Capital: Salem

Population: 4.246 million (2021)

State flower: Oregon Grape

Colleges and Universities: University of Oregon, MORE

Senators: Ron Wyden (Democratic Party), Jeff Merkley (Dem Party)

Points of interest

View::

Crater Lake National...	Mount Hood	Multnomah Falls	Portland Japanese Garden
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Destinations

View::

Portland	Bend	Crater Lake National...	Cannon Beach
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Idaho Electricity Profile 2021

Table 1. 2021 Summary statistics (Idaho)

Item	Value	Rank
Primary energy source		Hydroelectric
Net summer capacity (megawatts)	5,076	43
Electric utilities	3,308	38
IPP & CHP	1,768	42
Net generation (megawatthours)	16,836,473	44
Electric utilities	10,457,407	36
IPP & CHP	6,379,065	40
Emissions		
Sulfur dioxide (short tons)	4,006	37
Nitrogen oxide (short tons)	4,349	45
Carbon dioxide (thousand metric tons)	2,573	45
Sulfur dioxide (lbs/MWh)	0.5	23
Nitrogen oxide (lbs/MWh)	0.5	34
Carbon dioxide (lbs/MWh)	336	46
Total retail sales (megawatthours)	25,285,616	39
Full service provider sales	25,285,616	37
Energy-only provider sales	0	0
Direct use (megawatthours)	628,093	31
Average retail price (cents/kWh)	8.17	51

Sources: U.S. Energy Information Administration, Form EIA-860, *Annual Electric Generator Report*, U.S. Energy Information Administration, Form EIA-861, *Annual Electric Power Industry Report*, U.S. Energy Information Administration, Form EIA-923, *Power Plant Operations Report* and predecessor forms.

Oregon Electricity Profile 2021

Table 1. 2021 Summary statistics (Oregon)

Item	Value	Rank
Primary energy source		Hydroelectric
Net summer capacity (megawatts)	16,917	27
Electric utilities	10,998	25
IPP & CHP	5,919	23
Net generation (megawatthours)	61,016,874	28
Electric utilities	40,152,940	24
IPP & CHP	20,863,934	19
Emissions		
Sulfur dioxide (short tons)	3,979	38
Nitrogen oxide (short tons)	19,486	29
Carbon dioxide (thousand metric tons)	8,710	40
Sulfur dioxide (lbs/MWh)	0.1	41
Nitrogen oxide (lbs/MWh)	0.6	29
Carbon dioxide (lbs/MWh)	314	48
Total retail sales (megawatthours)	54,135,205	27
Full service provider sales	51,192,743	25
Energy-only provider sales	2,942,462	18
Direct use (megawatthours)	473,142	33
Average retail price (cents/kWh)	8.95	41

Sources: U.S. Energy Information Administration, Form EIA-860, *Annual Electric Generator Report*, U.S. Energy Information Administration, Form EIA-861, *Annual Electric Power Industry Report*, U.S. Energy Information Administration, Form EIA-923, *Power Plant Operations Report* and predecessor forms

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Profile Analysis [Print State Energy Profile](#) ([overview](#), [data](#), & [analysis](#))

Last Updated: March 17, 2022

Overview

Idaho has many renewable energy resources, but few fossil fuel reserves.

Idaho, known as the Gem State, is rich in silver, phosphate, gold, cobalt, and many other minerals, but the state has few fossil fuel reserves.[1,2,3,4](#) Idaho's energy potential lies in its substantial renewable resources, including hydropower, wind, solar, biomass, and geothermal.[5](#) Mountains cover much of Idaho from its border with Canada in the north to Nevada and Utah in the south. The mountains capture moisture-laden clouds that move east from the Pacific Ocean, and produce deep mountain snowfalls that feed the state's fast-running rivers.[6](#) Idaho's river valleys, which offered passage through the rugged mountains for early pioneer settlers, today give the state a wealth of hydroelectric and wind energy resources.[7,8,9](#) The plains flanking Idaho's Snake River stretch in an arc all the way across the southern part of the state from the Teton Mountains on the Wyoming border to Hells Canyon at the Oregon border.[10](#) The valleys of the Snake River and its tributaries are home to most of Idaho's small population, more than two-fifths of whom live in the Boise area. Vast stretches of Idaho remain wilderness.[11,12,13](#)

About 70% of the energy consumed in Idaho comes from out of state.[14](#) Idaho's energy consumption per capita ranks near the middle of the 50 states, and the energy intensity of its economy—the amount of energy used to produce each dollar of GDP—is near the top one-third of the states.[15,16](#) The industrial sector and the transportation sector each account for about 30% of the state's total energy use, followed by the residential sector at 24% and the commercial sector at 16%.[17](#) Real estate, manufacturing, healthcare, and construction are among the largest contributors to Idaho's GDP. Other contributors to the state's economy are the energy-intensive agriculture, food processing, pulp and paper, and mining sectors.[18,19](#)

Renewable energy

In 2021, Idaho ranked fourth among the states in the share of electricity generated from renewables.

In 2021, renewable energy generated 74% of Idaho's total in-state electricity, including from small-scale solar panel generating systems (less than 1 megawatt capacity), which is the fourth-highest share for any state, after Vermont, South Dakota, and Washington. Most of Idaho's renewable electricity comes from hydropower.[20,21](#) Hydropower and wind energy fuel 5 of Idaho's 10 largest generating facilities by capacity. Based on actual generation, 8 of the largest 10 power plants produce electricity from renewable resources.[22](#)

In 2021, hydropower provided 51% of Idaho's total in-state electricity generation.[23](#) Just over half of Idaho's utility-scale (1 megawatt or larger) electricity generating capacity is at hydroelectric power plants, and 6 of the state's 10 largest power plants ranked by the actual amount of electricity generated are hydroelectric facilities.[24,25](#) The nation's largest privately-owned conventional hydroelectric generating facility, the Brownlee plant, is on the Idaho-Oregon border. The three-dam complex, owned by Idaho Power, is on the Snake River in Hells Canyon, which is the deepest river gorge in North America.[26,27](#)

Although only a small amount of the state's land area is suitable for wind power development, Idaho has substantial wind energy potential in the southern half of the state along the Snake River and on mountain ridges across the state.[28](#) In 2021, about 16% of the state's total in-state electricity net generation came from wind facilities, whose total combined generating capacity was nearly 1,000 megawatts. Idaho's electricity generation from utility-scale wind power farms began in 2006. The state's 10th-largest electricity generating plant is a 125-megawatt wind facility.[29,30,31](#) Idaho's wind farms are located on the Snake River Plain. [32](#)

Idaho's first utility-scale solar photovoltaic (PV) electricity generation was in 2016, when three solar power generating facilities came online.[33,34](#) Solar heating and small-scale, customer-sited solar panel generating systems can be found in the state's cities and rural areas. About 90% of Idaho's solar PV electricity generation came from utility-scale facilities in 2021, when total solar power accounted for 4% of the state's net generation.[35,36,37](#)

About two-fifths of Idaho is covered by forests.³⁸ Biomass, primarily wood waste from those forests, provided 3% of the state's total in-state electricity generation in 2021. Other waste biomass and landfill gas also generate electricity in the state.³⁹⁻⁴⁰ Idaho's biomass resources provide feedstock for the state's three wood pellet manufacturing plants, which have a combined production capacity of 75,000 tons per year.⁴¹

In 2021, Idaho was one of seven states with utility-scale electricity generation from geothermal energy.⁴² Although geothermal energy provides less than 1% of the state's net generation, Idaho's volcanic landscape has some of the best geothermal potential in the nation. The state's wealth of hot springs and other geothermal resources have long been used as direct heat sources for aquaculture, greenhouses, spas, resorts, and city district heating. In 2008, the first commercial geothermal power plant in the U.S. Northwest came online in south-central Idaho. The 10-megawatt capacity facility is the state's only geothermal power plant.⁴³⁻⁴⁴⁻⁴⁵⁻⁴⁶

Idaho has no renewable portfolio standard (RPS) requiring that a specific amount of electricity come from renewables by a certain date.⁴⁷ The state offers low-interest loans for energy efficiency and renewable energy projects and tax deductions for small-scale renewable energy-fueled devices used for residential heating or electricity generation.⁴⁸⁻⁴⁹ Each of Idaho's three investor-owned electric utilities offers net metering programs for small-scale, customer-sited renewable generation. Idaho's commercial, residential, and agricultural customers are all eligible for net metering.⁵⁰⁻⁵¹⁻⁵²

Electricity

Hydroelectric power plants typically supplied more than two-thirds of Idaho's in-state generation. However, in recent years, drought and increased generation from other renewables have reduced hydropower's share of the state's total annual generation to slightly more than half. The balance of Idaho's in-state generation is supplied mostly by natural gas and wind power. In 2021, natural gas accounted for about one-fourth of Idaho's electricity generation and wind accounted for more than one-sixth.⁵³

Three large investor-owned electric utilities supply about four-fifths of the state's electricity. About two dozen municipal utilities and rural electric cooperatives provide the rest, and they buy almost all of their electricity from the Bonneville Power Administration (BPA), which markets electricity mainly from hydroelectric facilities at federal dams in the Pacific Northwest.⁵⁴⁻⁵⁵ About one-third of the electricity consumed in Idaho comes over interstate transmission lines from out-of-state generating facilities owned by Idaho utilities and from the BPA.⁵⁶⁻⁵⁷⁻⁵⁸

Idaho's only coal-fired power plant is an industrial combined-heat-and-power (CHP) facility.⁵⁹ Although coal's share of in-state electricity generation is minimal—about 0.1% in 2021—Idaho's utilities bring in electricity from coal-fired power plants in neighboring states.⁶⁰⁻⁶¹⁻⁶² However, a coal-fired power plant in Oregon that supplied electricity to Idaho closed in 2020, and other coal-fired generation in neighboring states is set to shut down over the next several years. Idaho's largest electric utility plans to end its coal-fired power generation purchases by 2028.⁶³⁻⁶⁴⁻⁶⁵

The state has no commercial nuclear power plants, but the Idaho National Laboratory (INL), a federal nuclear energy research center and one of the state's largest employers, was the site of the nation's first nuclear power plant. It first generated electricity in 1951.⁶⁶⁻⁶⁷⁻⁶⁸ Currently, plans are underway to build on the INL site the first power plant with six small modular nuclear reactors—each with 60 megawatts of generating capacity. The power plant, which is scheduled to be online by 2029, will be a smaller, scalable version of the widely-used light water reactor technology.⁶⁹⁻⁷⁰⁻⁷¹⁻⁷²⁻⁷³

The region's transmission lines are increasingly congested, and projects are under way to expand capacity both to supply Idaho with electricity and to transport power among several western states including Wyoming, Idaho, and Oregon. In the near term, most new generating capacity planned in the region will be fueled by renewable energy sources. The transmission projects are also designed to enable development of the region's remote renewable resources.⁷⁴⁻⁷⁵

Idaho has the lowest average electricity retail price of any state.

Idaho has the lowest average electricity retail price among the states, in part because of the large proportion of generation that comes from relatively inexpensive hydropower.⁷⁶ In 2021, the largest share of electricity retail sales went to the state's industrial sector—which accounted for 37% of the state's total—followed closely by the residential sector at almost 37% and the commercial sector at 26%.⁷⁷ About one-third of Idaho households use electricity as their primary energy source for home heating.⁷⁸

Profile Analysis [Print State Energy Profile](#)

(overview, data, & analysis)

Last Updated: February 17, 2022

Overview

Oregon sits on the U.S. Pacific Coast between the more populous states of Washington and California.¹ The Columbia River forms much of Oregon's northern border with Washington and cuts through both the Cascade Mountain Range and the Coastal Ranges, forming the Columbia Gorge, an area of high wind energy potential.^{2,3} Large dams along the Columbia River produce most of the hydroelectric power in Oregon and throughout the Pacific Northwest. High annual rainfall in the western part of the state coupled with runoff from the snowpack in the state's mountains make it possible for Oregon to generate substantial amounts of hydroelectric power.^{4,5} Mild temperatures and abundant rainfall in western Oregon contribute to rapid tree growth, which, along with agricultural residues, are ample sources of biomass for power generation.^{6,7} The Cascade Mountains are volcanic in origin, and in addition to containing the nation's deepest lake, they have the state's greatest geothermal resources. East of the Cascades is the Columbia Plateau, which, like the Basin and Range area along Oregon's southern border with California, is more arid than the areas west of the Cascades.⁸ However, the high desert country and uplands of southern and eastern Oregon are promising sites for wind, solar, and geothermal energy development.^{9,10,11} Oregon has only minor fossil energy reserves and no nuclear power reactors.^{12,13,14} Energy use per capita in Oregon is less than in almost three-fourths of the states.¹⁵ The transportation sector accounts for three-tenths of state end-use sector total energy consumption. The industrial sector is the second-largest energy consumer, followed closely by the residential sector. Each of those sectors accounts for about one-fourth of the state's end-use sector total energy consumption, and the commercial sector accounts for about one-fifth.¹⁶ Although the state's agriculture, food processing, and forestry activities, including the manufacture of forest products, are energy-intensive, most of Oregon's gross domestic product (GDP) comes from non-energy-intensive businesses. Computers and electronic products accounted for almost half of the state's manufacturing GDP in 2020, and Oregon's industrial sector per capita energy consumption is less than in two-thirds of the states.^{17,18} In part because most of Oregon's population centers are in mild climate zones in the Willamette Valley and along the Pacific Coast west of the Cascades, the state's residential sector energy use per capita ranked 42nd in the nation in 2019.^{19,20,21}

Electricity

Hydroelectric power typically provides more than half of Oregon's in-state total electricity net generation. However, because of abnormally dry weather and drought in recent years, hydroelectric power supplied less than half of Oregon's in-state net generation in 2019 for the first time in more than 20 years. In 2020, hydroelectric power accounted for 50% of Oregon's in-state electricity generation.^{22,23} Nevertheless, Oregon was the second-largest hydroelectric power producer in the nation in 2020.²⁴ Oregon's four largest electricity generating facilities—John Day, The Dalles, Bonneville, and McNary—are on the Columbia River and are all at federally owned and operated dams, the youngest of which is 50 years old. They account for two-thirds of the generating capacity from the 10 largest power plants in the state. The Bonneville Power Administration markets the power they produce.^{25,26} Many smaller hydroelectric plants along Oregon's rivers also supply the state with power.²⁷

Hydroelectric power typically provides more than half of the electricity generated in Oregon.

Natural gas fuels the second-largest share of Oregon's electricity generation. In 2020, natural gas-fired power plants provided 30% of the state's total net generation. Nonhydroelectric renewable resources—wind, solar, biomass, and geothermal power—provide almost all the rest of Oregon's total generation, almost 18% in 2020. Two decades ago, coal fueled about 10% of Oregon's in-state net generation, but, by 2020, coal's share was less than 3%, and Oregon's only coal-fired power plant closed in October 2020.^{28,29} There are no commercial nuclear power plants in the state.³⁰ Oregon's only nuclear power plant shut down after cracks in the steam tubes were detected in 1992. The plant was decommissioned and demolished in 2006.³¹

Oregon's total electricity retail sales per capita are near the U.S. average.³² The residential sector, where about half the households heat with electricity, accounted for almost two-fifths of Oregon's electricity retail sales in 2020.³³ The commercial sector and the industrial sector each accounted for slightly more than three-tenths. The transportation sector consumed a small amount of electricity.³⁴

In every year since 2007, Oregonians used less electricity than the state's power plants generated and the excess power went to other states by way of the Western Interconnection—one of North America's principal power grids.³⁵ The Western Interconnection reaches from western Canada down to Baja California in Mexico and stretches from the Pacific

Ocean eastward across the Rocky Mountains to the Great Plains.³⁶ Major transmission lines of the Western Interconnection link Oregon's electricity grid to California's grid, allowing for large interstate electricity transfers between the Pacific Northwest and the Southwest. The 846-mile Pacific Intertie Direct Current transmission line, which runs from the Oregon-Washington border to Los Angeles, can move up to 3,220 megawatts of power.³⁷ Although originally designed to transmit electricity south during California's peak summer demand season, the flow sometimes reverses at night and in the winter when power demand to meet heating needs increases in the Pacific Northwest.³⁸ Oregon partnered with Washington, California, and British Columbia, Canada, to create the West Coast Electric Highway corridor, a network of public charging stations for electric vehicles located every 25 to 50 miles along Interstate 5 and other major roads in the Pacific Northwest. It is part of the West Coast Green Highway system that spans more than 1,300 miles from British Columbia to Baja, Mexico.³⁹⁻⁴⁰ As of February 2022, there were about 900 public electric charging stations with more than 2,100 charging ports in service across Oregon.⁴¹ The state is also part of the Multi-State Zero Emission Vehicle (ZEV) collaborative.⁴² As of December 2020, Oregon had almost 23,000 registered all-electric vehicles.⁴³

Renewable energy

In 2020, wind power accounted for 14% of Oregon's in-state electricity generation.

In 2020, renewable resources, led by hydroelectric power, accounted for about 68% of Oregon's total in-state electricity net generation.⁴⁴ Although hydroelectric power accounted for three-fourths of the state's renewable generation, utility-scale (1 megawatt or larger) electricity generation from nonhydroelectric renewable sources more than doubled during the past decade. Wind accounted for the largest share of the increased generation.⁴⁵ In 2020, wind power accounted for 14% of Oregon's total in-state electricity net generation.⁴⁶ Most of the state's wind farms are along the Columbia Gorge and in eastern Oregon's Blue Mountains.⁴⁷ By November 2021, Oregon had almost 3,800 megawatts of wind capacity.⁴⁸ A 200-megawatt wind farm in northern Oregon is scheduled to come online in 2022.⁴⁹

In 2020, solar energy supplied about 2% of Oregon's total electricity net generation, including small-scale (less than 1 megawatt) installations, surpassing the contribution from biomass for the first time. All of Oregon's solar powered electricity generation is photovoltaic (PV).⁵⁰ The state's first utility-scale solar facilities came online in late 2011, but most of Oregon's solar generation came from rooftop and other small-scale solar power installations until 2017.⁵¹ Several larger utility-scale solar projects came online since then. A 56-megawatt solar PV facility came online in October 2017, and the state's first solar PV facility with greater than 70 megawatts of capacity came online in 2021.⁵² There are additional larger solar PV projects in development, and more than 400 megawatts of solar PV capacity is scheduled to come online in 2022.⁵³

Biomass generates most of the rest of Oregon's renewable-sourced electricity—about 1.5% of the state's total net generation in 2020.⁵⁴ Wood and wood waste fuel most of the state's biomass generation, but landfill gas, municipal solid waste, and other biomass-fueled facilities also contribute.⁵⁵⁻⁵⁶ Forest covers almost half of the state, and many industrial facilities in Oregon use woody biomass to generate electricity.⁵⁷⁻⁵⁸ Biomass is also a thermal energy source, and some commercial facilities in the state, including schools and hospitals, use wood for space heating. About 6% of Oregon households heat with wood.⁵⁹⁻⁶⁰ Oregon also has five operating wood pellet manufacturing facilities with a combined production capacity of more than 250,000 tons per year, or about 2% of the nation's total.⁶¹

Although geothermal energy accounts for less than 1% of Oregon's net generation, the state has excellent geothermal resources.⁶²⁻⁶³ A U.S. Department of Energy study ranked the state's geothermal potential third in the nation, after Nevada and California.⁶⁴ Oregon's Cascade Mountains are an active volcanic region and, along with other high-temperature geothermal areas in the state, have an estimated 2,200 megawatts of electricity generating potential.⁶⁵⁻⁶⁶ Oregon has two geothermal power plants, but only one is operational. The state's larger geothermal power plant, built in 2012, is active and has about 18 megawatts of capacity. The second and much smaller geothermal power plant, with a capacity of about 2 megawatts, has been offline since 2017.⁶⁷⁻⁶⁸ Oregon residents have used low-to-moderate temperature geothermal resources for more than a century in direct heat applications. Almost the entire state east of the Cascade Range has ample low- to mid-temperature geothermal resources, and there are more than 2,000 thermal wells and springs in Oregon that furnish direct heat to buildings, communities, and other facilities in the state.⁶⁹⁻⁷⁰

Oregon is in the early stages of tapping its marine and hydrokinetic—wave and tidal—energy resources.⁷¹ A U.S. Department of Energy-funded investigation led by Oregon State University has two marine test sites off the coast of Newport, Oregon. The first, PacWave North, is a stand-alone test site for small-scale technologies. A second site, PacWave South, will be the first full-scale grid-connected, wave energy conversion technology test facility in the United States. When complete, the 20-megawatt capacity site will be the largest grid-connected wave energy testing facility in the world.⁷²⁻⁷³ Construction of PacWave South began in mid-2021.⁷⁴

In 2021, Oregon's legislature increased its Clean Energy Standard (CES). The legislature established a 100% clean energy target for the state's largest investor-owned utilities. The law calls for a reduction in greenhouse gas emissions of 80% of

baseline by 2030, 90% by 2035, and 100% by 2040.⁷⁵ Oregon's original renewable energy portfolio standard (RPS) required that the state's largest utilities—those with more than 3% of the state's electricity retail sales—acquire at least 50% of the electricity they sell from renewable-sourced generation by 2040.⁷⁶

Natural gas

Oregon has the only natural gas field in the Pacific Northwest.

Oregon has the only natural gas field in the Pacific Northwest—the Mist field of northwestern Oregon, discovered in 1979—but the state does not have significant natural gas reserves or production.⁷⁷⁻⁷⁸⁻⁷⁹ Although it produces only a small fraction of the U.S. total, Mist Field production reached a high of 4.6 billion cubic feet of natural gas per year in the mid-1980s. Annual natural gas production from the field declined to 320 million cubic feet in 2020.⁸⁰ Mist Field also contains two of the state's underground natural gas storage reservoirs.⁸¹⁻⁸² Oregon's natural gas storage fields have a combined capacity of about 35 billion cubic feet.⁸³ Typically, natural gas is put into storage during warmer months, when prices and demand are low, and removed from storage reservoirs during colder months to meet peak customer heating demand. However, natural gas withdrawals occur at other times to meet the needs of electricity suppliers as they balance intermittent generation from renewable energy resources, particularly wind.⁸⁴

Natural gas supplies enter Oregon by way of interstate pipelines, primarily from western Canada through Washington and from domestically produced natural gas that arrives through Nevada and Idaho. Almost all of the natural gas that enters Oregon continues on to California markets.⁸⁵⁻⁸⁶ Several Oregon liquefied natural gas (LNG) import/export terminal projects have been proposed since 2005, but none remain active.⁸⁷⁻⁸⁸⁻⁸⁹

Oregon's total and per capita natural gas consumption is less than in two-thirds of the states.⁹⁰ The electric power sector receives half of the natural gas delivered to Oregon consumers. The industrial sector accounts for about one-fifth of state consumption. The residential sector, where almost two-fifths of Oregon households use natural gas as their primary energy source for home heating, accounts for slightly more than one-sixth of natural gas deliveries, and the commercial sector uses almost all the rest. The transportation sector uses a very small amount of compressed natural gas as vehicle fuel.⁹¹⁻⁹²

Solar power in Idaho

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Solar panels

Solar power in Idaho comprised 550 MW in 2019.^[1] A 2016 report by the [National Renewable Energy Laboratory](#) estimated that rooftops alone have the potential to host 4,700 MW of solar panels, and thus provide 26.4% of all electricity used in [Idaho](#).^[2] A large increase in the state's solar generating capacity began starting year 2015 when 461 MW of solar power was contracted to be built in Idaho.^[3]

[Net metering](#) is limited to 25 kW for residential users, and 100 kW for commercial users, other than for Avista Utilities customers, where the limit for all users is 100 kW

Idaho sets record low solar price as it starts on shift to 100% renewables

[Joshua S Hill](#) 2 April 2019 [0](#)



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State utility Idaho Power has agreed to buy 120MW of power from a future solar project in the state's south at a cost of US2.175¢/kWh – a potentially record-low cost for solar power in the US

The announcement came at the same time that Idaho Power announced it had set a goal to provide 100 per cent clean energy by 2045.

Idaho Power signed a 20-year Power Purchase Agreement (PPA) with Idaho-based Jackpot Holdings for the power generated from a solar power project to be built south of Twin Falls and which will help the company replace power produced from the North Valmy coal-fired power plant in Nevada.

The 120 MW project is expected to be completed by 2022 and will connect to an existing transmission line that currently delivered power from the coal power plant.

More importantly, however, is the price Idaho Power will be paying for the electricity, which was awarded at US\$21.75/MWh – or 2.175¢/kWh, one of the lowest-cost solar contracts of its size that has been publicly reported.

It is lower than existing publicly known prices for solar PPAs which include a [2.375¢/kWh contract](#) awarded to 8minutenergy in Nevada, a [2.49¢/kWh](#) solar project in Arizona, and a project in Austin, Texas, which is believed to be below [2.5¢/kWh](#).

“Today’s announcement reflects Idaho Power’s commitment to resources that balance environmental stewardship with affordability and reliability,” [said Idaho Power President and CEO Darrel Anderson](#). “This deal will provide energy that is not only clean but is also at a cost that benefits our customers.”

At the same time, Idaho Power announced that it has set a goal of providing its customers with 100% clean energy by 2045 – a move which will see the company invest in additional wind, solar, and other clean sources, to compliment its existing hydropower facilities, which already provide around half of customers’ energy demands.

This decision makes Idaho Power one of the first publicly owned energy companies to set a goal for reaching 100% clean energy and doubles down on the company’s existing “Path Away From Coal” which will see the company part ways with two of its three coal-fired power plants by 2025, as it explores ending its participation with the third and final plant.

The company has also already reduced its carbon emissions intensity by almost 50% since 2005.

“Providing 100-per cent clean energy is an important goal for Idaho Power. More and more customers are telling us it is important to them, too,” [said Darrel Anderson](#).

“We believe this goal is attainable. We have a great head start, thanks to our clean hydropower plants that produce almost half the energy our customers use. Our recently signed agreement with Jackpot Holdings moves us even closer.”

“This plan demonstrates Idaho Power’s commitment to doing what’s right for customers’ pocketbooks and the environment,” added Idaho Governor Brad Little. “It also shows innovation can improve our lives with solutions that are reasonably priced, responsible and delivered without government intrusion.”

Idaho Power has promised to announce additional investments in wind, solar, other clean energy sources, and to invest in clean energy storage as well.

Solar

Home > Energy and the Environment > Energy > Our Energy Sources > Solar

- Cloud Seeding
- Hydroelectric Plants
- Other Renewables
- Relicensing
- Solar
- Natural Gas
- Our Path Away from Coal
- Wind and Other Renewables

The declining cost of solar technology, along with tax incentives and other factors, has made solar power more popular in recent years.

Idaho Power Solar Contracts

Idaho Power has contracts with 20 commercial solar-energy projects that have a combined capacity of 319 MW. These 20 agreements comply with the Public Utility Regulatory Policies Act (PURPA), which requires utilities like Idaho Power to buy all energy generated by certain facilities.

We also buy energy from the 120-MW Jackpot Solar plant south of Twin Falls, Idaho. This plant began generating energy in late 2022.

Idaho Power does not own or operate these projects.

Customer Generation

Some of our customers have installed solar systems on their homes or businesses to offset some of their energy costs. Here's some [important information](#) to keep in mind if you are thinking about installing a solar system or other customer generation.

Idaho Power Uses Rooftop Solar

Our Boise corporate headquarters' photovoltaic (PV) array, installed in 1994, is a 25-kilowatt (kW) rooftop solar system. The electricity created helps power the building and provides enough energy to operate all the computers on a single floor - just over 100 kilowatt-hours per day.

A similar-sized system was installed on our Twin Falls Operations Center in 2016.

The amount of energy these arrays generate varies depending on the season and weather.

Solar in Idaho Power's Daily Operations

Idaho Power uses small PV panels in its daily operations to power equipment used for checking water quality, measuring stream flows and operating cloud-seeding equipment.

In addition to these PV installations, Idaho Power:

- Participates in the [Solar 4R Schools](#) program.
- Donated a 2.7-kilowatt array (36 75-watt PV modules) to the Foothills Learning Center.
- Installed an 18.5-kilowatt array to boost voltage on a remote distribution line near Shoshone, Idaho ([video](#)).
- Operates a Solar-Enhanced Lighting^{1M} system in one of its downtown Boise parking lots. The system was installed in July 2013 and is designed to produce as much energy during the day as the lights consume at night while illuminating the parking lot.
- Participated in installing solar panels at Celebration Park, near Melba, Idaho. The panels supply electricity to the park's outdoor lighting and visitor center, with any additional power going back to the electrical grid.



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Customer Service
Treasure Valley: 208-388-2323
Toll Free: 1-800-488-6151

P.O. Box 70
Boise, ID 83707

Idaho Power Payment Processing
P.O. Box 5381
Carol Stream, IL 60197-5381



State Solar Power Rankings

1

Arizona's place

in solar ranking You can save a lot of money if you become a solar power producer
AZNMNVLACACOTXUTWYFLKSOKORGASCNEIDNCALMSSDVAMOARW
AMDTNDEKYNJILIARINYMTCTINMANDMNWVPANHMEWIOHVTMI
Medium Potential High Potential

[ABOUT STATE](#)

- \$54 353 Average lifetime savings
- 7 years Average system payback period
- 6 ¢ /kWh Levelized cost of solar energy
- 4.78 kW Recommended system size
- \$11 151 Average cost of a 4 kW solar power system in 2023
- 6.30 kWh / m² / day Average solar radiation per day

[Shop solar panels](#) [Calculate your system](#)

State	Rank	AC Energy (kWh)	Solar Radiation (kWh / m ² / day)
Arizona	1	9110.80	6.58
New Mexico	2	9303.20	6.49
Nevada	3	8817.30	6.09
Louisiana	4	8932.90	6.06
California	6	8431.80	5.95
Colorado	7	9199.50	5.76
Wyoming	8	8487.95	5.53
Utah	9	7947.10	5.51
Oklahoma	10	8265.10	5.41
Florida	11	7607.65	5.35
Georgia	12	7667.95	5.26
South Carolina	13	7864.70	5.23
Nebraska	14	8247.65	5.22
Texas	15	7785.75	5.21
Idaho	16	7931.95	5.15
North Carolina	17	7558.75	5.13
Alabama	18	7517.00	5.11
Mississippi	19	7524.90	5.09
Kansas	20	7802.45	5.06

State	Rank	AC Energy (kWh)	Solar Radiation (kWh / m² / day)
<u>South Dakota</u>	21	7894.50	5.01
<u>Virginia</u>	22	7400.65	5.01
<u>Missouri</u>	23	7503.50	4.94
<u>Arkansas</u>	24	7521.30	4.93
<u>Maryland</u>	26	7529.85	4.83
<u>Tennessee</u>	27	7212.10	4.82
<u>Delaware</u>	28	7580.50	4.81
<u>Iowa</u>	29	7419.00	4.72
<u>Kentucky</u>	30	7151.80	4.68
<u>New Jersey</u>	31	7303.45	4.67
<u>Illinois</u>	32	7335.50	4.67
<u>North Dakota</u>	33	7557.45	4.65
<u>New York</u>	34	7115.25	4.62
<u>Montana</u>	35	7067.95	4.60
<u>Rhode Island</u>	36	7135.55	4.59
<u>Indiana</u>	37	7304.75	4.58
<u>Massachusetts</u>	38	7137.80	4.55
<u>Connecticut</u>	39	7044.80	4.53
<u>New Hampshire</u>	40	7091.80	4.52
<u>Minnesota</u>	41	7325.95	4.51
<u>West Virginia</u>	42	6804.50	4.50
<u>Ohio</u>	43	7082.30	4.48
<u>Wisconsin</u>	44	7128.75	4.47
<u>Pennsylvania</u>	45	6668.75	4.46
<u>Maine</u>	46	6837.00	4.39
<u>Michigan</u>	47	6901.30	4.38
<u>Vermont</u>	48	6682.55	4.33
<u>Oregon</u>	49	6246.20	4.31
<u>Washington</u>	50	5774.60	3.84

No two states are alike

The solar industry is growing rapidly. Many people are choosing to turn to renewable energy and installing solar panels because it's trendy, eco-friendly, and profitable. But does it work the same for everybody in the US? Well, different states offer different solar irradiance, electricity rates and solar incentives, which form the basis of the U.S. Solar Ranking.

The best states for going solar are those with the shortest payback period. For example, residents of Arizona – #1 solar state – can get back the money they pay for a solar system installation just in 3 years and enjoy free electricity from then on. This is the combination of high electricity prices, abundant solar radiation, and local solar rebates and incentives that makes going solar a profitable investment. There are some other factors to take into account, though: availability of RPS (Renewable Portfolio Standard) and Net Metering, property and sales tax exemption, and tax credits.

See how much of its wind energy potential Idaho uses

Wind power is generated when kinetic energy from turbine propellers is converted to mechanical energy.

Even though wind isn't always present, turbines can still actively generate energy 90% of the time through the use of [stored energy surpluses](#). Turbines typically need to be located at higher elevations, where winds tend to be steadier and stronger, but there are alternate ways to utilize wind energy alongside other renewable sources, as has been shown with projects in Oregon and Nevada. Turbines can also be placed on offshore floating platforms, as planned in California.

Using data from the [Office of Energy Efficiency and Renewable Energy](#) (EERE), [Stacker](#) compared installed wind energy capacity in the continental U.S. to potential wind energy capacity [nationally](#). The EERE calculated wind energy potential through surveying wind patterns at 80 meters throughout the country and selecting suitable wind turbine locations, accounting for legal and technical factors. Stacker also utilized data from the [Energy Information Administration](#) to contextualize what percent of electricity generation is currently sourced from wind power in each state.

Idaho by the numbers

- Potential wind energy capacity: 212,830 megawatts
- Currently installed wind energy capacity: 973 megawatts
- Current wind energy generation as percent of state's electric grid: 14.2%

[Training for wind energy jobs in Idaho](#) is available to pre-college students: There are seven high schools involved with the Wind for Schools Project. Those who want to continue their education can attend three state colleges and universities. One proposed wind farm would [generate \\$4 million annually in tax revenues](#) and power 300,000 homes.

Nationally, the [American Jobs Plan](#) sets the intention to achieve carbon-free electricity by 2035, and wind is an obvious component in this game plan.

However, there has been pushback in response to aesthetic and [auditory impacts of wind farms](#), even though many are located miles offshore, and noise is less than that from a close-up, two-person conversation.

Statistics for the national capacity of wind energy in 2017, the most recent data available, stands at almost 85,000 megawatts, versus just short of 17,000 10 years earlier.

Comparatively, potential wind energy stands at 10,640,079 megawatts when collected at an altitude of 80 meters.

Many of the statistics noted here comment on the kilowatt capabilities of the different wind energy projects. For context, the U.S. Energy Information Administration reports that an [average U.S. household consumes about 877 kilowatt-hours](#) (kWh) monthly, or more than 10,000 kWh annually.

One notable insight in this state-by-state review of wind energy is there is a dearth of wind energy in many southern states. [Reasons for this include insufficient wind](#) in some regions, alongside solar energy availability that makes investment in a new form of renewable energy less appealing.

Continue reading to learn what's happening around the country in terms of wind power.

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

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

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

mm/sec = millimeters per second

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

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

**STRATEGIC HEALTH IMPACT ASSESSMENT ON
WIND ENERGY DEVELOPMENT IN OREGON**

March 2013

Prepared By:
Public Health Division
Oregon Health Authority

Final Report

This Health Impact Assessment report was released for public comment on January 3, 2012. During the 90-day comment period, the Oregon Health Authority's Public Health Division (PHD) received more than 1,000 pages of comments and reference materials. PHD revised this report based on comments received during the public comment period. PHD produced a "Response to comments" report which provides additional information on our revision process, the revisions made in this documents, and responses to other comments.

Prepared By:

Sujata Joshi, MSPH
Epidemiologist

Jae P. Douglas, Ph.D.
Principal Investigator and Manager,
Research and Education Services

Andrea Hamberg, BA
HIA Program Coordinator

Salom Teshale, BS
HIA Intern

Daniel Cain, BS
Industrial Hygienist

Julie Early-Alberts, MS
Manager, Research and Education Services
Healthy Communities Unit

Reviewed By:

Mel Kohn, MD, MPH

State Health Officer and Director, Public Health Division, Oregon Health Authority

Gail R. Shibley, JD

Former Administrator, Center for Health Protection, Public Health Division, Oregon Health Authority

Jae P. Douglas, PhD

Principal Investigator and Section Manager, Research and Education Services, Center for Health Protection, Public Health Division, Oregon Health Authority

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Casey Beard

Laura Madison

Tom Stoops

Barry Beyeler

Brendan McCarthy

Teri Thalhofer

Charles Gillis

Doris Penwell

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Finally, we thank this project's funders, the Association of State and Territorial Health Officials and the Centers for Disease Control and Prevention, for their continued support to build state and local capacity to conduct Health Impact Assessment in Oregon.

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Foreword

Wind Energy is an important area of renewable energy development for the Pacific Northwest and for the United States. As a key area of energy and economic development, wind energy has positive contributions to offer to Oregon and to the communities that host and are served by wind energy projects. In response to ever-growing energy demand and concerns over environmental and health impacts of petroleum and coal-based energy production, many states have enacted laws and policies requiring that increasing portions of their energy portfolios be derived from sustainable energy production, such as hydro, wind, solar, geo-thermal and wave sources. In 2007, Oregon's Legislature enacted one of the most aggressive sustainable energy plans among other states in the U.S. by passing a renewable energy bill that requires large utilities to obtain at least 25% of their retail electricity portfolio from renewable sources by 2025.

There is little doubt that sustainable energy development is here to stay, but some who live and work in locations where this development is occurring are expressing mixed reactions to the projects being built in their backyards. As these developments are sited near more communities around the state, there are questions and concerns about the potential impacts these projects have on nearby communities

Health Impact Assessment (HIA) is a tool that is being used with increasing frequency around the world. Developed in the European Union in the 1990's and ratified by consensus of the World Health Organization, HIA is "a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population."¹ HIAs are guided by the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."²

An HIA, as endorsed by the World Health Organization, aims to ensure that:

- people can meaningfully participate in a transparent process for the formulation, implementation and evaluation of policies that affect their health, both directly and through elected political decision makers,
- both positive and negative impacts are shared equitably across a community,
- both short term and long term impacts are considered in the decision-making process, and
- different scientific disciplines and methodologies are used as needed to get as comprehensive an assessment as possible.

This Health Impact Assessment was conducted as a "strategic HIA", as differentiated from a site-specific HIA. A site-specific HIA is designed primarily to answer questions about the health impact of a specific project. In contrast, this HIA is a more general assessment of the ways that wind energy developments in Oregon might affect the health of individuals and communities where they are built and maintained. It is

¹ World Health Organization Gothenburg consensus paper (1999). Available from: <http://www.apho.org.uk/resource/item.aspx?RID=44163>. Accessed November 16, 2011.

² Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946. Available from: <http://www.who.int/about/definition/en/print.html>. Accessed November 16, 2011.

designed to provide both a framework and relevant reference material for future HIAs that may be conducted on proposed wind energy installations. It is intended for use in Oregon, but we recognize that there are communities outside of Oregon where wind energy is being proposed and developed who may also find this a useful framework.

All development projects have both advocates and opponents, and the passions around wind energy developments in Oregon were running high when this HIA was conceived and executed. So it is not at all surprising that this HIA engendered some controversy. I want to recognize the staff that worked on this HIA, particularly the project lead, Dr. Jae Douglas, and thank them for their willingness to guide this project through those choppy waters, and maintain their professionalism and commitment to the goals of this project. Similarly, I want to recognize and thank the members of the project Steering Committee for their extremely constructive engagement with us, despite the passions which this work may have aroused.

Sometimes in the heat of controversy about development projects, economic development and health protection get portrayed as in opposition to one another. But this is a false dichotomy. A robust economy is a powerful driver of good health, just as healthy workers are a critical ingredient to a sustainably robust economy. Both are needed for a truly healthy community. While individual decisions related to a specific development project may of necessity involve compromising one of these goals in favor of another, the long-term public interest is best served when the interdependence of these goals is recognized and balanced through a process that empowers people to shape their lives and communities. It is my hope that this HIA will be a useful tool to do just that for future wind energy development projects in Oregon.

Mel Kohn, MD, MPH
State Health Officer and Director, Public Health Division
Oregon Health Authority

I. Key Findings and Recommendations

Wind energy
in Oregon

Wind is a renewable source of energy that increasingly is used to generate electricity in the U.S. and globally. In the U.S., the total installed wind energy capacity grew from 2,472 MW in 1999 to 40,180 MW in 2010 [1]. In the same time period, the total installed generating capacity in Oregon grew from 25 MW to 2,104 MW, and accounted for 7.1% of Oregon's net electricity generation in 2010 [2]. As of 2011, most of Oregon's wind energy development has taken place in north-central and northeastern areas of Oregon, with some development planned in central Oregon.

The growth in wind energy development in Oregon has been influenced by state and national initiatives to reduce greenhouse gas emissions, increase energy security, and promote economic growth in rural areas [3]. One such initiative is the Oregon Legislature's enactment of a Renewable Portfolio Standard (RPS) in 2007. This standard requires electric utilities in Oregon to provide a certain percentage of electricity sold to retail customers from renewable energy sources by 2025; this percentage ranges from 25% for the largest utilities to 5% for the smallest utilities [4]. Wind energy development is expected to continue in the near future because of the RPS, growing energy demand in the Northwest, and the relative cost-effectiveness of wind energy compared to other sources of renewable energy [5].

HIA Purpose,
Objectives
and Methods

The Oregon Health Authority's Public Health Division (PHD) conducted this strategic Health Impact Assessment (HIA) in response to a convergence of questions about potential health impacts from wind energy facilities in Oregon. HIA is "a structured process that uses scientific data, professional expertise, and stakeholder input to identify and evaluate public health consequences of proposals [or projects] and suggests actions that could be taken to minimize adverse health impacts and optimize beneficial ones" [6]. This strategic HIA is intended to assist stakeholders to understand and respond to health-related questions at new wind energy developments in Oregon, and provides a framework to guide assessments and decisions for specific projects. This HIA was conducted by PHD and was funded under grants from the Association of State and Territorial Health Officials and Centers for Disease Control and Prevention to build capacity in state health departments for conducting HIAs.

The objectives of this HIA were to:

- Identify community questions and concerns about any potential health impacts from wind energy facilities, and assess the available evidence for health impacts of highest priority for stakeholders in Oregon.
- Develop evidence-based recommendations for elected officials, the Oregon Department of Energy (ODOE), the Energy Facility Siting Council (EFSC), public health officials, the wind energy industry and community members to consider in future wind energy facility siting decisions.
- Engage community members in the HIA process, and provide them and other stakeholders with timely and useful information.
- Increase awareness of and knowledge about HIA and assess its use for specific wind farm siting decisions.

Methods

To establish the scope of this HIA, PHD collected information on questions, issues and concerns about potential health impacts from wind energy facilities in Oregon during three community listening sessions and an online questionnaire. Based on these data, PHD identified five domains, or areas of study, to assess in this HIA: noise, visual impacts, air pollution, economic effects, and community conflict. For each domain, PHD identified key research questions and conducted a literature review. The review focused on research and publications in peer-reviewed public health, engineering, social science, and other journals; reports and studies by state, federal and international governmental agencies; and information published by industry groups, community members, and non-profit organizations. PHD included baseline data on current conditions in Oregon when available and appropriate.

Steering
Committee

For this HIA, PHD convened and consulted with a steering committee that included representatives from ODOE, EFSC, county elected officials, a county public health director, a city community development director, community members, the wind energy industry, and private wind energy developers. The Steering Committee met four times from December 2010 to July 2011. During these meetings, the committee helped PHD define the HIA's objectives, scope and research questions, and identify research studies and resources for the assessment. The Steering Committee served in an advisory role only and did not write or provide final approval for this report.

How to use
this HIA

This strategic HIA does not replace the need for and value of site-specific assessments on individual wind energy developments in local communities. As noted in several places in this report, it is difficult to generalize about health and other impacts without specific information about a proposed facility and the impacted community. Further, local communities may have health-related questions not addressed in this report. Therefore, this report serves as a starting point for stakeholders to understand potential health impacts from wind energy developments, and assess the need and scope for site-specific assessments for future developments in Oregon.

The findings and recommendations in this strategic HIA reflect an intensive effort by PHD staff and management to review, assess, and synthesize the best available scientific and other credible literature on these topics. Despite our best efforts, we acknowledge that our review was constrained by limited scientific information on some topics, and limited staff time and resources to conduct an exhaustive review on these issues. Given the evolving scientific evidence on how environmental, social, and economic factors influence health, the findings and recommendations in this report may need to be revisited as new information becomes available.

This report is organized by the five areas of study: noise, visual impacts, air pollution, economic effects and community conflict. The Supporting Documentation section has detailed information from our assessment of these five domains, and the Appendix contains detailed information on our methods and process.

Noise:

Key Findings

- Environmental noise in community settings is linked to sleep disturbance, annoyance, stress, and decreased cognitive performance [7-9]. These effects, undesirable in their own right, can in turn adversely affect physical health. Chronic sleep disturbance and stress from environmental noise exposures may increase risks for cardiovascular disease, decreased immune function, endocrine disorders, mental illness, and other effects [7, 9-12].
- Objective measures of sound do not necessarily correlate with subjective experiences of noise. When comparing similar sounds, a 3 dB increase correlates to a doubling in sound energy levels, but is considered the threshold of perceivable difference in loudness [10, 13]. A 10 dB increase equates to a 10-fold increase in sound energy, but is perceived as a doubling in loudness [10].
- The perception of sound as noise is a subjective response that is influenced by factors related to the noise, the person, and the social/environmental setting. These factors result in considerable variability in how people perceive and respond to noise at the individual and community level [8, 14]. Factors that are consistently associated with negative community response are changes in noise exposure (i.e., the introduction of a new noise, or a noticeable change in noise loudness or quality), and increases in human-generated noise [14].
- A small number of epidemiological studies have linked wind turbine noise to increased annoyance, feelings of stress and irritation, sleep disturbance, and decreased quality of life [15-18]. These studies have not identified positive associations between wind turbine noise and hypertension, cardiovascular disease, or other diseases. In studies from Europe, annoyance from wind turbine noise was more likely when levels exceeded 35-40 dBA [15, 16].
- There is some evidence that wind turbine noise is more noticeable, annoying and disturbing than other community or industrial noise at the same level of loudness [15, 16, 18-20]. This may be because:
 - wind turbines produce noise that fluctuates in loudness and “type” (i.e., swishing vs. pulsing amplitude-modulated noise) [19-21]. Since fluctuating noise is generally considered more annoying than steady or constant noise, wind turbine noise may be perceived as more annoying than other environmental noise;
 - unlike other sources of community noise, wind turbine noise levels may not decrease predictably at night, and could be perceived as more noticeable and louder at night than during the day. This could result in sleep disturbance in nearby residences [15, 19, 22].
- Factors unrelated to noise may explain some of the annoyance reported in the few epidemiological studies of wind turbine noise. These factors include being able to see wind turbines from home, having a negative opinion about turbines, and self-reported sensitivity to noise [16, 17, 20, 22].
- Wind turbine-generated infrasound (frequencies below 20 Hz) is below levels that can be perceived by humans [23-26].

Oregon Noise
Standard for
Wind Energy
Facilities

- Some field studies have found that in some locations near wind turbine facilities, low frequency noise (frequencies between 10 and 200 Hz) may be near or at levels that can be heard by humans [24-26]. However, there is insufficient evidence to determine if low frequency noise from wind turbines is associated with increased annoyance, disturbance or other health effects [26].
- People with greater exposure to noise from wind turbines, such as those that live nearby, are more likely to experience negative health effects than those with lower levels of exposure to noise. The extent of that impact depends on many site-specific variables, such as distance from the facility, local topography and water bodies, weather patterns, background noise levels, etc.
- In Oregon, a developer must demonstrate that a new wind energy facility complies with an ambient degradation noise standard and a maximum allowable noise standard. These standards are defined in rule by the Oregon Department of Environmental Quality. The ambient degradation standard states that a wind energy development cannot increase the median background noise levels by more than 10 dBA. Developers can either measure actual background noise levels or assume an hourly median (L_{50}) noise level of 26 dBA. Based on the assumed background level of 26 dBA, the maximum L_{50} allowed under the ambient degradation standard is 36 dBA. Under the maximum allowable standard, a wind energy facility may not contribute more than 50 dBA of the noise measured outside of any residence. A landowner can waive the ambient degradation standard, in which case the facility must still comply with the maximum allowable noise standard [27, 28].
- For landowners who do not waive Oregon's noise standard, a new wind energy facility cannot increase outdoor median noise levels by more than 10 dBA. If the background L_{50} level is assumed to be 26 dBA, the maximum outdoor L_{50} level allowed under Oregon's ambient degradation standard is 36 dBA.
 - When compared to WHO and USEPA health-based guidelines, an outdoor L_{50} of 36 dBA is not expected to result in sleep disturbance, disturbance of communication, or annoyance in the general population.
 - Landowners who do not waive Oregon's standard could experience up to a 10 dBA increase in outdoor hourly median noise levels. Given that a 10 dBA increase in noise levels is generally perceived as a doubling in loudness [10] and that wind turbine noise may be more noticeable than other forms of community noise [16], a 10 dBA increase could represent a noticeable change in outdoor noise levels. However, the resulting noise levels are below the WHO and USEPA's recommended guidelines for outdoor noise.

- For landowners who waive Oregon's ambient degradation standard, a wind energy facility can contribute up to 50 dBA to outdoor ambient L₅₀ noise levels under Oregon's maximum allowable standard. The total outdoor L₅₀ level could exceed 50 dBA if noise from other sources contributes more than 41 dBA to the outdoor L₅₀.
 - When compared to WHO and USEPA health-based guidelines, an outdoor L₅₀ of 50 dBA (or higher) could result in sleep disturbance or serious annoyance. This may be especially true in rural areas, where ambient noise levels are relatively low compared to urbanized areas.
 - Landowners who waive Oregon's ambient degradation standard could experience a substantial change in outdoor noise levels if the total L₅₀ reaches or exceeds 50 dBA. An L₅₀ of 50 dBA could be perceived as approximately four times louder than 26 dBA. Typically, an increase in long-term noise levels of this magnitude (over 20 dBA) is expected to cause widespread annoyance, complaints and possibly threats of legal action [10]. The actual change in long-term noise levels from a wind energy facility will likely be less than 20 dBA since the facility is not expected to continually operate at levels that will result in the maximum L₅₀ allowed by Oregon law. Further, landowners who waive Oregon's ambient degradation standard may perceive and respond differently (potentially more favorably) to the new noise levels, particularly if they benefit from the facility or have good relations with the developer [10, 15].
- The Oregon Department of Energy is responsible for responding to noise complaints related to large energy facilities sited through the EFSC process. To date, there have been no complaints related to operating wind energy facilities sited through the EFSC process [29].

Conclusions

1. Given the current scientific evidence, Oregon's ambient degradation standard of 36 dBA for wind energy facilities is not expected to result in annoyance, sleep disturbance or other health effects in the general population, and is protective of public health. However, the 10 dBA change allowed under this standard could result in a noticeable change in outdoor noise levels at impacted residences.
2. Landowners who waive Oregon's ambient degradation standard could experience outdoor L₅₀ noise levels up to 50 dBA from an operating facility under Oregon's maximum allowable standard. This could represent a substantial change in outdoor noise levels and possibly result in sleep disturbance and moderate to serious annoyance. The likelihood and magnitude of any impacts will depend on a number of factors, including time of day, characteristics of the noise, and people's perceptions of the noise source.

Recommendations

3. The major source of uncertainty in our assessment is related to the subjective nature of response to noise, and variability in how people perceive, respond to, and cope with noise. Additional uncertainty is due to moderate or limited evidence in the following areas:
 - a. Epidemiological studies on wind turbine noise
 - b. Amplitude modulation of wind turbine noise
 - c. Indoor low frequency noise impacts from wind turbines
 4. The Oregon Department of Energy is responsible for responding to noise complaints related to large energy facilities sited through the EFSC process. To date, there have been no complaints related to operating wind energy facilities sited through the EFSC process [29]. However, there does not appear to be a systematic process for responding to complaints from county-sited facilities. While PHD has anecdotal evidence of noise complaints and reported health impacts from a few operating facilities in Oregon, we currently lack the data needed to evaluate the frequency or magnitude of any noise-related impacts from existing facilities in the state.
1. To reduce the potential for health effects from wind turbine noise, planners and developers should evaluate and implement strategies to minimize noise generation when outdoor levels exceed Oregon's standards for wind turbine noise. These strategies could include the following:
 - a. During the planning phase, consider site-specific factors that may influence noise propagation and perceived loudness wind turbine noise, particularly factors that may influence actual or perceived noise levels at night.
 - b. Continue to evaluate scientific evidence on how local conditions could change the propagation and character of wind turbine noise (e.g., the effects of wind shear on amplitude modulation and noise generation at night).
 2. The level of annoyance or disturbance experienced by people hearing wind turbine noise is influenced by individuals' perceptions of other aspects of wind energy facilities, such as turbine visibility, visual impacts, trust, fairness and equity, and the level of community engagement during the planning process. By explicitly and aggressively addressing these and other community concerns as part of the wind facility siting process, developers and planners may reduce the health impact from noise produced by wind turbines.
 3. Developers, planners and regulatory agencies should ensure that residents living near wind energy facilities understand the potential risks and benefits associated with a development, and are aware (and able) to report health issues and concerns if they choose.

**Visual
Impacts:**

Key Findings

- Shadow flicker refers to the alternating levels of light intensity produced when rotating turbine blades cast shadows on nearby buildings or receptors [30]. Most modern large wind turbines produce shadow flicker at frequencies between 0.3 and 1 Hz [30].
- Wind turbines produce shadow flicker at certain times, locations, and under certain conditions. In the continental U.S., shadow flicker impacts are relatively lower compared to locations at higher latitudes, are more likely to occur at sunrise or sunset, and affect a butterfly-shaped area to the northeast and northwest of a wind turbine [30, 31].
- There is insufficient evidence to determine if the “looming effect” (i.e., psychological reactions from feeling “enclosed” by a tall building or object) could have negative impacts on people’s quality of life and well-being. Urban planning guidelines that recommend a 4:1 distance-to-height ratio to minimize negative psychological reactions from feeling “enclosed” by a tall building or object may not be applicable to wind turbines in rural environments [32].
- Some Oregonians voiced concern that wind turbines could distract drivers and result in traffic crashes. However, the very few research studies on this issue did not find any increase in crash rates after the construction of the wind energy facilities [33].

Conclusions

1. Shadow flicker from wind turbines in Oregon is unlikely to cause adverse health impacts in the general population. The low flicker rate from wind turbines is unlikely to trigger seizures in people with photosensitive epilepsy. Further, the available evidence suggests that very few individuals will be annoyed by the low flicker frequencies expected from most modern wind turbines [30, 31, 34].
2. While Oregon does not have specific guidelines for shadow flicker, the setback distances (i.e., the distances between turbines and other structures) required to meet Oregon’s noise standard should be sufficient to minimize shadow flicker impacts in most cases.

Recommendations

1. In cases where the conditions at a particular site make shadow flicker a potential issue, planners and developers should consider the distance, orientation and placement of turbines relative to homes and buildings, and the use of visual obstructions to block flicker.
2. If shadow flicker negatively affects people after a wind turbine is installed, strategies such as planting vegetation as visual barriers or installing blinds on affected buildings may be needed [30].
3. While aesthetic impacts are unlikely to directly affect health, they may play an important role in peoples’ perceptions and acceptance of wind energy developments near their communities [34]. Planners should consider evaluating these impacts if they emerge as an important community concern.

**Air
Pollution:**

Key Findings

- Direct exposure to air pollutants is associated with short and long-term health effects that include respiratory irritation, asthma, cardiovascular disease, cancer, and premature death [35, 36]. Greenhouse gas (GHG) emissions indirectly impact public health through their contribution to global climate change [36]. Children, the elderly, and those with pre-existing respiratory problems are particularly vulnerable to the health effects from air pollution.
- The major sources of air pollution in Oregon and the U.S. are the combustion of fossil fuels for electricity, transportation and other uses; industrial processes; agricultural practices; wildfires; and construction sites and equipment.
- Wind energy facilities do not generate air emissions from electricity production, and could reduce air pollution if they displace electricity generated from gas, coal, and other fossil fuels [36, 37]. The magnitude of any reductions in air pollutant emissions will depend on the type and amount of fossil fuel units replaced, technological changes, and the effect of policies aimed at reducing air emissions from power plants [36]. The available evidence suggests that the largest air pollution reductions will occur by first replacing energy from coal-fired sources, followed by replacement of oil and natural gas.
- Wind energy could contribute to air pollution through the burning of fossil fuels in vehicles and equipment used for construction and maintenance of wind energy developments. However, the construction-related impacts on local air quality are likely to be short-term and relatively small in magnitude.
- It is unlikely that new or improved access roads will result in substantial increases in vehicular traffic or appreciable changes in local air quality.

Conclusions

1. Wind energy facilities in Oregon could indirectly result in positive health impacts if they reduce regional emissions of GHGs, criteria air pollutants and hazardous air pollutants.
2. Communities near fossil-fuel based power plants that are displaced by wind energy could experience reduced risks for respiratory illness, cardiovascular diseases, cancer, and premature death.
3. The health benefits from any reductions in GHG emissions depend on the extent to which these reductions prevent or lessen the severity of future climate change impacts in Oregon.

Recommend-
ations

1. To reduce the health effects from air pollution, mechanisms that link the development and integration of wind energy for electricity consumption to reductions in fossil fuel use should be implemented (if such mechanisms are available and can be feasibly implemented).
2. While construction-related air pollution is expected to have minimal health impacts, planners and developers should consider strategies to reduce diesel emissions from non-road construction equipment. Some effective strategies include reducing idling time, using cleaner fuels, retrofitting engines, and developing environmental management strategies for operations. The EPA's Clean Construction USA program³ and Oregon DEQ's Clean Diesel Initiative⁴ offer resources, technical assistance, and in some cases, tax credits and grant funding to assist in implementing these strategies.

³ U.S. Environmental Protection Agency. National Clean Diesel Campaign. Available from: <http://www.epa.gov/cleandiesel/index.htm>. Accessed November 16, 2011.

⁴ Oregon Department of Environmental Quality. Oregon Clean Diesel Initiative. Available from: <http://www.deq.state.or.us/aq/diesel/initiative.htm>. Accessed November 16, 2011.

Economic Effects:

Key Findings

- Socioeconomic status (measured by income, education and employment) is a strong predictor of life expectancy and overall health at each stage of life [38, 39]. While the links between SES and health are complex and difficult to measure [40], public health studies have found that as SES increases, the risks for premature mortality, disease, disability, and unhealthy behaviors decrease.
- Higher levels of income inequality are associated with poorer health outcomes [41].
- Data from Oregon indicate that personal income and employment levels in the state are lower compared to the U.S., though educational attainment levels in the state are higher compared to the nation as a whole [42, 43]. Within Oregon, there are noticeable disparities in SES between urban and non-urban areas. Compared to urban areas of the state, non-urban areas have relatively lower levels of personal income, lower wages, and higher rates of unemployment [42, 44].
- Wind energy facilities could result in positive local economic impacts if they increase local jobs, personal income, and local tax revenue. Some evidence suggests that community owned wind projects may have relatively larger economic benefits for local communities compared to absentee-owned projects.
- Decreased property values are often an issue of community concern. Economic studies have not found an association between nearby wind energy facilities and changes in long-term property values [45, 46]. However, because property values are influenced by many factors, and it is difficult to generalize these findings to individual or local changes in property values near a given facility [34].
- Data from Oregon indicate that wind energy facilities have increased employment in Oregon's renewable energy sector and the economy as a whole [47, 48]. Wind energy facilities increased personal income for landowners who obtain lease payments and for workers employed by wind energy facilities [47], and increased tax revenue for local government through property taxes and other fees [34, 49].

Conclusions

1. Wind energy developments could indirectly result in positive health impacts in Oregon communities if they increase local employment, personal income, and community-wide income and revenue. However, these positive effects may be diminished if there are real or perceived increases in income inequality, or an uneven distribution of costs and benefits, within a community.

Recommendations

1. Local officials, decision-makers and other stakeholders should consider strategies to increase community-wide economic benefits from wind energy developments. These strategies may include:
 - provisions or incentives for hiring local labor, purchasing goods and supplies from local or state businesses, and investing in training programs to prepare local workers for jobs in the wind energy sector;
 - investing tax revenue in public services (e.g., education and health-care);
 - disbursing regular cash payments to local residents;
 - considering the feasibility of community ownership models in which a wind energy project is partially or wholly owned by community members.

**Community
Conflict:**
Key Findings
and
Conclusions

1. Community conflicts over wind energy developments have many similarities to conflicts over other controversial siting or natural resource decisions in rural communities [50, 51]. These similarities include: tensions between local risks vs. global benefits, mistrust of developers or owners, and limited opportunities for community members to influence the decision-making process [50, 51].
2. Long-term stress from real or perceived environmental threats can increase risks for cardiovascular disease, endocrine disorders, reduced immune function, mental illness, and other negative health effects [52, 53]. Community conflict over controversial siting or environmental decisions may contribute to or exacerbate this stress, and thus increase risks of these negative health effects [53].
3. Rural communities may be disproportionately impacted by community-level conflicts because these conflicts may erode traditional sources of social and interactional support that community members rely on [54].
4. Based on experiences from other controversial environmental and siting decisions, public participation that is inclusive, collaborative, and transparent is an effective strategy to improve the quality, legitimacy and acceptance of environmental and siting decisions [50, 51, 55, 56].

Recommendations

1. Planners, developers, decision-makers, and government agencies involved in wind facility siting decisions should consider and use strategies to anticipate, understand, and manage conflict and stress in communities near proposed developments. If done well, public participation and community consultation are strategies that can minimize negative and maximize positive impacts (health and otherwise) for local communities, decision-makers, developers, and other stakeholders.

II. Supporting Documentation

- A. Wind Energy Development in Oregon
- B. Noise
- C. Visual Impacts
- D. Air Pollution
- E. Economic Effects
- F. Community Conflict

A. Wind Energy Development in Oregon

1. Policies related to Wind Energy Development
2. Trends in Generating Capacity
3. Energy Facility Siting in Oregon

1. Key Policies related to Wind Energy Development

Several state policies and programs have influenced the growth of wind energy developments in Oregon, including the following:

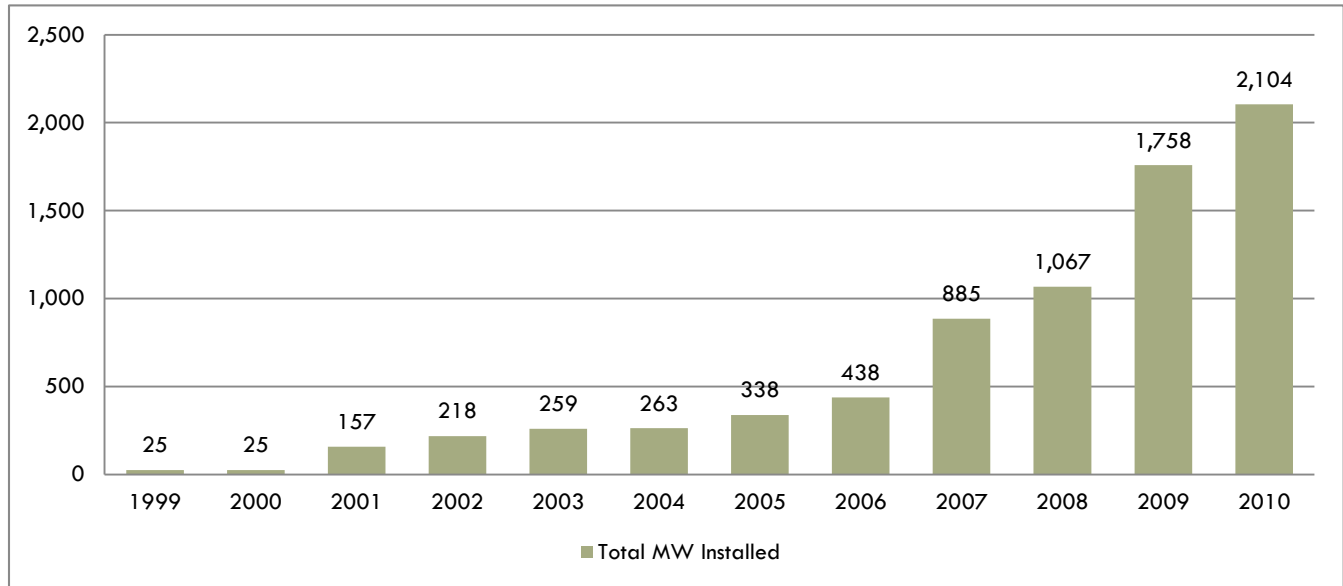
- Greenhouse gas (GHG) emission targets: House Bill 3543 (passed in 2007) set goals to reduce Oregon's GHG emissions and prepare state and local jurisdictions for the effects of climate change. Oregon's goals are to begin reversing growth in GHG emissions by 2010, decrease emissions to 10% below 1990 levels by 2020, and decrease emissions to at least 75% below 1990 levels by 2050 [57].
- Renewable Portfolio Standard (RPS): Oregon's RPS was enacted by Senate Bill 838 in 2007. The RPS requires electric utilities in Oregon to provide a certain percentage of electricity sold to retail customers from renewable energy sources by 2025; this percentage ranges from 25% for the largest utilities to 5% for the smallest utilities [4]. Utilities can meet these requirements by building or operating eligible renewable energy facilities, or buying power or renewable energy certificates from eligible facilities within the Western Electricity Coordinating Council [58]. RPS-eligible sources of renewable energy include biomass, geothermal, hydropower, ocean thermal, solar, tidal, wave, wind and hydrogen [58].
- Business Energy Tax Credit (BETC): Oregon's BETC was enacted in 1979 and modified several times to change the credit's eligibility requirements and caps. In 2007, the BETC was amended to increase the tax credit for renewable energy facilities (including wind) to 50% of the total cost of the project, with a cap of \$10 million. This cap was reduced to \$2.5 million in 2010 [59]. In June 2011, the Oregon legislature sunset the BETC; however, renewable energy projects may be eligible for grants up to \$250,000 or 35% of project costs that are funded through tax credit auctions, taxpayer contributions, or direct appropriations from the legislature [60].

Federal programs that support wind energy development include investment and production tax credits, research and development through the National Renewable Energy Laboratory, and the Wind Powering America initiative.

2. Trends in Generating Capacity

The percentage of Oregon's electricity generated by wind increased from 1.5% in 2005 to 7.1% in 2010 [2, 61]. At the end of the second quarter in 2011, Oregon was ranked seventh in the nation for total installed wind energy generating capacity. The total installed generating capacity in Oregon grew from 25 MW in 1999 to 2,305 MW by July 2011 [2]. At the end of 2011, an additional 2,431 MW of generating capacity was approved or under construction (Table 1).

Figure 1: Installed wind capacity in Oregon, 1999-2010.



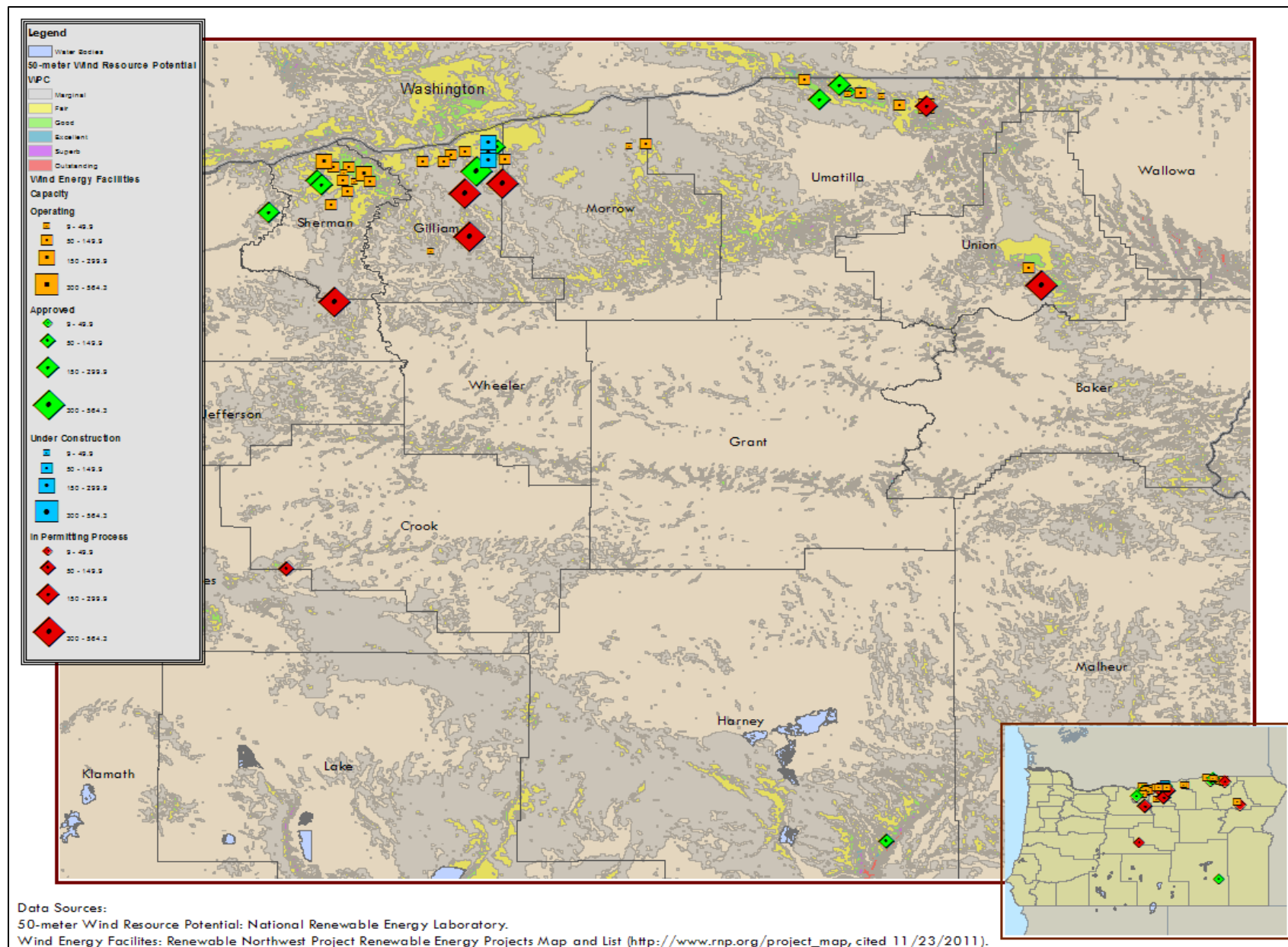
Data source: US Department of Energy. *U.S. Installed Wind Capacity and Wind Project Locations*. Wind Powering America 2011 [cited 3/6/2011]; Available from: http://www.windpoweringamerica.gov/wind_installed_capacity.asp.

Table 1: Wind generating capacity by status and county as of November 2011.

	Operating	Under Construction	Approved	In Permitting Process	Proposed	Total
Crook				104		104
Gilliam	650.1	265	482	1050		2447.1
Gilliam & Morrow	72	580		564.3		1216.3
Harney			100		104	204
Morrow	9.9					9.9
Morrow & Umatilla	64.5					64.5
Sherman	1057.3		400			1457.3
Umatilla	350.8		404	199.5		954.3
Union	100.7			300		400.7
Wasco			200			200
Wasco & Sherman				500		500
Total	2305.3	845	1586	2717.8	104	7558.1

Data Source: Renewable Northwest Project. Renewable Energy Projects Map and List. [cited 11/23/2011]; Available from: http://www.rnp.org/project_map.

Figure 2. Locations of wind energy developments in Oregon, 2011.



Locations of
wind energy
development
in Oregon

As of 2011, most of Oregon's wind energy development has occurred in north-central and northeastern areas of the state. Several facilities are located on the Oregon and Washington sides of the Columbia River Gorge. Figure 2 shows the approximate locations of facilities in operation, under construction, approved, and in the permitting process as of November 2011. At this time, Sherman County has the most wind energy generating capacity in operation, though Gilliam County may soon lead the state in generating capacity as new facilities are approved and constructed (Table 1). There are a few facilities proposed in southern Oregon (Crook and Harney counties), which represents a new area for development.

Future
development
in Oregon

Wind energy development is expected to continue in order to meet growing regional electricity demand, and satisfy the state's GHG emission goals and the RPS [5, 62]. The population of the Pacific Northwest is expected to grow by more than 28% by 2030; this growth is expected to increase demand for electricity by 1.4% per year through 2030 [5]. While the Northwest Power and Conservation Council has set a goal to meet 85% of regional load growth with conservation measures, the remaining electricity demand will require new generating facilities [62].

There are constraints on increasing electricity production from Oregon's "traditional" sources of energy. Oregon law effectively prohibits constructing new coal-based power plants in the state [62], and the state's only operating coal-based plant is slated to close by 2020 [63]. Hydroelectric generation is constrained by requirements to protect fish and wildlife and is not expected to contribute to increases in load growth in the next 20 years [5]. Finally, in addition to Oregon's GHG emission goals and the RPS, there may be future state and federal policies to reduce carbon and air pollutant emissions. These factors, and wind energy's relative cost-effectiveness compared to other regional renewable energy sources, indicate growth will continue in the near future.

3. Energy Facility Siting in Oregon

Prior to building a new energy facility in Oregon, a developer must demonstrate that the facility complies with local, state and federal regulations by obtaining permits from the appropriate government agencies. These regulations are intended to ensure that "the siting, construction and operation of energy facilities [are] accomplished in a manner consistent with protection of the public health and safety and in compliance with the energy policy and air, water, solid waste, land use and other environmental protection policies of this state" [28]. In keeping with this policy, a developer must demonstrate that the facility complies with local, state and federal regulations by obtaining permits prior to the construction of a new energy facility.

A developer can obtain permits through either a local or a state-level siting process [64]. Small facilities (with a peak operating capacity less than 105 MW) can obtain permits through either the state or local process. In the local-level process, a developer applies to all the appropriate state and local-level agencies for the needed permits and approvals. Ultimately, local officials make the final decision for small facilities based on whether the facility complies with a local jurisdiction’s land-use ordinances, which vary across counties, cities and tribal lands.

Large facilities with a peak operating capacity of 105 MW or more are required to go through the state-level siting process. The state-level process provides a streamlined and standardized approach to siting [64]. In this process, a developer applies to one agency (ODOE) to obtain all the necessary permits, and must meet standard requirements that apply to all large energy facilities in Oregon. The Energy Facility Siting Council, a Governor-appointed body of citizens, makes the final determination to issue a site certificate that allows a developer to build and operate a facility. Table 2 shows a comparison of the state and local energy siting processes. As of 2010, approximately 75% of current operational wind farms in Oregon had capacities less than 105 MW and were sited through the local-level process [62].

Table 2: Comparison of state and local energy facility siting processes in Oregon.

	State-level	Local-Level
Facility size	Required for 105 MW or higher; optional for smaller facilities	Less than 105 MW
Process to obtain local/state/federal permits	Consolidated: developer applies to Oregon DOE for site certificate (covers all state-level permits), and to DEQ for federal air/water permits	Unconsolidated: developer applies to local agency to obtain a conditional land-use permit, and then applies to each state/federal authority to obtain necessary permits
Additional requirements	Standardized for all large energy facilities	Dependent on local ordinances
Opportunity for public comment	Defined in site certificate process	Dependent on local requirements
Decision-making body	Energy Facility Siting Council	Local Governments
Entities bound by decision	EFSC decision is binding on all state and local governments	Conditional use permit is binding on local government only
Options to appeal decision	Oregon Supreme Court	Land Use Board of Appeals Oregon Court of Appeals Oregon Supreme Court

MW = Megawatts; DOE = Oregon Department of Energy; DEQ = Oregon Department of Environmental Quality; EFSC = Energy Facility Siting Council

Local
experience
with wind
energy siting

As wind energy development has expanded in some parts of Oregon, developers, decision-makers and community members have gained experience in evaluating the impacts associated with these facilities. This experience has led to the development of policies and processes to guide the siting of future facilities. Some examples include the passage of local ordinances for wind energy facilities, the use of strategic investment plans to guide tax payments and revenue from a facility, and the development of guidelines ⁵ for counties involved in permitting decisions. These policies and guidelines may be useful for counties that are considering or are new to the siting of wind energy facilities.

⁵ Association of Oregon Counties. Wind Energy Task Force 2009 Report and Recommendations. Available at: <http://www.aocweb.org/aoc/Portals/0/Committees/December%2014%20Report.pdf>. Accessed January 9, 2013.

B. Noise

1. Introduction
2. Overview of Sound, Noise and Health
3. Wind Turbine Noise
4. Wind Turbine Noise and Health
5. Oregon Standard for Wind Turbine Noise
6. Conclusions and Recommendations

1. Introduction

Community or environmental noise is unwanted sound from man-made sources and activities outside of the workplace [7]. Community noise is widely recognized as a public health issue that affects people's health and quality of life [7, 14]. Some common sources of community noise include traffic, construction, industry, agriculture, recreation, ventilation systems, and appliances [7].

Wind energy developments represent a relatively new source of noise in Oregon. As new facilities are proposed and built, there are questions about the potential health impacts of wind turbine noise on nearby communities [62]. This section begins with an overview of sound, noise, the impacts of noise on human health, and methods to measure and assess community noise. We then describe the types of noise produced by wind turbines, summarize the available evidence on the effects of wind turbine noise on human health, and examine Oregon's standard for wind turbine noise. This section concludes with our findings and recommendations for wind turbine noise.

2. Overview of Sound, Noise and Health

2.1. Sound

Sound is a mechanical wave vibration that travels through the air and causes changes in air pressure. Sound frequency is measured in Hertz (Hz), and sound intensity (also known as sound pressure level, or SPL) is typically measured in decibels or dB.

Human perception of sound

Humans with normal hearing can perceive sounds within a certain frequency range depending on the sound's intensity. The human ear can generally hear sound frequencies that range from 20 to 20,000 Hz ⁶, and is particularly attuned to frequencies between 1,000 and 6,000 Hz [65]. Sounds with content below 250 Hz are typically characterized as low frequency sound; within this low frequency range, sounds with content below 20 Hz are called infrasound and are not audible by humans. Sounds with content above 1000 Hz are considered to be in the high frequency region, and high frequency sounds above 20,000 Hz (known as ultrasound) are not audible by the human ear. Sounds at lower frequencies must be louder (i.e., have higher SPLs) in order to be heard by humans. For example, the median hearing threshold ⁷ at 8 Hz is 100 dB, at 20 Hz is 80 dB, and at 200 Hz is 14 dB [66].

Sound propagation

In general, SPLs will decrease (or attenuate) as sound waves move away from the source and through the environment. The major factors that affect how sound propagates and decays through the environment are [10, 13]:

- Geometric spreading from a point, line or plane source. Sound from line or plane sources have the same rate of attenuation as sound from point sources; however, they appear to have lower rates of attenuation because of the contribution of sound from multiple sources.
- atmospheric attenuation, which is the absorption and scattering of sound waves as they move through the atmosphere. Atmospheric attenuation is affected by air temperature, humidity, barometric pressure, and wind speed and direction.
- the sound's frequency content. Lower frequency sounds are less attenuated (or dampened) by the atmosphere than sounds at higher frequencies. Therefore, as the distance from a sound source increases, the sound's lower frequency components will have relatively higher SPLs than the sound's higher frequency components.
- ground characteristics. Hard ground (e.g., pavement or water) tends to reflect more sound, while more porous ground surfaces will absorb some sound.
- terrain profile, obstructions, and other features that act as barriers to sound wave propagation.

⁶ Adults generally are not able to hear sounds at the lower and higher ends of this frequency range.

⁷ The hearing threshold is the median SPL that can be heard by young adults with normal hearing; 50% of people have a more sensitive hearing threshold (hear at a lower SPL) and 50% of people have a less sensitive hearing threshold (hear at a higher SPL).

Sound levels
at a receptor

There also are physical or environmental factors that affect how sound levels at a particular location are perceived. These include [10, 13]:

- distance and position relative to the sound source. Sound levels typically decrease as distance increases. Given the same distance, the sound levels downwind of a source are often louder than levels upwind.
- the presence of barriers, insulation or reflective surfaces. These can include walls, buildings, materials used in a building, etc.
- the sound's frequency content. In general, lower frequency sounds are less attenuated by building materials than sounds at higher frequencies.
- background sounds (from natural or man-made sources) that mask or interfere with sounds from a particular source. Background sound levels vary depending on location, time of day and season, and are generally lower at night-time and in rural areas.

Sound
measurement

Environmental sound is typically measured and reported as a frequency-weighted decibel level. The dB(A) scale correlates well with human response to sound, and is used to measure moderately loud broadband sounds [67]. The dB(C) scale was developed to evaluate relatively loud sounds (over 70 dB), impulsive sounds, and low frequency sounds [67]. Decibels are measured on a logarithmic scale; therefore, a 3 dB increase in SPLs correlates to a doubling in sound energy, and a 10 dB increase correlates to a 10-fold increase in sound energy [22]. When comparing similar sounds (e.g., comparing one traffic level to another traffic sound level), a 3 dB increase is considered the threshold of perceivable difference.

Investigators use frequency or spectrum analysis when they need additional information on a sound's frequency content. This type of analysis is used to assess sounds with distinct tones, or to examine a sound's frequency components. Spectrum analysis uses filters to separate out a sound's frequency components into bands, and then measure the SPLs within these bands. Frequency analyzers can use "fine" filters that provide very detailed information (narrow-band filters) or relatively "coarse" filters that provide fewer data points (1/3 octave and octave band filters). The type of filter used depends on the goals and resources of the investigation [67].

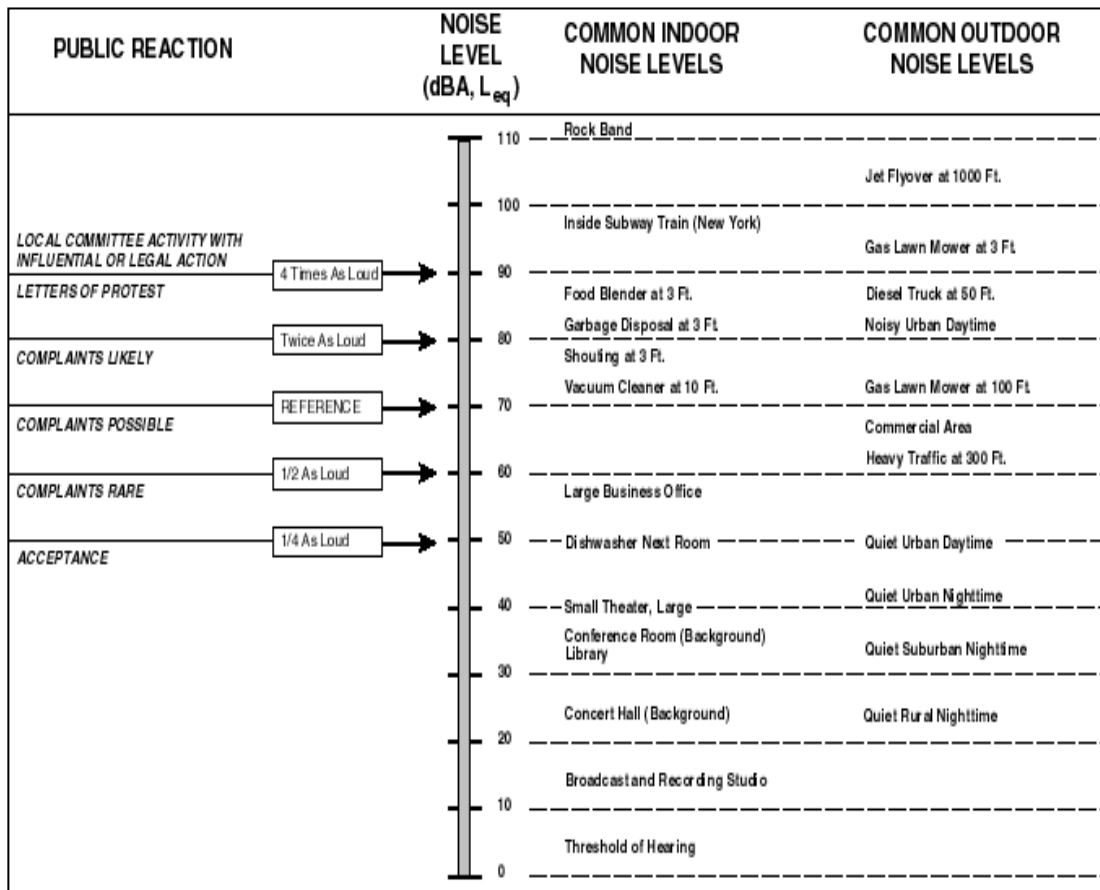
2.2. Noise and Health

Noise is sound that is perceived as unwanted, annoying, or disturbing [8]. Environmental or community noise is unwanted sound from man-made sources and activities outside of the workplace [7]. Some common sources of community noise include traffic, construction, industry, agriculture, recreation, ventilation systems, and appliances [7].

Noise levels found in community settings

Community noise levels vary across different community settings, types of land use, and population density. In general, man-made noise is expected to be higher in urban areas, near transportation corridors (including highways, airports/air routes, and railways), and in industrial and commercial areas. Noise levels are expected to be relatively lower in wilderness/natural settings, rural areas ⁸, and residential areas [7, 68]. Figure 3 shows some examples of indoor and outdoor noise levels.

Figure 3: Examples of common indoor and outdoor noise levels*.



Source: California Public Utilities Commission. [cited 12/4/2011]. Available from: http://www.cpuc.ca.gov/Environment/info/esa/divest-pge-one/newpge/chap4_10.htm.

*Note: This figure is shown as an example only. Actual indoor and outdoor noise levels and public reaction depend on noise and community characteristics.

⁸ While rural areas typically have lower noise levels than urban/suburban areas, agricultural, manufacturing and transportation activities can impact sound levels in these settings.

Health effects
from
environmental
noise

Scientists have identified three broad categories of health effects from exposure to noise: 1) subjective effects such as annoyance; 2) disturbance of sleep, communication, concentration and other activities; and 3) physiological effects such as anxiety, hearing loss and tinnitus [69]. These effects are often related; for example, disturbance of communication or sleep can lead to annoyance, or vice versa.

Annoyance
from noise

"Annoyance" from noise encompasses a wide range of human reactions. People may become annoyed with a noise because it actually interferes with activities or sleep, or because it is simply perceived as being out of place [70]. Suter (1991) provides some context for the use of annoyance in scientific noise surveys:

"Annoyance" has been the term used to describe the community's collective feelings about noise ever since the early noise surveys in the 1950s and 1960s, although some have suggested that this term tends to minimize the impact. While "aversion" or "distress" might be more appropriate descriptors, their use would make comparisons to previous research difficult. It should be clear, however, that annoyance can connote more than a slight irritation; it can mean a significant degradation in the quality of life. This represents a degradation of health in accordance with the WHO's definition of health, meaning total physical and mental well-being, as well as the absence of disease [71].

Impacts from
environmental
noise

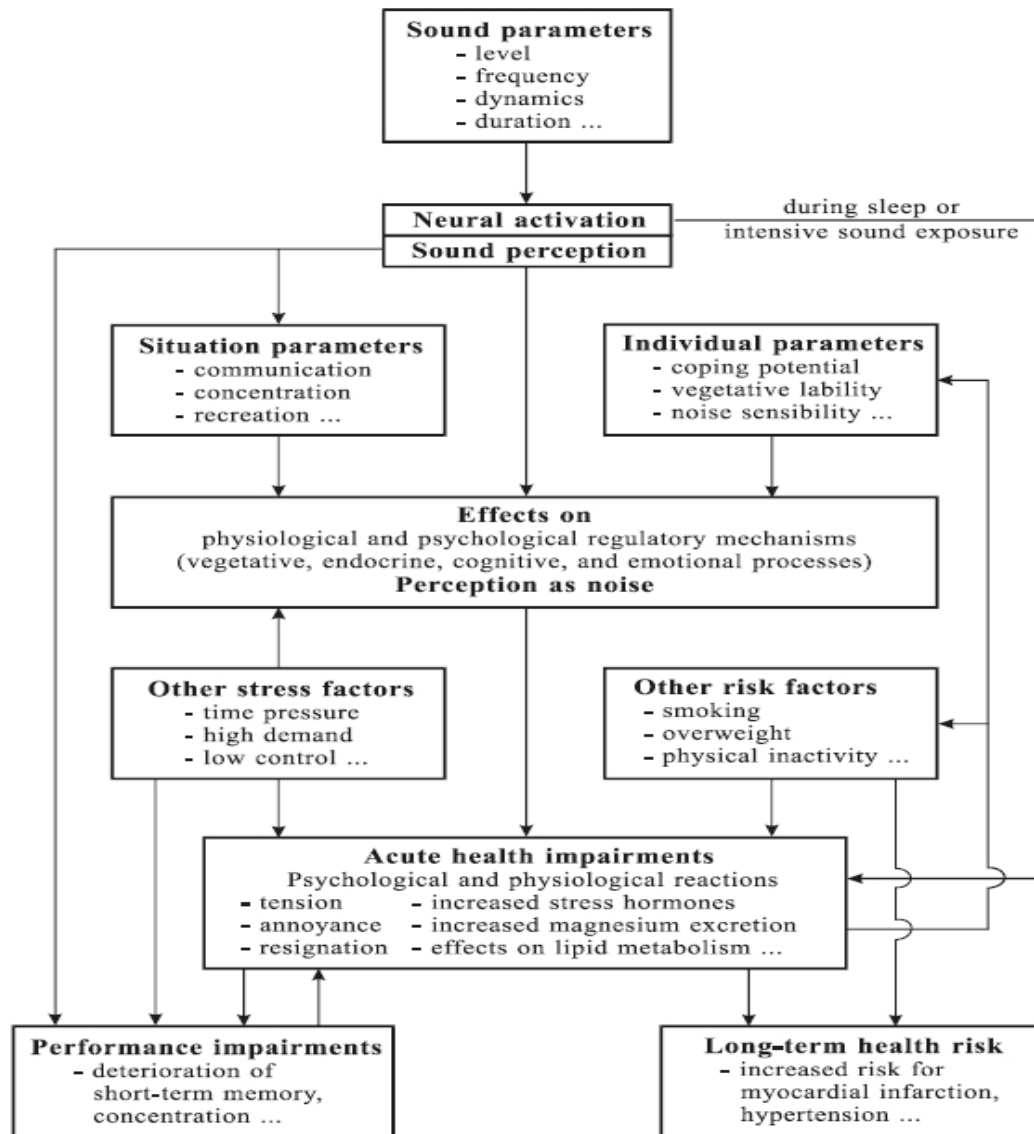
At the levels usually found in community settings, environmental noise is most strongly associated with annoyance, sleep disturbance and decreased cognitive performance [8, 9]. The long-term average day-time noise levels associated with increased annoyance are 50 to 55 dBA for outdoor noise, and 35 dBA for indoor noise (measured as L_{eq}) [7, 8]. The indoor night-time noise levels associated with sleep disturbance are 30 to 35 dBA (measured as $L_{eq,8}$) [7, 8]. The lowest average night-time outdoor noise levels associated with changes in sleep patterns or self-reported sleep disturbance are between 30 to 40 dBA (measured as $L_{night, outside}$) [69]. Community noise rarely reaches levels that cause hearing loss or decreased hearing sensitivity; these effects occur at levels above 85 dB for long-term or continuous exposures, and at levels beginning at 120 dB for short-term exposures [8, 9].

A limited but growing body of evidence has linked environmental noise to small increased risks for hypertension and cardiovascular disease [8, 72]; this evidence is from European community noise studies focused on aircraft and traffic noise. The increased risks for hypertension and cardiovascular disease were observed at higher noise levels compared to the levels associated with increased annoyance and sleep disturbance. Scientists have not established a threshold or dose-response relationship for these effects [8]. Laboratory studies have documented short-term changes in blood pressure and stress hormones following noise exposure; however, these studies have not established if these physiological changes persist after the noise exposure stops.

Biological
 mechanism

Scientists do not completely understand the complex mechanism by which noise produces health effects in humans. Figure 4 shows one possible model for how noise produces health effects through direct and indirect pathways. In the direct pathway, noise exposure activates the nervous and endocrine systems and results in short-term physiological stress response. In the indirect pathway, a person perceives sound as noise and becomes annoyed, which triggers a short-term physiological stress response. The physiological response in both the direct and indirect pathways involves short-term changes in stress hormone levels, heart rate, blood pressure and other factors; these changes resolve when the noise exposure ends. In cases of chronic or long-term noise exposures, people may become habituated to regular noise sources or develop coping mechanisms that reduce their stress response. If this does not occur, the continued stress response to noise may contribute to long-term health risks for cardiovascular disease [8, 73]. As mentioned previously, scientists have not identified a threshold level of exposure for the more harmful effects of noise exposure.

Figure 4: One model to explain effects of low-level noise exposures on health[73].



Factors that affect annoyance or disturbance from noise

At the individual and group levels, the perception of sound as noise is influenced by characteristics related to the noise, the person, and the social/environmental setting (Table 3). The available evidence on noise suggests the following:

- There is considerable variability in how people respond to noise [8]. A particular noise, noise source or noise level may elicit a range of responses within a community. Further, the response seen in one community may be very different than the response in another community [14].
- In addition to loudness or intensity, noise quality (particularly frequency content and temporal distribution) can influence community response [12]. For example, research studies have found that given the same intensity, aircraft noise is more annoying than road traffic noise, which in turn is more annoying than railway noise [7, 14, 70].
- Factors that are consistently associated with negative community response are:
 - a person’s fear of a noise source, and noise sensitivity [7, 74];
 - changes in noise exposure (i.e., the introduction of a new noise, or a noticeable change in noise loudness or quality) [14];
 - increases in man-made noise [14].

Table 3: Factors that influence human perception of sound as noise.

Noise characteristics	<ul style="list-style-type: none"> • Loudness or intensity [7, 9, 14] • Frequency content [7, 9] • Continuous noise vs. discrete noise “events” [14] • Impulsive or fluctuating noise (loudness that varies over time) [7] • Noise accompanied by vibrations [7, 9] • Predictability of noise [22]
Personal characteristics, attitudes and beliefs	<ul style="list-style-type: none"> • Sensitivity to noise [7, 74] • Ability to control or cope with noise [7] • Fear of danger or harm from noise source [7, 74] • Annoyance with other (non-noise) aspects of source [74] • Beliefs about benefits and importance of source [7, 74] • Expectations about the types and levels of noise appropriate for community [10]
Social and environmental characteristics	<ul style="list-style-type: none"> • Ability to insulate or isolate from noise [74] • Background noise levels [7] • Community setting and characteristics (i.e., rural, suburban, urban) [10, 75]

2.3. Assessing noise exposure and response

The complex and subjective nature of human response to noise has made it difficult to develop dose-response models to predict the noise levels that result in annoyance, sleep disturbance, and other health effects [7, 8, 14, 70]. This contributes to the challenge of determining the levels of community noise that are “acceptable” or constitute a “significant” impact. In this section, we briefly describe some metrics and guidelines used to assess and evaluate community noise.

Metrics for
community
noise levels

Table 4 shows some common metrics used to measure environmental noise. Equivalent noise levels describe the amount of energy present in noise that varies in intensity over time. The equivalent measures L_{dn} and L_{eq} are considered the most appropriate metrics to describe long-term average noise levels in a community [7, 10], in part because they have been shown to correlate well with annoyance [7, 13]. While these metrics are useful for evaluating continuous or predictable sources of noise, they are not good measures of impulsive noise or noise events [10]. Further, L_{dn} and other long-term/annualized metrics may be difficult to use for enforcement purposes because they require long-term measurements of community noise levels [10].

Statistical noise measures are also used to describe community noise levels during a specified measurement interval. Typical measurement durations for statistical noise levels vary from 10 minutes to one hour. Some common statistical descriptors are L_{10} , L_{50} and L_{90} . During a given measurement interval, L_{10} represents the loudest 10% of the measurement interval, L_{50} represents the median noise level, and L_{90} represents the quietest 90% of the measurement interval [10, 13].

Table 4: Common metrics used to measure community noise.

Metric	Definition	Uses	Notes
$L_{eq, T}$	The level of a hypothetical constant noise with the same energy as the actual noise over a specified time period. Can be thought of as the "average" noise energy level over a time period.	Used for general descriptions of community noise [8] Appropriate for most continuous sources of noise (e.g., road-way or continuous industrial noise) [7] Considered a good predictor of community response to community noise [7]	Equivalent noise descriptor Does not account for noise characteristics that may cause annoyance (e.g., time variation, pulsing, noise "events") [7, 8]
L_{dn}/L_{den}	Similar to $L_{eq, 24}$ with penalties (10dB and 5 dB respectively) for night-time and/or evening hours to account for increased noise sensitivity	Describes cumulative outdoor noise Correlates well with overall community response to noise, especially in residential areas [8, 68] Often used to describe long-term average noise levels	Equivalent noise descriptor Penalties not intended to protect from sleep disturbance [7]
L_{max}	Maximum noise level during a measurement period	Useful for measuring noise "events" (e.g., aircraft or railway noise) [7, 8]	
L_{night}	Similar to L_{eq} for night-time hours (11 pm – 7 am)	Often used to describe long-term average noise levels	Equivalent noise descriptor
L_{10}	Loudest 10% of the measurement interval * (90% of the interval duration is below this level)	Sometimes used to evaluate noise "events"	Statistical noise descriptor
L_{50}	Median noise level (50% of the measurement interval* is above this level, 50% is below)		Statistical noise descriptor
L_{90}	Quietest 10% of the measurement interval* (90% of the measurement interval is above this level)	Used to determine background noise levels	Statistical noise descriptor

SPL = sound pressure level

*Typical measurement intervals for statistical descriptors range from 10 minutes to 1 hour.

Guidelines for
Community
Noise

The U.S. EPA's 1972 Federal Noise Control Act provide federal recommendations for environmental noise exposures. The WHO's Guidelines for Community Noise provide more recent and comprehensive guidelines to protect human health from noise exposures. These guidelines (see Table 5 for a subset) identify the indoor and outdoor noise levels that are expected to protect the general population from sleep disturbance, annoyance, hearing impairment and other effects. Some key recommendations for residential areas are as follows:

- For indoor residential areas, the WHO recommends a maximum noise level (L_{max}) of 45 dBA. During the day-time or waking hours, an indoor level ($L_{eq, 16}$) of 35 dBA will protect from disturbance of speech communication, while a level of 30 dBA will protect from sleep disturbance during night-time hours [7].
- The WHO recommends day-time outdoor L_{eq} levels of 50 dBA and 55 dBA to protect from moderate and serious annoyance, respectively [7].
- The U.S. EPA recommends a yearly outdoor L_{dn} of 55 dBA to protect from disturbance of speech communication. This level will “provide an indoor L_{dn} ⁹ of approximately 40 dBA with windows partly open for ventilation. The nighttime portion of this L_{dn} will be approximately 32 dBA, which should in most cases, protect against sleep interference” [68].
- The U.S. EPA recommends a yearly indoor L_{dn} of 45 dBA to permit communication in the home [68].
- For residential areas, the WHO and EPA recommend a $L_{eq, 24}$ of 70 dBA to protect against hearing impairment [7, 68]. Note that the recommended occupational limit for workplace noise exposures is 85 dBA for eight hours ($L_{eq, 8} = 85$ dBA) [76].
- In 2009, the World Health Organization released a report on the health impacts of night-time noise which included recommendations for night-time noise levels in Europe [72]. In this report, the WHO recommended an annual night-time level of 40 dBA for noise measured outside the facade of a building ($L_{night, outside}$) [72]. This recommendation is based on the lowest noise levels at which adverse health effects (body movements, awakening, self-reported sleep disturbance and arousals) have been observed, even among vulnerable groups. The WHO also established an interim night-time noise target of 55 dBA $L_{night, outside}$ for jurisdictions unable to achieve the 40 dBA guideline in the near term. The WHO notes that the interim target is not health-based and does not protect vulnerable groups, and recommends its use as “as a feasibility-based intermediate target which can be temporarily considered by policy-makers for exceptional local situations”[72]. Table 6 provides a summary WHO's major findings on night-time noise exposures in Europe.

⁹ While the U.S. EPA assumed an outdoor to indoor noise reduction of 15 dBA (with partly opened windows), the actual reduction will vary depending on the noise source, condition of home and windows, and other factors.

Table 5: Selected WHO and EPA guidelines for community noise[7, 68].

	Health Effects	Environment	Noise level in dBA
WHO Guidelines for Community Noise (1999)	Sleep disturbance	Indoor Dwelling	$L_{eq,T} = 30$ (8) $L_{max} = 45$
	Sleep disturbance	Outside bedroom, window open	$L_{eq,T} = 45$ (8) $L_{max} = 60$
	Speech intelligibility, moderate annoyance	Indoor Dwelling	$L_{eq,T} = 35$ (16) $L_{max} = 45$
	Moderate annoyance	Outdoor living areas	$L_{eq,T} = 50$ (16)
	Serious annoyance	Outdoor living areas	$L_{eq,T} = 55$ (16)
	Speech intelligibility, learning disturbance, message communication	Indoor schools	$L_{eq,T} = 35$ (class time)
	Hearing impairment	Industrial/ commercial/ traffic areas	$L_{eq,T} = 70$ (24)
US EPA - 1972 Federal Noise Control Act	Annoyance and activity disturbance (outdoor speech communication, sleep disturbance indoors at night-time)	Outdoor living areas	$L_{dn} \leq 55^*$
	Annoyance and activity disturbance (indoor speech communication)	Indoor living areas	$L_{dn} \leq 45$
	Hearing impairment	All areas	$L_{eq,T} = 70$ (24)

WHO = World Health Organization, EPA = Environmental Protection Agency, dBA = A-weighted decibels, $L_{eq,T}$ = equivalent noise energy in dB(A) over time period T (hours), L_{max} = maximum noise level, L_{dn} = yearly day-night equivalent noise levels

*An outdoor L_{dn} of 55 dBA will provide an indoor L_{dn} of approximately 40 dBA with windows partly open for ventilation. The nighttime portion of this L_{dn} will be approximately 32 dBA, which should in most cases, protect against sleep interference[68].

Table 6: Effects of different night-time noise levels on population health [72].

Annual night-time noise level ($L_{night, outside}$)	Health effects observed in the population
Up to 30 dBA	Although individual sensitivities and circumstances may differ, it appears that up to this level no substantial biological effects are observed. $L_{night, outside}$ of 30 dBA is equivalent to the no observed effect level (NOEL) for night noise.
30 to 40 dBA	A number of effects on sleep are observed in this range: body movements, awakening, self-reported sleep disturbance, arousals. The intensity of the effect depends on the nature of the source and the number of events. Vulnerable groups (e.g, children, the chronically ill, the elderly) are more susceptible. However, even in the worst cases the effects seem modest. $L_{night, outside}$ of 40 dBA is equivalent to the lowest observed adverse effect level (LOAEL) for night noise.
40 to 55 dBA	Adverse health effects are observed among the exposed population. Many people have to adapt their lives to cope with the noise at night. Vulnerable groups are more severely affected.
Above 55 dBA	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed. There is evidence that the risk of cardiovascular disease increases.

Relative
 Guidelines

The "absolute" guidelines discussed above address noise intensity and (for L_{dn}/L_{night}) time of day, but do not account for the many other factors that influence community response to noise. For example, there is evidence that noticeable changes in long-term noise levels may result in community response, even if the new levels fall below the guidelines noted above [10, 12]. The EPA and WHO suggest that long-term increases of 5 dBA or greater may result in community noise impacts [7, 68]. Other guidelines suggest that an increase of 5-10 dBA may be perceived as intrusive, an increase of 10-15 dBA may be noticeable, and increases over 15 dBA may be objectionable or intolerable [11].

In order to improve community noise impact assessments, the EPA proposed a method that adjusts (or normalizes) increases in long-term noise levels by noise characteristics (e.g., impulsivity, the presence of distinct tones), background noise levels, community characteristics and attitudes, and other factors [12, 68]. For example, in a community with no previous experience with intrusive noise, the noise level from a new source may be adjusted by +5 dBA. However, if a community has previous experience with intrusive noise or good relations with the source's operator, the "new" noise level may be adjusted by -5 dBA. After making these adjustments, the guidelines in Table 7 are used to predict the community's reaction.

EPA's method is based on changes in the L_{dn} , which is a measure of long-term community noise levels, and may not be appropriate for evaluating short-term changes in noise. A 5 or 10 dBA increase in average 24-hour noise levels will have a different (and likely greater) impact on nearby communities than short-term increases of 5 or 10 dBA.

Table 7: Expected community reaction due to changes in L_{dn} [10].

Normalized change in L_{dn} (dBA)	Expected community reaction
-5	None
0	Sporadic complaints
+5	Widespread complaints
+14	Threats of legal action
+21	Vigorous action

L_{dn} = day-night noise level; dBA = A-weighted decibels

Interpreting
Guidelines

The guidelines in Tables 5 and 6 can be considered ideal community noise levels. Both the absolute and relative guidelines discussed in this section are intended as starting points for decision makers to address and evaluate environmental noise in their communities and jurisdictions [7, 8, 68, 70]. Further:

- These guidelines address noise exposures and response in the general population, and are not intended as measures of individual or small communities' responses to noise. Exceeding a recommended noise level will not necessarily result in health impacts. Similarly, people may have adverse health impacts at noise levels below these guidelines [7, 8, 68, 70].
- These guidelines address the effects of long-term exposures to environmental noise (as measured by L_{eq} , L_{dn} , L_{night}), and may not be appropriate for assessing impacts from short-term exposures (as measured by L_{10} , L_{50} , L_{90} , etc.) [10].
- These guidelines are based, in large part, on evidence from studies of transportation and other noise sources in urban/suburban areas. Therefore, they may not reflect the exposures, context or responses of rural or small communities [7, 68].
- The guidelines do not take into account the cost and feasibility of meeting the recommended levels [7, 8, 68, 70].

3. Wind Turbine Noise

3.1. Mechanical and Aerodynamic Noise

Mechanical
Noise

The major sources of noise from wind turbines are mechanical noise and aerodynamic noise. Mechanical noise is generated by the mechanical components of the wind turbine such as the gearbox, cooling fans, and generator [23]. The amount of mechanical noise generated depends on the turbine's size, materials and design, and on the engineering practices used to construct and maintain the turbine. Modern turbines use a number of design factors to reduce mechanical noise [23].

Aerodynamic
Noise

Aerodynamic noise is usually the most noticeable source of noise from wind turbines [23, 77, 78]. One type of aerodynamic noise from wind turbines is the repetitive "swishing" sound often associated with moving turbine blades [79]. Wind turbine-generated aerodynamic noise is broadband in nature, which means that it is distributed over a wide frequency spectrum that ranges from infrasound to ultrasound (<20 Hz to >20 kHz) [80], and typically does not have distinct tonal components [77]. Some studies have found that most of the audible noise from wind turbines is in the 500-1,000 frequency range [77, 81]. Recent assessments of large wind turbines indicate that at residences near wind turbines, the dominant frequency range for outdoor noise is 200-2000 Hz [25, 26].

Design
features
that affect
aerodynamic
noise

Wind turbines generate noise (and electrical energy) when there is sufficient wind to move the turbine blades. In general, as the size and maximum power output of turbines increase, the amount of aerodynamic noise generated also increases [25]. Wind turbines will generate their maximum noise levels in high wind speed conditions. This is because at higher wind speeds, the interaction between a turbine's blade and the wind is more turbulent, which results in more noise generation [77, 78, 82]. Wind turbines will generate lower levels of noise (or no noise) in calmer wind conditions.¹⁰

Some modern wind turbines have features to minimize turbulence (e.g., fixed speed designs, or blade pitch control), though these features also reduce power output [23]. Factors that can increase turbulence and noise generation are inefficient angles of attack (angle the blade tilts into the wind), rough blade surface conditions, and rotors that are located downwind of the turbine tower [77]. The amount of noise generated by wind turbines of the same size can vary considerably between makes, models, and individual turbines of the same model [25, 26].

¹⁰ The noise levels generated by wind turbines may not reflect how wind turbine noise is perceived at a receptor. During periods of maximum noise generation, the higher levels of wind turbine noise may be masked by noise from high wind speeds. On the other hand, noise generated in calmer wind conditions may be more noticeable because of less masking from wind or other noise sources [19].

3.2. Amplitude Modulated Aerodynamic Noise

Definition

Amplitude modulation refers to fluctuations in the loudness of aerodynamic noise.

“Swish” sound

One form of amplitude-modulated noise is the characteristic “swish” sound associated with wind turbines [21]. This noise, which occurs approximately once every second, is from an increase in SPLs as turbine blades move downward [78]. This noise is most noticeable near a turbine. At a distance, the “swish” sound becomes less distinguishable, and may be perceived as a “churning” noise or the sound of an airplane overhead [79].

“Pulsing”
sound

In certain conditions, wind turbines may also generate “pulsing”, “thumping”, or “beating” sounds that are different from the “swishing” sound [29]. This type of amplitude modulated noise is hypothesized to be generated when there is wind shear, or “layers” of wind speeds at different heights above ground [19, 22]. In these conditions, a turbine blade passes through different layers of wind along its path, with higher winds at the top of a blade’s path and lower winds near the ground. This may result in varying angles of attack at different points on a blade’s path, which could result in fluctuations in the loudness of aerodynamic noise from the turbine [19].

There is a relatively limited body of evidence on the causes of the “pulsing” form of amplitude modulated wind turbine noise. Therefore, it is difficult to predict the conditions that result in amplitude modulation, or determine how common this phenomenon is at wind turbine facilities [22, 83]. The available evidence suggests the following:

- The pulsing form of amplitude modulated wind turbine noise is hypothesized to occur in stable atmospheric conditions, when overall wind speeds are relatively low and the wind shear effect is more pronounced [19].
- When it occurs, the pulsing noise from individual wind turbines may be louder and more noticeable than expected by planners or receptors. Further, it has been hypothesized that stable wind conditions may increase the likelihood of multiple turbines producing the pulsing noise “in sync”, which results in compounded noise levels that are higher than expected at a receptor [82]. Finally, at night or in stable atmospheric conditions, receptors may perceive the pulsing noise as being louder, since there may be less background noise to mask noise from wind turbines [19].
- There is evidence from laboratory and field studies that amplitude modulated noise (from wind turbines and other sources) is more annoying than unmodulated noise with the same frequency and intensity [22].

3.3. Low Frequency Noise

Low frequency noise is usually defined as noise with content below 250 Hz. Low frequency noise with content below 20 Hz is called infrasound, and is generally not audible by humans. Compared to higher frequency noise, noise at lower frequencies must be louder in order to be heard by people with normal hearing. For example, the median human hearing threshold at 8 Hz is 100 dB, at 20 Hz is 80 dB, and at 200 Hz is 14 dB [66]. Noise with lower frequency content is less attenuated by the atmosphere and building materials than noise with higher frequency noise [13].

Field studies
of low
frequency
noise

There are a limited, but growing, number of field studies that have measured levels of infrasound and low frequency noise generated by wind turbine facilities [24, 25, 80]. These studies vary in their methods and design, and their findings are not representative of all wind turbine facilities [26]. We noted the following findings from our review of some low frequency noise assessments and other literature:

- There is strong evidence that upwind turbines (rotors upwind of the tower) do not produce infrasound at levels that are perceptible to humans [22-26].
- There is evidence that as wind turbines increase in size and power, they may produce higher levels of low frequency noise per-MW [25, 26].
- Some assessments found that the indoor low frequency noise levels at locations near wind energy facilities were near or slightly above the threshold of human perception [24-26]. In both the Epsilon (2009) and Madsen and Pedersen (2010) assessments, the researchers concluded that while low frequency noise could be audible in these locations, it was below thresholds for annoyance [25, 26]. On the other hand, Møeller and Pedersen (2011) concluded that while the low frequency noise levels found in their assessment were relatively low, they could still cause some people to be annoyed [26]. An important limitation to these assessments is that they did not evaluate whether people at the measurement locations reported annoyance, disturbance or other health effects.
- In a 2011 self-published field study in Falmouth, MA (a community with three operational turbines), two investigators measured indoor and outdoor low frequency noise levels in one home, and documented the health effects they experienced during the three-day study (e.g., nausea, headache, anxiety) [84]. The investigators determined that their symptoms occurred when the turbines were operating under moderate to high wind speeds. Citing research by Salt and Hullar (2010), the researchers suggest that their symptoms were caused by the stimulation of their vestibular system by inaudible low frequency noise emissions from the wind turbines. Given the limitations in how the health and exposure data were collected (i.e., self-reported symptoms from the two investigators) and interpreted, and the theoretical nature of Salt and Hullar's research on inner ear responses to infrasound [85], it is difficult to determine the public health significance of this study's findings.

4. Wind Turbine Noise and Health

In this section, we summarize our review of studies on wind turbine noise and human health. These studies fall into three major categories: cross-sectional studies; case-series reports; and other reviews, white papers, and assessments.

4.1. Cross-Sectional Studies

In epidemiology, cross-sectional studies are used to measure the prevalence of a characteristic in a population at a single point in time [86]. These studies provide a “snapshot” of how many people in a population have a disease, exposure, or risk factor at a particular time.

European studies of wind turbine noise

Most of the epidemiological evidence on wind turbine noise comes from three cross-sectional studies conducted in Sweden and the Netherlands between 2000 and 2007. The overarching objectives of these studies were to: a) evaluate the prevalence of perception and annoyance due to wind turbine noise; b) examine population, environmental and noise -related characteristics that influenced associations between noise and perception/annoyance; and c) examine the possibility of a dose-response relationship for wind turbine noise and annoyance [16, 17]. Another cross-sectional study examined the association between health-related quality of life and proximity to a wind energy facility in a semirural area of New Zealand [18].

Methods

The three European studies estimated exposure to wind turbine noise using modeled A-weighted sound pressure levels at respondents’ homes. The noise exposures ranged from approximately 30 dBA – 40 dBA in the Swedish studies, and from 24 dBA – 54 dBA in the Dutch study [22]. A mail-in questionnaire was used to collect data on health effects (measured as annoyance, sleep disturbance, stress, and self-reported clinical disease) and potential moderating variables. Subsequent analyses of the three studies’ combined data evaluated the relationship between wind turbine noise and adverse health effects [15], and compare a dose-response relationship between annoyance and wind turbine noise to annoyance from other sources of community noise [20].

The New Zealand study compared health-related quality of life between two communities with similar demographic, socio-economic and geographic characteristics, but different proximities to a wind turbine facility [18]. The study compared a “Turbine” group located less than 2 km from a wind turbine to a “Comparison” group located more than 8 km from a wind turbine. A mail-in questionnaire was used to collect data on physical, psychological, social, environmental and general health, neighborhood amenity, annoyance, and demographic information. In order to reduce response bias, the researchers masked the intent of the study by giving the questionnaire a generic title and including distracter questions.

Key Findings

The European studies found the following:

- Annoyance with wind turbine noise increased with A-weighted sound pressure levels [15-17]. The studies found that people were more likely to be annoyed when noise levels exceeded 35-40 dBA [16, 17].
- The following personal factors appeared to increase the odds of being annoyed by wind turbine noise [16, 17, 20, 22]:
 - Being able to see wind turbines from home
 - Having a negative opinion about the visual impact of turbines on the landscape, or a negative opinion about turbines in general
 - Self-reported sensitivity to noise
 - Economic benefit (only examined in the Netherlands study) decreased the likelihood of annoyance from wind turbine noise.
- In the analysis of combined data, the researchers found that people who reported annoyance outdoors were more likely to report sleep interruption, feeling tense and stressed, and feeling irritable. Annoyance indoors was positively associated with sleep interruption [15]. The researchers observed that the impact of noise on sleep interruption “did not increase gradually with noise levels”; instead, the rates of reported sleep interruption were stable at lower noise levels, and increased at 40 dB in the Swedish study and at 45 dB in the Dutch study [16].
- In the analysis of combined data, the researchers did not find statistically significant associations between annoyance (indoors or outdoors) and other self-reported health outcomes included in the study (including diabetes, high blood pressure, cardiovascular disease, tinnitus, and other outcomes)[15].
- The researchers concluded that wind turbine noise is different, and possibly more annoying, than other sources of community noise at similar levels [16, 17].
 - The Netherlands study found that below 50 dBA (L_{den}), wind turbine noise was more annoying than similar levels of noise from aircraft, general industry, road traffic and railways, and less annoying than shunting yards [16].
 - A 2011 analysis of the studies’ combined data compared an exposure-response relationship for wind turbine noise to exposure-response relationships for stationary industrial and transportation noise.¹¹ The researchers found that a higher percentage of people were annoyed indoors by wind turbine noise compared to the percentage annoyed by similar levels of industrial, aircraft, roadway, and railroad noise [20]. The exposure-response curve for wind turbine noise was steeper compared to those for industrial and transportation noise [20].

¹¹ The exposure-response model excluded people who benefitted financially from wind turbines.

Cross-sectional studies:
Key Findings continued

- The researchers suggest that the relatively high levels of annoyance observed in these studies may be explained in part by amplitude modulation of wind turbine noise [15, 20].
- Some key limitations include the use of self-reported responses to measure health effects and moderating factors, the use of modeled (versus measured) noise levels outdoors to estimate exposure, possible reporting bias from relatively low response rates (37%, 57.6% and 68.4% for the Netherlands, 2007 Sweden and 2004 Sweden studies respectively), and the omission of potential personal or situational factors in their questionnaire and analysis (e.g., type of housing) [15-17, 20]. Further, the exposure response relationship described by the researchers were developed using data from a small number of field studies [20].

In the New Zealand study, respondents from the "Turbine" group had lower average scores compared to respondents living farther away in the following domains: overall quality of life, amenity (i.e., satisfaction with neighborhood/living environment) and physical and environmental health-related quality of life [18]. When examining specific factors in the physical and environmental domains, the respondents in the "Turbine" group had lower average scores in self-reported perceived sleep quality, energy levels, how healthy they perceived their environment to be, and their satisfaction with their living conditions. There was no difference between the two groups for social, psychological and general health-related quality of life, or for annoyance from traffic or neighborhood noise. However, 23 of the 39 respondents in the "Turbine" group independently identified wind turbines as an "other" source of noise annoyance, and rated turbine noise as highly annoying. Some limitations of this study were small sample sizes (39 and 158 respondents in the Turbine and Comparison groups respectively), the use of self-reported outcome measures, lack of noise measurements in the turbine and comparison areas, and limited information on respondents' attitudes about wind turbines[18].

4.2. Case Series Reports

Case series or case reports are the most basic type of observational study in which investigators describe the symptoms, outcomes, and other characteristics of one or more individuals with health problems. These studies are often used to describe unusual or new health symptoms, and may provide a basis for further epidemiological studies.

Case series reports on wind turbine noise

A number of case investigations and case reports on health effects associated with wind turbine noise have been conducted and self-published by medical doctors, community groups, and others. We reviewed case series reports by Harry (2007), Phipps (2007), Pierpont (2009), and Nissenbaum (2009), Ambrose and Rand (2011) and also reviewed summaries and critiques of these and other investigations [77, 81, 87]. Most of the case series reports we considered are not peer-reviewed in the traditional sense of the scholarly peer review process. However, these and other case reports have been cited in a number of journal articles, including several articles on wind turbine noise impacts in a 2011 issue of the *Bulletin of Science, Technology & Society*.

Methods

The reports we reviewed are quite similar in their methodology and major findings. Some investigators (Harry 2007, Pierpont 2009) selected the individuals to include in their case reports; usually, these cases had previously contacted the investigator about health issues they believed were related to nearby wind turbines. Other investigators (Phipps, Wind VOiCe) utilized a self-select self-report method by sending or making a survey available to individuals within a certain geographic area. The investigators collected data using surveys or questionnaires that included one or more of the following topic areas:

- Demographic information (age, sex, occupation);
- Place of residence (location, time in home, distance from nearest wind turbine or facility);
- Health conditions/prescription use before and after wind turbine installation;
- Checklist of various health symptoms/diagnoses;
- Perception of wind turbines (visual/noise/environmental aspects)
- Changes in quality of life

Some investigators asked if the cases had seen a medical doctor about their health issues, and at least one reviewed a handful of cases' medical records. None of the investigations appeared to include independent medical examinations. With the exception of the Ambrose and Rand (2011) field study [84], none of these reports

include exposure data on noise levels (or other measures); however, some investigators used distance to the nearest wind turbine as a proxy measure for exposure.

Key Findings

The case reports' findings and conclusions have some similarities:

- The investigators found that people living near wind turbines experienced new or worsening health symptoms after the turbines began operating. The most common symptoms reported are sleep disturbance, headache/migraines, stress, depression, anxiety, and feelings of anger and hopelessness. At least one investigator (Pierpont) has developed a case definition for these symptoms called "wind turbine syndrome"[88].
- Some investigators documented an increase in prescription drug use (offers by doctors and/or acceptance by patients).
- Many cases reported decreased quality of life, and some reported that they had or were considering moving from their home/area.
- Some investigators have hypothesized that cases' symptoms are caused by low frequency noise or infrasound, which affects people's health by disturbing the vestibular system [84, 88].

Limitations

Case series investigations are the most basic type of epidemiological study. In addition to the inherent limitations of these types of studies, the investigations on wind turbine noise had the following limitations:

- Cases were either self-selected (e.g., chose/initiated participation in study) or selected by investigator
- Lack of controls
- Reliance on self-reported information
- Limited review of medical records, and no independent clinical exams
- Data on "pre-exposure" health status collected retrospectively
- Lack of exposure information (i.e., noise measurements), and no identified "threshold levels"

4.3. Reviews, White Papers, and HIAs

There are several evidence reviews, white papers, and at least two HIAs on the health impacts from wind turbine noise. These evidence reviews have been conducted or commissioned by public health agencies [69, 87], industry groups [77], non-profit organizations [89], and consultants to community groups and developers.

Similarities
and
Differences

For the most part, these reviews draw on the same body of evidence. They may differ on how they define health and health effects; some reports use a relatively narrow and clinical definition that emphasizes direct health effects (e.g., hearing impairment), while others use broader definitions that consider overall impacts to health, quality of life, and well-being.

Key Findings

Overall, these reviews tend to have similar conclusions:

- Wind turbines do not produce noise at levels that could cause hearing impairment [34, 69, 77, 87, 90].
- Annoyance and impacts on quality of life are the most common effects found in epidemiological studies of wind turbines [69, 77, 90, 91]. The available evidence suggests that these effects are from audible levels of amplitude-modulated noise [77, 87, 89].
- A number of case reports have found that some people living near wind energy facilities have reported symptoms such as dizziness, headaches, sleep disturbance, stress and anxiety. However, there have not been epidemiological analyses to determine if these symptoms are or are not associated with wind turbine noise [77, 87, 90].
- Some key data gaps in exposure assessment include limited noise measurements or monitoring data on actual noise levels near wind turbine facilities, and the need for noise models that account for local conditions and aerodynamic modulation [34, 77, 87, 89].
- People's attitudes and concerns about potential health impacts from wind turbine facilities may be influenced by: the visibility and visual impacts of turbines; concerns about fairness and equity; values and interests of community members; and the level of community engagement during the planning process [69, 87, 89-91].

5. Oregon Standard for Wind Turbine Noise

New wind energy developments in Oregon are subject to the Noise Control Regulations for Industry and Commerce (OAR 340-035-0035), which were developed by the Oregon Environmental Quality Commission for new industrial and commercial noise sources on previously unused sites. The Department of Environmental Quality (DEQ) implemented a noise control program in Oregon until funding for the program was eliminated in 1991 [92]. In 2004, Oregon’s noise control regulations were amended to include specific provisions for commercial wind energy facilities.

Under DEQ’s noise regulations, wind energy facilities in Oregon must meet two standards: an ambient degradation standard and a maximum allowable standard [27]. The ambient degradation standard specifies that a wind energy facility cannot increase the L_{10} or L_{50} ambient noise level at a residence by more than 10 dBA. A developer can either measure the actual ambient background noise levels or assume a background L_{50} of 26 dBA. Under the assumed background L_{50} of 26 dBA, the facility must be designed so that the resulting ambient noise levels at a residence do not exceed 36 dBA (26 dBA plus the 10 dBA allowed by the ambient degradation standard). The facility may result in ambient noise levels above 36 dBA if the developer measures ambient noise levels and finds that the background L_{50} is greater than 26 dBA. The maximum allowable standard requires wind energy facilities to meet DEQ’s “Table 8” limits for general industrial and commercial noise sources in Oregon. Under this rule, a wind energy facility must not contribute more than 50 dBA to the noise measured outside of any residence. The maximum allowable rule only applies to noise generated by a facility and does not consider the background noise level or the contribution of other noise sources.

Table 8: Summary of noise limits for wind turbine facilities in Oregon.

	Ambient Degradation Standard	Maximum Allowable Standard*	
Landowner does not waive ambient degradation standard	$L_{50} = 36$ dBA (background + 10 dBA)	Daytime $L_{50}: 55$ dBA $L_{10}: 60$ dBA	Evening $L_{50}: 50$ dBA $L_{10}: 55$ dBA
Landowner waives ambient degradation standard	N/A	$L_1: 75$ dBA	$L_1: 60$ dBA

*In practice, EFSC determines compliance with the maximum allowable standard based on the lowest level from Table 8, which is 50 dBA.

Landowners in Oregon have the option to waive the ambient degradation standard. In these cases, the developer must still comply with the maximum allowable standard and ensure that the facility does not contribute more than 50 dBA to outdoor ambient L₅₀ noise levels.

During the siting of a proposed facility, a developer must demonstrate compliance with the ambient degradation and maximum allowable standards by modeling the anticipated noise levels at a receptor. These models must assume that all of the facility's turbines are operating between cut-in speed (the minimum speed at which a wind turbine will generate energy) and the wind speed that produces the maximum sound power level (i.e., the "worst-case scenario" in terms of noise levels). In practice, projects evaluate compliance with Oregon's noise standard based on the maximum warranted SPL, which is typically + 2 dBA over the levels that manufacturers expect the turbine will produce. OAR 340-035-0035 has additional details on the methods and procedures for modeling noise from wind energy facilities in Oregon.

5.1. Comparison of Oregon Standard to health guidelines

There are some difficulties in comparing Oregon's noise standard to the WHO and EPA guidelines discussed in Section B.2.3. Oregon's standard is based on hourly statistical levels, while the WHO and EPA guidelines are equivalent noise levels (L_{eq} and L_{dn}) over longer time periods. Therefore, Oregon's standard cannot be directly compared to WHO or EPA guidelines. In the absence of comparable metrics, we assumed that for a wind turbine, the hourly L_{50} level is roughly equivalent to the hourly L_{eq} . This is a conservative assumption that may overestimate the L_{eq} depending on the character of the noise.¹² L_{50} tends to be lower than L_{eq} since it is less influenced by noise events [93].

Another limitation is that without site-specific information, we can only draw general conclusions about changes in noise levels, and are unable to address issues related to changes in noise patterns or quality (e.g., whether wind turbine noise at a site is relatively constant, characterized by noise events, or varies with time of day).

Re-cap
WHO/EPA
Guidelines

- The WHO recommends that outdoor noise levels not exceed $L_{eq} = 45$ dBA at night to protect from sleep disturbance, 50 dBA during the day to protect from moderate annoyance, and 55 dBA during the day to protect from serious annoyance [7].
- The EPA recommends a yearly outdoor L_{dn} of 55 dBA to prevent serious annoyance and activity disturbance during the day and sleep disturbance at night [68].
- The WHO and EPA suggest a 5 dBA or greater increase over "typical" long-term noise levels could result in significant community noise impacts [7, 68]. Depending on characteristics related to the noise and community, a 10 dBA or greater increase in community noise levels could be perceived as intrusive or noticeable, and increases above 15 dBA may be objectionable or intolerable [10-12]. These guidelines address changes in long-term community noise levels and are based on equivalent noise metrics (L_{eq}/L_{dn}). A 5 or 10 dBA increase in L_{eq} will likely be greater (louder) than a 5 or 10 dBA increase in L_{50} .

¹² L_{eq} is approximately equivalent to L_{50} for noise that is steady (i.e., does not fluctuate too much). For noise with larger fluctuations, L_{10} may be a more appropriate approximation; for intermittent noise events, the L_{eq} may be some value between L_{90} and L_{50} .

Potential
Impacts

For landowners who do not waive Oregon's noise standard, a new wind energy facility cannot increase outdoor median noise levels by more than 10 dBA. If the background L_{50} level is assumed to be 26 dBA, the maximum outdoor L_{50} level allowed under Oregon's ambient degradation standard is 36 dBA.

- When compared to absolute health-based guidelines, an outdoor L_{50} of 36 dBA is not expected to result in sleep disturbance, disturbance of communication, or annoyance in the general population.
- Landowners who do not waive Oregon's standard could experience up to a 10 dBA increase in outdoor hourly median noise levels. Given that a 10 dBA increase in noise levels is generally perceived as a doubling in loudness [10] and that wind turbine noise may be more noticeable than other forms of community noise [16], a 10 dBA increase could represent a noticeable change in outdoor noise levels.

For landowners who waive Oregon's ambient degradation standard, a wind energy facility can contribute up to 50 dBA to outdoor ambient L_{50} noise levels under Oregon's maximum allowable standard. The total outdoor L_{50} level could exceed 50 dBA if noise from other sources contributes more than 40 dBA to the outdoor L_{50} .¹³

- When compared to absolute health-based guidelines, an outdoor L_{50} of 50 dBA or more could result in sleep disturbance or serious annoyance. This may be especially true in rural areas, where ambient noise levels are relatively low compared to urbanized areas.
- Landowners who waive Oregon's ambient degradation standard could experience a substantial change in outdoor noise levels at times when the L_{50} reaches or exceeds 50 dBA. An L_{50} of 50 dBA could be perceived as approximately four times louder than 26 dBA. Typically, an increase in long-term noise levels of this magnitude (over 20 dBA) is expected to cause widespread annoyance, complaints and possibly threats of legal action [10]. The actual change in long-term noise levels from a wind energy facility may be less than 20 dBA, since the facility is not expected to continually operate at levels that will result in the maximum L_{50} allowed by Oregon law. Landowners who waive Oregon's ambient degradation standard may perceive and respond differently (potentially more favorably) to the new noise levels, particularly if they benefit from the facility or have good relations with the developer [10, 15].

¹³ Noise levels are measured on a logarithmic scale and cannot be added or subtracted in the "typical" arithmetic way. For example, 50 dBA + 50 dBA = 53 dBA (not 100 dBA). If the difference between two noise levels exceeds 10 dBA, the resulting noise level will be the "louder" of the two noise levels. In other words, adding 50 dBA to a background of 26 dBA will result in a total noise level of 50 dBA.

The Oregon Department of Energy is responsible for responding to noise complaints related to large energy facilities sited through the EFSC process. To date, there have been no complaints related to operating wind energy facilities sited through the EFSC process [29].

Key Findings

6. Conclusions and Recommendations

- Environmental noise in community settings is linked to sleep disturbance, annoyance, stress, and decreased cognitive performance [7-9]. These effects, undesirable in their own right, can in turn adversely affect physical health. Chronic sleep disturbance and stress from environmental noise exposures may increase risks for cardiovascular disease, decreased immune function, endocrine disorders, mental illness, and other effects [7, 9-12].
- Objective measures of sound do not necessarily correlate with subjective experiences of noise. When comparing similar sounds, a 3 dB increase correlates to a doubling in objective sound energy levels, but is considered the threshold of perceivable difference in loudness [10, 13]. A 10 dB increase equates to a 10-fold increase in sound energy, but is perceived as a doubling in loudness [10].
- The perception of sound as noise is a subjective response that is influenced by factors related to the noise, the person, and the social/environmental setting. These factors result in considerable variability in how people perceive and respond to noise at the individual and community level [8, 14]. Factors that are consistently associated with negative community response are changes in noise exposure (i.e., the introduction of a new noise, or a noticeable change in noise loudness or quality), and increases in human-generated noise [14].
- A small number of epidemiological studies have linked wind turbine noise to increased annoyance, feelings of stress and irritation, sleep disturbance, and decreased quality of life [15-18]. These studies have not identified positive associations between wind turbine noise and hypertension, cardiovascular disease, or other diseases. In studies from Europe, annoyance from wind turbine noise was more likely when levels exceeded 35-40 dBA [15, 16].
- There is some evidence that wind turbine noise is more noticeable, annoying and disturbing than other community or industrial noise at the same level of loudness [15, 16, 18-20]. This may be because:
 - wind turbines produce noise that fluctuates in loudness and “type” (i.e., swishing vs. pulsing amplitude-modulated noise) [19-21]. Since fluctuating noise is generally considered more annoying than steady or constant noise, wind turbine noise may be perceived as more annoying than other environmental noise;
 - unlike other sources of community noise, wind turbine noise levels may not decrease predictably at night, and could be perceived as more noticeable and louder at night than during the day. This could result in sleep disturbance in nearby residences [15, 19, 22].

Oregon Noise
Standard for
Wind Energy
Facilities

- Factors unrelated to noise may explain some of the annoyance reported in the few epidemiological studies of wind turbine noise. These factors include being able to see wind turbines from home, having a negative opinion about turbines, and self-reported sensitivity to noise [16, 17, 20, 22].
- Wind turbine-generated infrasound (frequencies below 20 Hz) is below levels that can be perceived by humans [23-26].
- Some field studies have found that in some locations near wind turbine facilities, low frequency noise (frequencies between 10 and 200 Hz) may be near or at levels that can be heard by humans [24-26]. However, there is insufficient evidence to determine if low frequency noise from wind turbines is associated with increased annoyance, disturbance or other health effects [26].
- People with greater exposure to noise from wind turbines, such as those that live nearby, are more likely to experience negative health effects than those with lower levels of exposure to noise. The extent of that impact depends on many site-specific variables, such as distance from the facility, local topography and water bodies, weather patterns, background noise levels, etc.
- In Oregon, a developer must demonstrate that a new wind energy facility complies with an ambient degradation noise standard and a maximum allowable noise standard. These standards are defined in rule by the Oregon Department of Environmental Quality. The ambient degradation standard states that a wind energy development cannot increase the median background noise levels by more than 10 dBA. Developers can either measure the actual background noise levels or assume an hourly median (L_{50}) noise level of 26 dBA. Based on the assumed background level of 26 dBA, the maximum L_{50} allowed under the ambient degradation standard is 36 dBA. Under the maximum allowable standard, a wind energy facility may not contribute more than 50 dBA of the noise measured outside of any residence. A landowner can waive the ambient degradation standard, in which case the facility must still comply with the maximum allowable noise standard [27, 28].
- For landowners who do not waive Oregon's noise standard, a new wind energy facility cannot increase outdoor median noise levels by more than 10 dBA. If the background L_{50} level is assumed to be 26 dBA, the maximum outdoor L_{50} level allowed under Oregon's ambient degradation standard is 36 dBA.
 - When compared to WHO and USEPA health-based guidelines, an outdoor L_{50} of 36 dBA is not expected to result in sleep disturbance, disturbance of communication, or annoyance in the general population.

- Landowners who do not waive Oregon's standard could experience up to a 10 dBA increase in outdoor hourly median noise levels. Given that a 10 dBA increase in noise levels is generally perceived as a doubling in loudness [10] and that wind turbine noise may be more noticeable than other forms of community noise [16], a 10 dBA increase could represent a noticeable change in outdoor noise levels. However, the resulting noise levels are below the WHO and USEPA's recommended guidelines for outdoor noise.
- For landowners who waive Oregon's ambient degradation standard, a wind energy facility can contribute up to 50 dBA to outdoor ambient L₅₀ noise levels under Oregon's maximum allowable standard. The total outdoor L₅₀ level could exceed 50 dBA if noise from other sources contributes more than 41 dBA to the outdoor L₅₀.
 - When compared to WHO and USEPA health-based guidelines, an outdoor L₅₀ of 50 dBA (or higher) could result in sleep disturbance or serious annoyance. This may be especially true in rural areas, where ambient noise levels are relatively low compared to urbanized areas.
 - Landowners who waive Oregon's ambient degradation standard could experience a substantial change in outdoor noise levels if the total L₅₀ reaches or exceeds 50 dBA. An L₅₀ of 50 dBA could be perceived as approximately four times louder than 26 dBA. Typically, an increase in long-term noise levels of this magnitude (over 20 dBA) is expected to cause widespread annoyance, complaints and possibly threats of legal action [10]. The actual change in long-term noise levels from a wind energy facility will likely be less than 20 dBA, since the facility is not expected to continually operate at levels that will result in the maximum L₅₀ allowed by Oregon law. Further, landowners who waive Oregon's ambient degradation standard may perceive and respond differently (potentially more favorably) to the new noise levels, particularly if they benefit from the facility or have good relations with the developer [10, 15].
- The Oregon Department of Energy is responsible for responding to noise complaints related to large energy facilities sited through the EFSC process. To date, there have been no complaints related to operating wind energy facilities sited through the EFSC process [29].

Conclusions

1. Given the current scientific evidence, Oregon's ambient degradation standard of 36 dBA for wind energy facilities is not expected to result in annoyance, sleep disturbance or other health effects in the general population, and is protective of public health. However, the 10 dBA change allowed under this standard could result in a noticeable change in outdoor noise levels at impacted residences.
2. Landowners who waive Oregon's ambient degradation standard could experience outdoor L₅₀ noise levels up to 50 dBA from an operating facility under Oregon's maximum allowable standard. This could represent a substantial change in outdoor noise levels and possibly result in sleep disturbance and moderate to serious annoyance. The likelihood and magnitude of any impacts will depend on a number of factors, including time of day, characteristics of the noise, and the receptors' perceptions of the noise source.
3. The major source of uncertainty in our assessment is related to the subjective nature of response to noise, and variability in how people perceive, respond to, and cope with noise. Additional uncertainty is due to moderate or limited evidence in the following areas:
 - a. Epidemiological studies on wind turbine noise
 - b. Amplitude modulation of wind turbine noise
 - c. Indoor low frequency noise impacts from wind turbines
4. The Oregon Department of Energy is responsible for responding to noise complaints related to large energy facilities sited through the EFSC process. To date, there have been no complaints related to operating wind energy facilities sited through the EFSC process [29]. However, there does not appear to be a systematic process for responding to complaints from county-sited facilities. While PHD has anecdotal evidence of noise complaints and reported health impacts from a few operating facilities in Oregon, we currently lack the data needed to evaluate the frequency or magnitude of any noise-related impacts from existing facilities in the state.

Recommendations

1. To reduce the potential for health effects from wind turbine noise, planners and developers should evaluate and implement strategies to minimize noise generation when outdoor levels exceed Oregon's standards for wind turbine noise. These strategies could include the following:
 - a. During the planning phase, consider site-specific factors that may influence noise propagation and perceived loudness wind turbine noise, particularly factors that may influence actual or perceived noise levels at night.
 - b. Continue to evaluate scientific evidence on how local conditions could change the propagation and character of wind turbine noise (e.g., the effects of wind shear on amplitude modulation and noise generation at night).

2. The level of annoyance or disturbance experienced by people hearing wind turbine noise is influenced by individuals' perceptions of other aspects of wind energy facilities, such as turbine visibility, visual impacts, trust, fairness and equity, and the level of community engagement during the planning process. By explicitly and aggressively addressing these and other community concerns as part of the wind facility siting process, developer and planners may reduce the health impact from noise produced by wind turbines.
3. Ensure that residents living near wind energy facilities understand the potential risks and benefits associated with a development, and are aware (and able) to report health issues and concerns if they choose.

Strategies
during the
planning
phase

6.1. Additional Recommendations

Based on the available evidence, the dBA scale appears to be the most appropriate scale for measuring noise from wind turbine facilities [16, 79]. The dBA scale is appropriate for measuring broadband frequency noise with moderate SPLs. This is a fairly accurate description of the typical noise profile from wind turbines. Further, most of the public health evidence and guidelines for noise exposures are based on studies that have used A-weighted noise measurements. Therefore, measurement in the dBA scale would provide data that could be compared public health guidelines or studies.

In cases where low frequency noise is a concern, some public health authorities have recommended comparing simultaneous measurements in the dBC and dBA scales, and considering more in-depth analyses if the difference in measurements (dBC-dBA) is greater than 10 dBA [7, 87]. Historically, the dBC-dBA difference has been used to evaluate low frequency noise sources with tonal components (e.g., diesel engines, aircraft, compressors) [94]. The dBC-dBA comparison is intended as an initial screen to determine the need for additional evaluations, and is not intended as method to determine if low frequency noise levels are problematic at a particular site [94]. In cases where conditions at a site indicate the need for additional noise measurement and analysis, it may be appropriate to conduct an in-depth frequency or spectrum analysis (discussed in Section B.2.1) [7].

At this time, there is limited guidance for measuring and evaluating amplitude modulated noise generated by wind turbine facilities. As more is known about the causes of this phenomenon, the frequency of its occurrence, and its impacts on nearby communities, there may be additional guidance on assessing and mitigating potential impacts from amplitude modulated wind turbine noise.

Planners and developers can consider several strategies to ensure that nearby residents and communities are not adversely affected by noise generated from wind turbines. These strategies could include:

1. Use iterative noise modeling to plan facilities boundaries and turbine locations [79]. In the early phases of planning, developers can use baseline modeling techniques to establish the initial boundaries of a project. Once these boundaries are defined, developers can identify residences or receptors within or near the facility, and use more refined and location-specific modeling techniques to plan and site turbines at appropriate distances from these sensitive areas.

Strategies
during the
operations
phase

2. Ensure that the measurements and models used during the siting process are up-to-date and reflect the current state of science.
3. Ensure that nearby residents understand the potential health implications associated with a development (wind energy or otherwise). Further, residents should receive information on how to report health-based issues or concerns during the operations phase, and information on the developer's noise mitigations plans (if any).

In cases where noise levels from a facility exceed local regulations, or result in complaints from nearby community members, government agencies, planners and developers, and other stakeholders may need to implement noise mitigation strategies. These could include the following:

1. Develop systems and protocols for systematically documenting, responding to, and evaluating complaints. This complaint-based system may include noise monitoring at affected residences, documentation of residents' symptoms (e.g., a symptom log), or other measures. Ideally, this system would allow for the collection of complaints across multiple sites in order to track issues and trends over time.
2. Use noise mitigation strategies, such as operating the facility in a low-noise operating mode (usually achieved by reducing the rotational speed of turbines). Developers should outline and communicate their proposed mitigation strategies to nearby residents, government agencies, and other stakeholders.

C. Visual Impacts

1. Introduction
2. Overview of Shadow Flicker
3. Shadow Flicker and Health
4. Other Visual Impacts
5. Conclusions and Recommendations

1. Introduction

A common community concern about wind energy developments in the U.S. and other countries is their visual impact on the surrounding landscape and viewshed [34, 62, 95]. Some potential reasons for these concerns are [34]:

- wind energy developments are a relatively new type of development, and often are built in rural or remote areas that historically were not considered for industrial development;
- a wind energy facility's project area can extend over a very large geographic area;
- wind turbines are highly visible due to their height, moving blades (or blinking lights), and sometimes due to their location at higher elevations (e.g., on mountain tops or ridges).

In this HIA, we focused our assessment of visual impacts on shadow flicker, and briefly discuss the available evidence on distraction to drivers and looming. We did not address aesthetic impacts on the landscape and viewshed. However, aesthetic impacts may play an important role in peoples' perceptions and acceptance of wind energy developments near their communities [22, 34]. Further, these perceptions may play a role in other pathways examined in this HIA, particularly in the noise and community conflict domains. Therefore, we believe it is important for planners to consider and evaluate the aesthetic impacts of these developments on nearby communities and viewsheds.

2. Overview of Shadow Flicker

Definition

Shadow flicker refers to the alternating levels of light intensity produced when rotating turbine blades cast shadows on nearby buildings or receptors [30]. Shadow flicker is most noticeable indoors when shadows are cast through windows or other openings, and is generally not considered an issue outdoors [30].

Factors that affect people's experience of shadow flicker

Wind turbines only produce shadow flicker at certain times and locations. Factors that influence the magnitude and likelihood of shadow flicker impacts include the following [30, 31, 34]:

- **Geographic location:** Shadow flicker impacts are relatively lower in the continental U.S. compared to countries at higher (or more northern) latitudes. This is because at higher latitudes, the sun has a lower position in the sky, which results in longer shadows.
- **Distance:** The likelihood and magnitude of shadow flicker impacts decrease with increasing distance from a turbine.
- **Location relative to turbine:** The shadow flicker effect occurs in a butterfly-shaped area around a turbine. In the northern hemisphere, this area extends in directions east-northeast and west-northwest of a turbine, and does not affect receptors located to the south of a turbine.
- **Time of day/year:** Shadow flicker is more likely to occur when the sun's position is low in the horizon. Therefore, shadow flicker impacts are more likely to occur at either sunrise or sunset, and may be greater during winter months compared to summer.
- **Intensity of light:** Shadow flicker occurs in sunny clear weather, and is unlikely to be an issue in cloudy conditions.
- **Turbine design, wind speed and direction:** In variable speed turbines, increasing wind speed will increase shadow flicker speed or frequency. In turbines that rotate on their axis, wind direction will affect the direction that blades cast their shadows.
- **Presence of visual obstructions:** Visual obstructions such as trees and buildings may reduce the amount of shadow flicker at a location.

Measurement of Shadow Flicker

Shadow flicker is measured in Hertz (Hz), or flashes per second, which is determined by the rotational speed of wind turbine blades. For example, a three-blade turbine with a speed of 20 rotations per minute (rpm) produces shadow flicker at a rate of 1 Hz. Most modern large wind turbines produce shadow flicker at frequencies between 0.3 and 1 Hz [30]. Chronic or long-term exposures to shadow flicker are measured in minutes/hours of flicker per day/year [31].

3. Shadow Flicker and Health

There is limited epidemiological evidence on the health risks associated with shadow flicker from wind turbines. The health effects that have received the most attention are photosensitive epilepsy (PSE) and nuisance.

3.1. Photosensitive epilepsy (PSE)

Epilepsy affects approximately 2 million people in the U.S., or 0.6% of the U.S. population [96]. PSE is a form of epilepsy in which seizures are triggered by exposure to flashing lights at certain intensities, or certain types of visual patterns. Approximately 3% of people with epilepsy have PSE [97]. People with PSE may have increased seizure risks at flicker levels that range from 3 Hz [98] to 30 Hz [97]. This flicker can come from many potential sources, including television, video games, strobe lights, or natural light that flickers in the environment [97].

Evidence on
turbine-
generated
flicker and
PSE

Only a handful of published research studies have examined the risks of PSE from turbine-generated shadow flicker. These studies examine the issue from theoretical or risk assessment perspectives, and are not based on epidemiological data. Harding et al. (2008) outlines the conditions where shadow flicker from wind turbines could theoretically exceed a 3 Hz risk level (thereby increasing seizure risks in people with PSE), and recommends that wind turbines have rotational speeds less than 60 rpm [98]. The authors mention "two examples of seizures induced by wind turbines on small wind turbine farms in the UK... reported to the authors in 2007", but do not give any specifics on the nature of exposure or any clinical evaluations of these individuals.

In 2007, the UK-based organization Epilepsy Action collaborated with Dr. Harding on an online survey to identify people affected by shadow flicker from wind turbines. The survey had a low response rate, and the organization could not conclusively identify any cases of seizures triggered by wind turbines. The organization stated that it "...does not challenge the theory that wind turbines may create circumstances where photosensitive seizures can be triggered. However from our experience and that of our members and website users it does appear that this risk is minimal [99]."

Another study used a model to assess the risk of epileptic seizures under different meteorological conditions in land and marine environments. The researchers concluded that because of their relatively slow rotational speed, large turbines are unlikely to pose risks for seizures. For the various meteorological conditions considered, the study found minimal risks at distances more than nine times the maximum height of a turbine's blade [100]. We did not identify any self-published or self-reported cases of seizures or epilepsy associated with shadow flicker from wind turbines.

3.2. Nuisance

Nuisance or annoyance is a subjective measure of a person's reaction to an exposure or stimulus. Annoyance can range from a feeling of irritation to a "significant degradation in the quality of life" (Suter 1999).

A 2010 evidence review on shadow flicker found that approximately 10% of adults and between 15-30% of children in the general population may be disturbed by light fluctuations at 15-20 Hz from any source. Children are more likely than adults to be annoyed by light fluctuations, and may be more severely impacted if this annoyance disrupts their concentration or work activities [30]. The report also notes that very few people are annoyed at frequencies below 2.5 Hz [30].

3.3. Guidelines for shadow flicker

Oregon does not have any specific guidance or requirements for shadow flicker from commercial wind turbines. However, the setback distances required to meet Oregon's noise standard may also minimize any impacts from shadow flicker, though there may be sites or conditions where this is not true.

A few European countries have regulations or guidelines on the maximum number of hours of shadow flicker per year allowed at a receptor. For example, Germany has a maximum worst-case limit of 30 hours of flicker per year or 30 minutes a day, while Denmark recommends no more than 10 hours per year for people who experience shadow flicker [30, 34]. However, it is not clear if these are health-based recommendations.

3.4. Summary

The available evidence indicates that shadow flicker from properly sited wind turbines in Oregon are unlikely to cause PSE or nuisance. The risks for PSE or nuisance are minimal at flicker levels below 2.5 Hz, and most modern wind turbines produce flicker at frequencies between 0.3 and 1 Hz. Further, because shadow flicker only occurs under certain conditions, any impacts will be limited in time and location. In the majority of cases, the setback distances required to meet Oregon's noise standard are expected to minimize shadow flicker impacts.

4. Other Visual Impacts

4.1. Distraction while driving

Theoretically, wind turbines could be an external source of distraction for drivers because of their moving blades, blinking lights, size, and because they may be a “novel” object in the landscape. However, there is very limited data to evaluate if wind turbines have increased accident rates due to driver distraction. There have been one or two research studies on this issue, which did not find any increase in accident rates before and after the construction of the wind energy facilities [33]. We did not identify any health-based recommendations that address driver distraction from wind energy facilities.

4.2. Visual looming effect

The "looming effect" refers to the phenomenon of large wind turbines towering or looming over nearby residents. This effect could theoretically have negative impacts on people's quality of life and well-being. The looming effect was raised as an issue of concern in Oregon, and was addressed during the siting of at least one wind energy development in Washington. The analysis conducted for the Washington site is the only reference we were able to identify on the visual looming effect from wind turbines [32]. In their paper, the authors provide background on the visual looming effect in science and architecture, and describe field tests to assess the potential for the visual looming effect at an existing wind energy development. The authors conclude that looming will not cause negative effects at a 4:1 distance to height ratio (i.e., the setback distance from a receptor should be four times the height of a wind turbine). This finding is based on urban planning guidelines, which suggest that a 4:1 distance-to-height ratio will minimize any negative psychological reactions from feeling "enclosed" by a tall building or object. It should be noted that this is not a health-based guideline. Further, it is not clear if this guideline also applies to wind turbines built at higher elevations (e.g., on a ridge or mountaintop).

5. Conclusions and Recommendations

Key Findings

- Shadow flicker refers to the alternating levels of light intensity produced when rotating turbine blades cast shadows on nearby buildings or receptors [30]. Most modern large wind turbines produce shadow flicker at frequencies between 0.3 and 1 Hz [30].
- Wind turbines produce shadow flicker at certain times, locations, and under certain conditions. In the continental U.S., shadow flicker impacts are relatively lower compared to locations at higher latitudes, are more likely to occur at sunrise or sunset, and affect a butterfly-shaped area to the northeast and northwest of a wind turbine [30, 31].
- There is insufficient evidence to determine if the “looming effect” (i.e., psychological reactions from feeling “enclosed” by a tall building or object) could have negative impacts on people’s quality of life and well-being. Urban planning guidelines that recommend a 4:1 distance-to-height ratio to minimize negative psychological reactions from feeling “enclosed” by a tall building or object may not be applicable to wind turbines in rural environments [32].
- Some Oregonians voiced concern that wind turbines could distract drivers and result in traffic crashes. However, the very few research studies on this issue did not find any increase in crash rates after the construction of the wind energy facilities [33].

Conclusions

1. Shadow flicker from wind turbines in Oregon is unlikely to cause adverse health impacts in the general population. The low flicker rate from wind turbines is unlikely to trigger seizures in people with photosensitive epilepsy. Further, the available evidence suggests that very few individuals will be annoyed by the low flicker frequencies expected from most modern wind turbines [30, 31, 34].
2. While Oregon does not have specific guidelines for shadow flicker, the setback distances (i.e., the distances between turbines and other structures) required to meet Oregon’s noise standard should be sufficient to minimize shadow flicker impacts in most cases.

Recommendations

1. In cases where the conditions at a particular site make shadow flicker a potential issue, planners and developers should consider the distance, orientation and placement turbines relative to homes and buildings, and the use of visual obstructions to block flicker.
2. If shadow flicker negatively affects people after a wind turbine is installed, strategies such as planting vegetation as visual barriers or installing blinds on affected buildings may be needed [30].
3. While aesthetic impacts are unlikely to directly affect health, they may play an important role in peoples’ perceptions and acceptance of wind energy developments near their communities [34]. Planners should consider evaluating these impacts if they emerge as an important community concern.

D. Air Pollution

1. Introduction
2. Overview of Air Pollution and Health
3. Wind Energy and Air Pollution
4. Conclusions and Recommendations

1. Introduction

Air pollution is a complex mixture of chemicals, particles, gases and other materials in the atmosphere that can harm human health and damage the environment. There are natural and man-made sources of air pollution. The primary man-made sources of air pollution in Oregon and the U.S. include emissions from power plants, industrial facilities, cars and other transportation sources, and chemicals used in everyday activities [101]. One important source of air pollution is from power plants that burn fossil fuels to produce electricity. While most of Oregon's electricity production is from renewable sources, more than 30% of electricity generated in the state from 2005-2009 years was from coal and natural gas [61, 102].

Direct exposure to the most common air pollutants in the U.S. is associated with short and long-term health effects that include respiratory irritation, asthma, cardiovascular disease, cancer, and premature death [35, 36]. Some air pollutants have indirect effects on human health; for example, greenhouse gas emissions accumulate in the atmosphere and contribute to climate change, while persistent pollutants like mercury can deposit on soil and water, and accumulate in our food chain [36]. The risks from air pollution depend on several factors, including: 1) the type and toxicity of pollutants; 2) synergistic effects between pollutants; 3) routes and levels of exposure; and 4) whether there are vulnerable or susceptible people in the exposed population.

The process of generating electricity from wind energy does not produce air pollution [37]. However, there are other ways that wind energy development can impact local and regional air emissions. In this section, we begin with an overview of the major types of air pollution and their effects on human health. We then evaluate how wind energy facilities could change local air pollution levels through three pathways: 1) the replacement of gas/coal-fired units in the state; b) construction equipment and vehicular traffic during construction and operation and maintenance phases; and c) changes in road conditions/infrastructure in local communities.

2. Air Pollution: Types, sources, and health impacts

2.1. Greenhouse gases

Greenhouse gases (GHGs) trap heat in the atmosphere, and are produced from natural and human sources. Increases in GHGs from human activities are the cause of rising global surface temperatures, changes in precipitation patterns, changes in ocean temperatures and sea levels, and other changes in the Earth's climate [103].

The main greenhouse gases generated from human activity are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and fluorinated gases. The major sources of GHGs in the U.S. are: the combustion of fossil fuels for energy; the extraction, processing and transport of fossil fuels; livestock and agricultural practices; and industrial processes [104]. From 1990 to 2009, total U.S. emissions of greenhouse gases increased by 7.3% [104]. Oregon accounts for 1% of U.S. GHG emissions [105]. Transportation and electricity generation are the major sources of GHG emissions in the state, and agriculture, waste management and industrial processes also contribute smaller amounts of GHGs [106].

Table 9: Greenhouse gas emissions in the U.S. and Oregon [104, 106].

Gas	% total US GHG emissions (2009)	% total OR GHG emissions (2008)	Major Sources
CO ₂	83%	83.5%	Fossil Fuel Combustion Non-energy use of fuels Iron/steel/coke production
Methane	10.3%	8.5%	Natural gas production Enteric fermentation Landfills
N ₂ O	4.5%	4.7%	Agricultural soil management Mobile combustion Manure management
Fluorinated gases Hydrofluorocarbons (HFCs) Perfluorocarbons (PFCs) Sulfur hexafluoride (SF ₆)	2.2%	3.3%	Substitution of ozone depleting chemicals Electricity transmission and distribution Production of HCFC-22

Sources and Trends

Health effects

GHG emissions have indirect impacts on public health through their contribution to global climate change [36]. These health impacts are long-term and global in scale, and include: increased morbidity and mortality from extreme heat and weather-related; increased incidence of respiratory illnesses, cardiovascular diseases and cancer; increased risks for food-, vector- and water-borne diseases; increased mental health and stress disorders; and food insecurity and malnutrition from disruptions in agricultural systems [107].

Climate change poses some specific challenges for the Pacific Northwest in the near and long-term, including the following [105]:

- Average annual temperatures are expected to increase by 0.2-1 °F per decade
- Summers will be warmer and drier
- Extreme precipitation events may increase
- Global sea levels may increase

These changes may result in the following health impacts [105]:

- Injuries and deaths due to heat waves, flooding and other extreme weather events
- Altered infectious disease patterns due to changes in disease vectors, water and food quality, and environmental/weather conditions that influence disease transmission
- Changes in incidence and severity of respiratory illnesses (e.g., asthma, hay fever)
- Cardiovascular diseases and stroke from changes in heat and air pollution
- Mental health and stress

GHG emission goals

Global GHG emissions must be reduced by 60-80% below 1990 levels to avoid serious changes in the climate system [108]. In 2007, the Oregon Legislature established state goals to reduce GHG emissions and prepare for the impacts of climate change. These goals represent Oregon's "fair share" of the global emissions reductions needed to avoid "dangerous interference with the climate system" [108]. Oregon's GHG reduction goals are to begin reversing growth in GHG emissions by 2010, decrease emissions to 10% below 1990 levels by 2020, and decrease emissions to at least 75% below 1990 levels by 2050 [108].

2.2. Criteria Air Pollutants

The U.S. EPA enforces national air quality standards for six criteria air pollutants: ground-level ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO) and lead [35]. CO, SO_2 , lead and PM_{10} are emitted directly into the atmosphere from fuel combustion, construction sites and equipment, wildfires, and industrial sources. Ozone, $PM_{2.5}$, and NO_x are formed indirectly during complex chemical reactions in the atmosphere.

Health effects

The criteria air pollutants are the most common air pollutants in the U.S., and account for most of the public health burden from air pollution [35]. These pollutants have direct and near-term health impacts at the local and regional levels. Ozone and fine particulate matter are the most harmful of these pollutants. Short-term exposures to criteria air pollutants are associated with increased respiratory symptoms (coughing, wheezing, difficulty breathing), inflammation of airways, irregular heartbeat, aggravation of asthma, bronchitis, and other respiratory illness, non-fatal heart attacks, and increased risk for death [35]. In the long-term, higher levels of exposure to these pollutants can cause increased risks for chronic lung and heart disease, cancer, and premature death [35].

Health-based guidelines

The EPA's National Ambient Air Quality Standards (NAAQS) and the Air Quality Index are health-based standards for the criteria air pollutants (Table 10). These standards are a useful guide to determine when local levels of these pollutants pose risks to public health. It is important to note that these thresholds are for air pollution from all local sources, and cannot be used to determine if emissions from a single source are "safe" or unacceptable.

Oregon data

The Oregon DEQ and the Lane Regional Air Pollution Agency (LRAPA) monitor and report on air quality in Oregon. In 2010, most areas in Oregon met EPA's air quality standards for the criteria air pollutants; the exceptions were Klamath Falls, Oakridge and Lakeview, which did not meet the daily $PM_{2.5}$ standard [109]. The levels of NO_x and SO_2 in Oregon have been below national standards for decades, and PM_{10} and CO levels have been below these standards since the mid-1990s. While ozone levels in the state are near the NAAQS, they are on a downward trend due to ozone reduction efforts in metropolitan areas [109].

Table 10: Sources and air quality standards for criteria air pollutants.

Pollutant	Sources	NAAQS
Ground-level Ozone (O ₃)	Formed indirectly by reactions between sunlight, NO _x and other chemicals	75 ppb (8-hour average)
Particulate matter (PM)	PM ₁₀ (coarse particulate matter): emitted directly from construction sites, unpaved roads, fires, and smokestacks	PM ₁₀ : 150 µg/m ³ (24-hour average)
	PM _{2.5} (fine particulate matter): formed indirectly by chemical reactions in the atmosphere	PM _{2.5} : 35 µg/m ³ (24-hour average) PM _{2.5} : 15 µg/m ³ (annual average)
NO _x (NO ₂ and other nitrogen oxides)	Formed from emissions of motor vehicles, power plants, construction equipment Contributes to formation of ozone and fine particulate matter	100 ppb (1-hour average) 53 ppb (Annual average)
SO ₂	Primary source is power plants that use fossil fuels (73% of all emissions); also formed from non-road equipment Contributes to formation of fine PM	140 ppb (24-hour average)
CO	Formed during combustion of fuels; primary source is from mobile sources	9000 ppb (8-hour average) 35000 ppb (1-hour average)
Lead	Primary sources are lead smelters, leaded aviation gasoline and other industrial sources	0.15 µg/m ³ (3-month rolling average)

NAAQS = EPA National Air Quality Standards, ppb = parts per billion; µg/m³ = micrograms per meter cubed

2.3. Hazardous Air Pollutants

The EPA currently regulates 188 air toxics in the U.S. [110], and has designated 33 of these chemicals as air toxics of national concern [109]. Power plants, diesel engines and motor vehicles are all sources of hazardous air pollutants. The amount and type of air pollutants emitted by these sources vary depending on the fuel, chemicals and technology and processes used.

Health effects

Hazardous air pollutants (or air toxics) can cause serious illnesses in people who are exposed to unsafe levels of these chemicals. Exposure to these chemicals may cause increased risks for cancer, neurological problems, developmental issues, and damage to the immune, respiratory, and reproductive systems [110]. These pollutants enter the environment through air emissions, but may eventually deposit in soil or water, or be taken up into plants, fish, milk and other foods. Therefore, people can be exposed to these pollutants by breathing in contaminated air; swallowing pollutants in water, soil or dust; absorbing chemicals through the skin; or eating fish, plants, or other foods that are contaminated with these chemicals [110].

Health-based guidelines

Health-based thresholds (if any) for hazardous air pollutants depend on the toxicity and other properties of each individual contaminant. Currently, there are no federal health-based standards for this class of pollutants. However, the Oregon DEQ has developed ambient benchmark concentration for 52 contaminants in order to prioritize pollution reduction efforts in the state [111]. Information on these benchmarks is available at: <http://www.deq.state.or.us/aa/toxics/benchmark.htm>.

2.4. Vulnerable Populations

In general, children, the elderly, and people with existing respiratory or cardiovascular illnesses may be more vulnerable to the effects of air pollution [35, 110]. People who live or work near a pollutant source may be at higher risk for exposure to air pollution.

3. Wind Energy Facilities' Impacts on Air Pollution

3.1. Pathway 1: Displacement of fossil-fuel generated electricity in Oregon

Wind energy facilities do not generate air emissions from electricity production, and could reduce regional air pollution levels if they displace electricity generated from gas, coal, and other fossil fuels [36, 37]. In order to quantify reductions in air emissions, researchers must consider the following factors [34, 36]:

- The sources and amounts of fossil-fuel energy displaced by wind energy
- The types and amounts (per unit energy) of air pollutants emitted by the displaced energy source
- Current and future demographic, technological and policy changes that will affect electricity consumption and air emissions

Estimating the impacts of wind energy facilities on local air emissions is a complex process that is outside of the scope of this report. Reports by the National Research Council (NRC) and EPA provide more in-depth information on calculating a development's impact on air pollution [34, 36]. In this section, we provide some basic information on electricity production in Oregon and the air emissions impacted by electricity generation in the state.

3.1.a. Electricity Production in Oregon

Electricity demand varies by time of day and season. The “base load” demand (demand that stays relatively constant over time) is met using electricity from the lowest-cost power plants. The remaining demand is met by dispatching power plants based on availability and cost, with the highest-cost sources utilized last to meet periods of peak electricity demand [36].

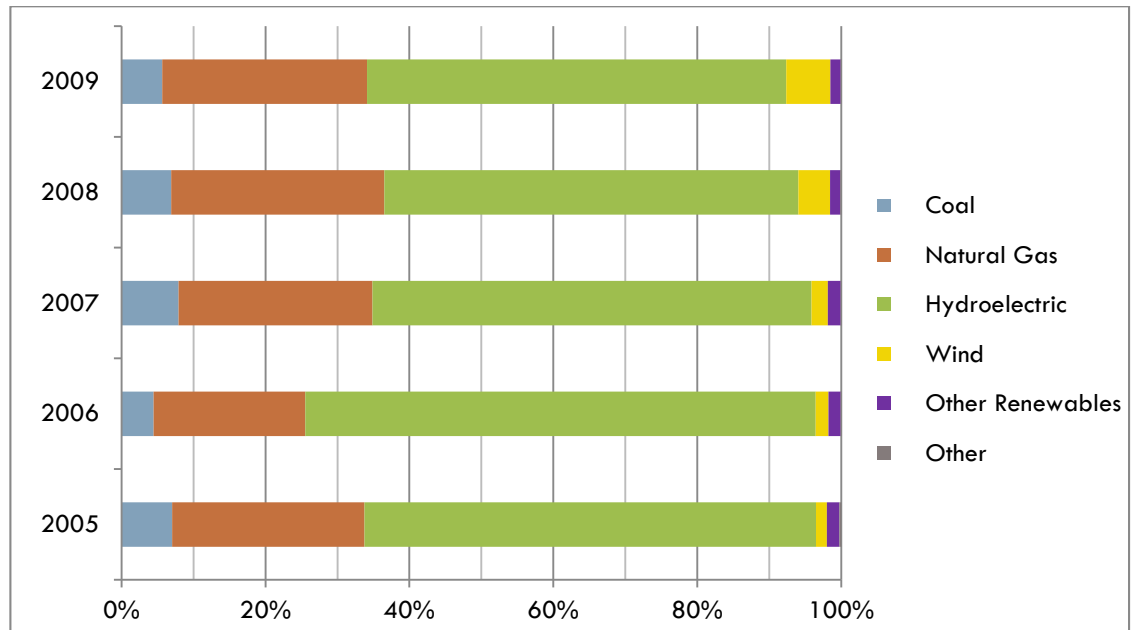
In the U.S., electricity is bought and sold on a regional level. Therefore, a power plant in a particular locale or state may generate electricity that is ultimately consumed in another locale or state [36, 112]. Most of the electricity consumed in Oregon comes from a network of utilities that serve Oregon, Washington, Utah and parts of California, Nevada, Wyoming and Montana [112].

Basic
information on
electricity
production

Electricity generation in Oregon

Hydroelectricity is the largest source of electric power generation in Oregon, followed by coal and natural gas (Figure 5) [61, 102]. The proportion of the state's electricity generated from wind energy grew from 1.5% in 2005 [61] to 7.1% in 2010 [2].

Figure 5: Sources of electricity generated in Oregon, 2005-2009.



Data source: U.S. Energy Information Administration. Oregon Renewable Electricity Profile 2009, Tables 4 and 5. Available at: http://www.eia.gov/cneaf/solar.renewables/page/state_profiles/oregon.html.

Factors that will affect future electricity production in Oregon include:

- Population and electricity load growth: The population of the Pacific Northwest is expected to grow by more than 28% by 2030 [5], and regional electricity demand is expected to increase by 7000 average MW between 2009 and 2030, or by 1.4% per year [5].
- Phase-out of coal-based power plants: Oregon law effectively prohibits constructing new coal-based power plants in the state [62], and the state's only operating coal-based plant is slated to close by 2020 [63].
- Constraints on hydroelectricity: Hydroelectric generation is constrained by fish and wildlife protections and other environmental considerations. Hydroelectric output in the region is unlikely to change in the next 20 years and is not considered an option to meet growing load demand [5].
- Current and future policies related to climate change, environmental quality, and energy: These policies include renewable portfolio standards, GHG goals, restrictions on air pollutant emissions, and carbon reduction strategies.
- Electricity costs: The costs of producing electricity any source depends on future demand, fuel prices, technological changes in production and transmission systems, and a host of other factors.

3.1.b. Changes in air emissions

To estimate changes in air emissions due to wind energy developments, we need information on the following factors:

- The source and amount of fossil-fuel energy displaced by wind energy
- The type and amount of air pollutants emitted by the displaced energy source per unit energy
- Current or future technological and policy changes that affect air emissions from fossil fuels

Energy displacement refers to the amount of fossil-fuel generated electricity that wind energy replaces in a particular region. Energy displacement depends on many factors, including those shown in Table 11.

Table 11: Factors that influence energy displacement.

Displacement factor	Modifiers/Supporting information
The amount of energy actually generated by wind energy facilities	Currently, commercial wind energy facilities in the U.S. are estimated to have an average generating capacity that is 30% of their nameplate capacity[34]. For example, a 20 MW facility with a 30% average generating capacity will produce 52,560 MW-hours of electricity in a year.
The amount of wind energy integrated into the regional electrical grid	Wind energy is considered an intermittent source of energy because it depends on having adequate wind speeds to produce electricity. The extent to which intermittent energy sources are integrated into electrical grids depends on the accuracy of supply/demand forecasts, mix of available energy sources, the grid's ability to accommodate variations in demand and output, and other factors.
The electric energy source(s) that wind energy displaces (e.g., coal, natural gas, nuclear, hydroelectric), and the amount of displacement that occurs	Electric grid operators respond to changes in electricity demand by dispatching power plants based on cost and availability. Because of its variability, wind energy is typically not used to meet peak energy demand. The types of energy sources displaced by wind energy (in both the near and long-term) will depend on the relative costs of each energy source.

Energy
 Displacement

Air Pollutants
 from fossil
 fuels

Fossil fuel-based power plants contribute to the following atmospheric air emissions [101, 113]:

- Greenhouse gases, including CO₂
- Criteria air pollutants: NO_x, SO₂ and coarse particulate matter are directly released to the atmosphere, while ozone and fine particulate matter are indirectly formed during reactions involving NO_x, SO₂, ammonia, and other chemicals in the atmosphere
- Hazardous air pollutants, including volatile organic compounds (VOCs), mercury (from coal), heavy metals, polycyclic aromatic hydrocarbons (PAHs), and dioxins/furans

The type and amount of air pollutants produced by fossil fuel combustion depend on the fuel, technology and emission controls used at a particular plant. Table 12 compares the average emission rates (expressed in pounds per megawatt-hour electricity generated) of four pollutants from the combustion of natural gas, coal, and fossil fuels in general. The available data indicate that natural gas produces lower levels of air pollutants per unit energy than coal or oil [114, 115].

Table 12: Average emission rates of NO_x, SO₂, CO₂, and mercury by fuel-type*, 2005.

	NO _x (lb/MWh)		SO ₂ (lb/MWh)		CO ₂ (lb/MWh)		Mercury (lb/GWh)	
	OR	US	OR	US	OR	US	OR	US
Coal	4.8	3.4	6.9	9.7	2306.3	2135.9	0.05	0.05
Natural Gas	0.25	0.54	0.008	0.11	870.9	966.3	-	-
Fossil Fuels [^]	1.2	2.59	1.5	7.1	1171.4	1797.6	0.01	0.04

*Data for oil is not shown since it is not major fuel source in Oregon. U.S. data shown for comparison.
[^]Represents the average emission rate for fossil fuels in general.

Data source: US EPA. eGRIDweb database. Available from: <http://cfpub.epa.gov/eGRIDweb/index.cfm>. Accessed: May 5, 2011.

Effects of technological and policy changes

Technological changes, environmental regulations, and policies to improve air quality affect local and regional emissions from power plants. The Clean Air Act, Clean Air Interstate Rule, and Clean Air Market programs are examples of federal-level initiatives to regulate air emissions from utilities and other regional pollutant sources. From 1970 to 2003, these regulations reduced emissions of SO₂ and NO_x from electric generating plants in the U.S. by 37% and 9% respectively [34]. As new federal and state regulations and policies are implemented, it is likely that air pollutant emissions from electric utilities will continue to decline. However, these programs (particularly market-based cap and trade programs) add additional complexity in estimating the impacts of renewable energy on air pollution [36].

Pathway 1: Summary

In summary, wind energy facilities could reduce state-wide emissions of greenhouse gases, criteria air pollutants, and hazardous air pollutants if they displace fossil-fuel based power plants in Oregon. The magnitude of any reductions in air pollutant emissions will depend on the type and amount of fossil fuel units replaced, technological changes, and the effect of policies aimed at reducing air emissions from power plants. The available evidence suggests that the largest air pollution reductions will occur by first replacing energy from coal-fired sources, followed by replacement of oil and natural gas.

3.2. Pathway 2: Emissions from construction and vehicular traffic

Any industrial development will generate some amount of air and other environmental pollution during construction, operations and maintenance (O&M), and decommissioning activities. Wind energy facilities have some unique characteristics that may affect the emission and impacts of air pollution during these phases:

- Wind energy facilities are usually built in rural areas with low population density. Compared to construction projects in urban areas, there may be fewer people directly impacted by pollutants from these sites.
- Some large facilities have a large project area, with turbines spread over tens of thousands of acres. This means that air pollution sources at these sites (mostly construction and maintenance equipment) will not be centralized, but spread across a large geographic region.
- Local transportation infrastructure may be inadequate for transporting parts and equipment because of the size and weight of rotors and towers [116]. These factors may result in more intensive construction activities (e.g., building more access roads, or fortifying and improving existing bridges and roads) or more vehicular traffic to transport parts and equipment.

Sources of air pollution

The major sources of air pollution at wind facility sites are equipment and vehicles that run on diesel or other fuel [116]. The equipment and materials needed during the construction phase are typical of those used in most road construction projects. This equipment includes: concrete mixers and water tank trucks; heavy-duty trucks (flatbed/goose-neck trailers); cranes; trenching/augering equipment; line trucks; and light or medium-duty vehicles [116]. During the O&M phase, the equipment typically includes light or medium-duty vehicles.

Diesel and other emissions

Diesel engines release particulate matter, greenhouse gases, carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic compounds (VOCs), sulfur compounds and other chemicals into the atmosphere. Other air pollutants from construction activities are dust and silicate; vapors from paints, cleaning solvents and degreasing chemicals; and pesticides and herbicides. The level of air emissions from these activities depends on the size, scale, timeline and other facility-specific factors [116].

Potential for exposure

The amount of exposure to construction-related air pollution depends on a person's proximity to the pollutant source, amount of time exposed, and personal or environmental factors that increase or decrease contact with these air pollutants. In general, construction and on-site workers are expected to have the highest amount of exposure, followed by residents living close to construction sites, workers involved with transporting equipment and parts, and community members who live or work near transportation corridors.

Applicable
Regulations

There are a number of state and federal requirements to protect environmental quality, public health, and worker safety at construction sites in Oregon [117] which include provisions to limit air pollution and dust generation at these sites.

Pathway 2:
Summary

Given that construction activities at wind energy facilities are relatively short-lived, and that these facilities are built in sparsely populated areas of Oregon, the expected health impacts from construction-related air pollution are short-term and minimal.

3.3. Pathway 3: Changes in road conditions and infrastructure

As mentioned previously, wind turbine facilities sometimes require new access roads or improvement to existing roads and bridges. These roads are used by facility workers, and may be used by landowners and residents living near the facility. This section examines if changes in local road infrastructure (e.g., new access roads) or road surface conditions (e.g., pavement or gravel caps) could have a measurable impact on local air quality.

Increased
road
capacity

Increased road capacity (measured as new miles of roadway) is associated with increased driving (measured as vehicle miles traveled, or VMT) in both urban and rural areas [118]. An increase in VMT will result in increased emissions of particulate matter, NO_x, SO₂, CO₂, CO, hydrocarbons and hazardous air pollutants. It is likely O&M activities at a facility will increase VMT at the local level, though this may not significantly change local air pollutant emissions. It is less certain if new or improved roads will increase VMT by local residents or visitors in an area. If new or improved road capacity does not substantially change residents' driving habits, there will not be a measurable change in VMT-related air emissions. However, if the roads improve access to nearby recreational or tourist areas, there may be an increase in emissions due to increased traffic in an area. The human health significance of any changes in air emissions changes will depend on the number and characteristics of people who exposed these air pollutants.

Road
conditions
and air
quality

We found limited information on the air pollution impacts of paved versus unpaved roads. The most comprehensive analysis was from a 2002 report on the environmental and socioeconomic impacts of paved versus unpaved roads in Alaska [119]. The study authors found the following:

- Unpaved roads generate a significant amount of dust and coarse particulate matter from blowing wind and vehicles traveling across the road surface. Paved roads also generate dust and particulate matter, but at much lower levels compared to unpaved or gravel roads.

- The amount of airborne dust decreases with increasing distance from roads. The main impact is usually within 100 ft of a road.
- Paving is an effective dust control strategy that is estimated to control up to 99% of coarse air particles.
- Other strategies to suppress dust include traffic control, and using water or chemicals to stabilize the road surface. Some chemical stabilizers may cause air and other environmental impacts, depending on the toxicity, persistence and amount of chemicals used.
- There is little information on non-dust emissions from vehicles on paved versus unpaved roads.

Other environmental and public health impacts

There are other environmental and public health issues related to building and improving road conditions. Paved roads generate less air pollution, but may cause other negative environmental and ecological effects, including water and soil pollution, disruption of local habitats, and killing local wildlife. In terms of safety, there is mixed evidence on whether unpaved roads are more or less dangerous than paved roads. On the one hand, unpaved roads may reduce accident rates because they force reduced vehicle speeds and have less volume; on the other hand, they could pose more dangers because of decreased visibility and narrower right-of-ways. Lastly, road conditions affect other safety and quality of life measures in rural communities, including speed, ease and cost of travel for local residents, and improved access for emergency vehicles.

Pathway 3: Summary

It is unlikely that changes in local road conditions and infrastructure will result in air quality-related health impacts.

4. Conclusions and Recommendations

Key Findings

- Direct exposure to air pollutants is associated with short and long-term health effects that include respiratory irritation, asthma, cardiovascular disease, cancer, and premature death [35, 36]. Greenhouse gas (GHG) emissions indirectly impact public health through their contribution to global climate change [36]. Children, the elderly, and those with pre-existing respiratory problems are particularly vulnerable to the health effects from air pollution.
- The major sources of air pollution in Oregon and the U.S. are the combustion of fossil fuels for electricity, transportation and other uses; industrial processes; agricultural practices; wildfires; and construction sites and equipment.
- Wind energy facilities do not generate air emissions from electricity production, and could reduce air pollution if they displace electricity generated from gas, coal, and other fossil fuels [36, 37]. The magnitude of any reductions in air pollutant emissions will depend on the type and amount of fossil fuel units replaced, technological changes, and the effect of policies aimed at reducing air emissions from power plants [36]. The available evidence suggests that the largest air pollution reductions will occur by first replacing energy from coal-fired sources, followed by replacement of oil and natural gas.
- Wind energy could contribute to air pollution through the burning of fossil fuels in vehicles and equipment used for construction and maintenance of wind energy developments. However, the construction-related impacts on local air quality are likely to be short-term and relatively small in magnitude.
- It is unlikely that new or improved access roads will result in substantial increases in vehicular traffic or appreciable changes in local air quality.

Conclusions

1. Wind energy facilities in Oregon could indirectly result in positive health impacts if they reduce regional emissions of GHGs, criteria air pollutants and hazardous air pollutants.
2. Communities near fossil-fuel based power plants that are displaced by wind energy could experience reduced risks for respiratory illness, cardiovascular diseases, cancer, and premature death.
3. The health benefits from any reductions in GHG emissions depend on the extent to which these reductions prevent or lessen the severity of future climate change impacts in Oregon.

Recommendations

1. To reduce the health effects from air pollution, mechanisms that link the development and integration of wind energy for electricity consumption to reductions in fossil fuel use should be implemented (if such mechanisms are available and can be feasibly implemented).
2. While construction-related air pollution is expected to have minimal health impacts, planners and developers should consider strategies to reduce diesel emissions from non-road construction equipment. Some effective strategies include reducing idling time, using cleaner fuels, retrofitting engines, and developing environmental management strategies for operations. The EPA's Clean Construction USA program¹⁴ and Oregon DEQ's Clean Diesel Initiative¹⁵ offer resources, technical assistance, and in some cases, tax credits and grant funding to assist in implementing these strategies.

4.1. Additional Recommendations for Site-Specific Assessments

1. Given time and resources, an assessment of impacts from air pollution could range from a qualitative or descriptive analysis to a fairly sophisticated quantitative analysis. There are a number of tools and resources that can be used to predict potential health impacts if there is sufficient site-specific information. Impact assessment tools such as EPA's Co-Benefits Risk Assessment (COBRA) model and BenMAP use concentration-response models to predict the health impacts of air pollution. Planners can use these tools to estimate how local air pollution levels may affect the health of their communities. It is important to note that these tools may use different concentration-response functions depending on the tool's purpose and the quality and availability of evidence. They also vary in terms of their sophistication, input data requirements, and software platforms. As with any modeled data, there are a number of uncertainties and limitations in the estimates from these tools. One notable limitation is that most epidemiological studies of air pollution are conducted in urban areas. There will be more uncertainties in applying concentration-functions from these studies to rural areas with lower population densities, and different air pollution levels.
2. A description of baseline conditions should include any available information on local air pollutant levels, particularly if the site is in a maintenance or non-attainment area for a particular criteria air pollutant. For a list of these areas, see the Oregon Department of Environmental Quality's website:
<http://www.deq.state.or.us/aq/planning/index.htm>.

¹⁴ U.S. Environmental Protection Agency. National Clean Diesel Campaign. Available from: <http://www.epa.gov/cleandiesel/index.htm>. Accessed November 16, 2011.

¹⁵ Oregon Department of Environmental Quality. Oregon Clean Diesel Initiative. Available from: <http://www.deq.state.or.us/aq/diesel/initiative.htm>. Accessed November 16, 2011.

E. Economic Effects

1. Introduction
2. Overview of Socioeconomic Factors and Health
3. Economic Effects from Wind Energy Facilities
4. Conclusions and Recommendations

1. Introduction

At the local level, wind energy facilities can impact personal income, the availability and quality of local jobs, and local jurisdictions' revenue for education, healthcare, public safety, and other public services. These factors (particularly income, employment and education) are indicators of individual and community-level socioeconomic status (SES), which are strong predictors of health and disease [39, 120].

This section begins with a brief overview of the associations between major socioeconomic factors and health. We then describe our findings on how wind energy developments could affect the following economic factors in local communities: a) personal income and assets; b) jobs, employment and local business; and c) revenue and liability for local and state jurisdictions, including education and other districts. This section concludes with our key findings and recommendations on potential health impacts from the local economic effects of wind energy developments.

2. Socioeconomic status and health

Links between
SES and
health and
mortality risks

In the U.S. and throughout the world, SES predicts both life expectancy and overall health at each stage of life [38, 39]. In the U.S., people with the lowest SES have over three times the risk of dying prematurely (before the age of 65) than those with the highest SES, while people in the middle have up to twice the risk of premature death than those at the top [120]. Researchers have found a similar gradient in the relationship between SES and the relative risks for infectious and chronic diseases, disability, and unhealthful behaviors across the lifespan [39, 120]. Public health researchers have identified at least four pathways to explain why health and mortality risks appear to increase as SES decreases. People with lower SES are believed to:

- have poorer access to quality health care;
- be more likely to live and work in unhealthy or toxic environments;
- be more likely to have behaviors and lifestyles that increase their health risks;
- have more sources and higher levels of chronic stress [38, 121].

Public health
studies on
SES and
health

In public health studies, SES is often measured by income level, educational attainment, or employment status. Public health researchers note that the links between these indicators and health are complex and difficult to measure [40]. For one, income, employment, and education are often related to each other, but may not be interchangeable because they influence health to different degrees and through different mechanisms [38]. Second, race, ethnicity, and other factors are strongly associated with both socioeconomic status and health, which makes it difficult to isolate the effects of SES [40]. Further, just as income or education can affect a person's health, health can affect a person's socioeconomic opportunities and outcomes [122]. Finally, researchers have observed that both individual and community-level SES play an important role in health; for example, both absolute income (i.e., a person's net worth) and relative income (i.e., a person's net worth relative to other community members) affect disease and mortality risks [39, 122].

In the follow section, we summarize the current evidence on the links between SES (income, education and employment) with health and mortality risks. When available, we provide Oregon-specific data on these SES measures.

Income

- As income increases, people are less likely to die prematurely [121], and more likely to report better health [123]. People with the lowest income have the largest gains in health and lifespan as income increases. For example, an increase from \$10,000 to \$20,000 in income is correlated with a more dramatic increase in health and lifespan than an increase from \$80,000 to \$90,000 [121].
- Compared to those with higher incomes, people with lower incomes have increased risks for giving birth to low-birth weight babies, for suffering injuries or violence [120, 124], and for developing chronic conditions such as obesity, diabetes and hypertension [120, 125].
- Even after accounting for race, ethnicity and gender, income and wealth affect the likelihood of developing a chronic condition (such as diabetes, heart disease or hypertension), and how well a person functions once they have a chronic illness [126].
- Children are especially vulnerable to the effects of poverty. Children living in poverty have higher risks of injury-related morbidity and mortality, less access to health care, and higher risks of cognitive and developmental delays [127].
- In addition to absolute income levels, income distribution and inequality may result in health disparities. Studies at the state and national level have found that higher levels of income inequality within a population are associated with higher age-adjusted mortality rates [41]. For example, one study found that individuals living in states with high levels of income inequality had up to a 12% increased mortality risk [128]. Further, there is some evidence that perceived income inequality is more strongly associated with poor self-reported health than absolute income levels [129].

Data on
income in
Oregon

Personal income in Oregon is lower compared to the U.S. In 2009, the median household income in Oregon was \$48,325 (compared to \$50,221 in the U.S.) [130], and per-capita personal income¹⁶ in the state was \$35,571 (compared to \$38,46 in the U.S.) [44]. Personal income in rural areas of Oregon is lower compared to urbanized areas of the state. In 2009, per-capita personal income in non-metro¹⁷ counties was \$6,986 (23%) lower than in metro counties; this is largely due to an average \$9,920 difference in wages between metro and non-metro workers [44].

¹⁶ Per-capita personal income is the total amount of income earned in a geographic area divided by the population in that area. This measure takes into account income from wages, pensions, dividends, interest, rent, and benefits from retirement, Medicare and unemployment insurance.

¹⁷ The 11 metro counties in Oregon have (or are closely connected to) cities with more than 50,000 people [45].

Education

- Education is positively linked to health. Education leads to better employment outcomes, higher income, improved access to health care, and higher levels of health literacy, which are all associated with improved health outcomes [131].
- Some studies have found that even after controlling for income and access to health insurance, education remains a strong independent predictor of health [132]. Educational attainment may be a stronger predictor of health risks, outcomes and disparities than income or occupation [133, 134].
- People with lower educational attainment have relatively higher risks for premature death. Even after controlling for income and other demographic variables, people with less than 12 years of education have higher mortality risks than high school or college graduate [121].
- In an analysis of data from the National Health Interview Survey and the National Death Index, Cutler and Lleras-Muney (2006) observed the following health gains for every four additional years of education [132]:
 - a 1.8% decrease (or -1.8%) in risk for death within five years;
 - lowered risks for heart disease (-2.2%), diabetes (-1.3%), and self-reported poor health (-6%);
 - decreased likelihood of smoking (-11%), being overweight or obese (-5%), or using illegal drugs (-0.6%);
 - an increased likelihood of positive health behaviors such as obtaining flu shots (+7%), wearing seat belts (+12%), and having a smoke detector in home (+10.8%)[132].
- Some research suggests that educational attainment is a stronger predictor of health risks, outcomes and disparities than income or occupation [133, 134].

Data on educational attainment levels in Oregon

Adults in Oregon have higher levels of educational attainment compared to adults in the U.S. Among Oregonians over the age of 25, 88.3% were high school graduates (compared to 84.6% in the U.S.) and 28.3% had a bachelor's degree or higher (compared to 27.5% in the U.S.) [43]. While the high-school graduation rates in non-metro and metro areas of Oregon are similar (76% and 78% respectively), a higher percentage of adults in metro areas have some secondary education (64% compared to 54% in non-metro areas) [135].

Employment

- Employment is linked to overall better health and to slower declines in health over time. People who are employed have more access to resources to maintain and improve their health [136].
- Unemployment, underemployment and uncertain employment have been shown to have negative effects on health [137].
- Compared to people who are employed, the unemployed are more likely to die prematurely, have poor mental health, report chronic illnesses (particular cardiovascular diseases) and lower self-rated health, and have higher rates of smoking, poor nutrition and other health risk factors [138]. Overall, these risks appear to be higher for men than women [138], though some evidence suggests that women in blue-collar occupations have poorer health outcomes than men in the same occupations [137].
- Studies have found that workers who receive low incomes and workers who are overqualified for their jobs reported higher levels of depression symptoms and worse health than consistently employed workers [139, 140].
- Workers with lower occupational status (i.e., blue-collar or hourly-wage workers) have higher risks for chronic illnesses, injury, and death compared to workers with higher occupational status (white-collar or salaried workers) [137].

Data on employment in Oregon

Oregon's unemployment rate has historically been higher than the national rate, and this trend has continued in recent years. During the recent recession, Oregon's unemployment rate peaked at 11.6% in the summer of 2009. At the end of 2011, the seasonally adjusted unemployment rates in Oregon and the U.S. were 9.5% and 9% respectively [42].

In recent years, non-metro counties have had unemployment rates that were 1-2 percentage points higher than metro counties [44]. Urban and rural areas of Oregon are different in terms of industry major sectors and wages paid to workers [47]. Metro counties in Oregon tend to have higher shares of employment in higher paying industries such as information, financial and business services, while non-metro counties have higher employment shares in lower-paying sectors like agriculture and hospitality. Further, workers in metro counties have higher wages compared to non-metro workers in the same industry.

3. Economic Effects from Wind Energy Facilities

3.1. Overview of economic impacts

Types of economic impacts

Wind energy developments can affect local economies through direct, indirect and induced impacts [141]. Direct impacts are the most immediate or obvious effects from a development. These impacts can include [36]:

- short-term jobs during the construction phase for on-site workers, managers, and driver,
- long-term jobs in operations and maintenance,
- purchases from local suppliers,
- land lease payments to local landowners, and
- property tax payments.

Indirect impacts include changes in jobs, income or revenue from businesses or sectors that support activities and workers at a development [36]. For example, hotels and restaurants may see an increase in business during the construction phase as outside workers come into the area. Induced economic effects are from changes in household, business and government income and spending in a local community [36].

Studies of economic impacts

There are relatively limited data on the actual impacts of wind energy developments on jobs, income and other economic indicators. Most of the available economic impact studies use models to determine the impacts of these facilities at the local and state levels. These studies, and the models on which they are based, have some important limitations. For example, one commonly used model (the Jobs and Economic Development Impact Model, or JEDI) provides predictions on the gross impacts of a facility on a handful of economic variables. While the JEDI model provides approximate values for the magnitude of economic impacts, it does not provide estimates of net impacts (e.g., does not account for losses due to increased electricity rates, displaced economic activity, or reduced tax revenue), and is a static model that does not account for changes in energy demand, costs or production [142].

Relative impacts during construction and operations phases

Most of the studies in our review examined economic effects during three phases of a development: manufacturing, construction, and operations. Local communities are most likely to be impacted during the construction and operation phases of a development. On average, the construction phase of a wind energy development lasts approximately one year, while the operations phase can last between 20 to 30 years [143]. During the construction phase, local economies can experience a large short-term increase in demand for labor, supplies, and services [34, 143]. On an annual basis, these demands are substantially greater in the construction phase compared to the operations phase; however, the total economic impacts from operations over the lifetime of a facility are greater than short-term construction-related impacts [143].

3.1.a. Employment

Jobs

Wind energy developments require a relatively large number of workers during the construction phase, and fewer workers during the operations phase [144]. The number of new jobs created depends largely on a facility's size, and the number of jobs filled by local workers depends on whether the local labor force has the needed skills and experience [144]. Further, local businesses may hire more workers if the development increases demand for local goods and services (especially during the construction phase); however, there could also be short or long-term drops in employment if the development has a negative effect on certain sectors (e.g., tourism or recreation) [34].

Lantz and Tegen (2009) reviewed several county and state-level economic impact assessments on community and absentee wind energy projects [145].¹⁸ The authors found that community and absentee projects had similar employment impacts during the construction phase. In the county-level analyses, the short-term employment impacts ranged from 0.15 – 2.58 jobs per-MW, while the state-level analyses projected 2.8-4.2 jobs per-MW.¹⁹ For the operations phase, the projected annual employment impacts ranged from 0.8-1.4 jobs per-MW in county-level analyses, and 0.45-0.92 jobs per-MW in state-level analyses. The analysis also found that community wind projects had greater county and state level impacts on employment than absentee projects. Most of the studies found that community projects' impacts were 1.5-3.4 times higher than absentee projects [145].

Wages and compensation

Jobs in the wind energy sector may require specialized skills and training, which could translate to higher wages and compensation compared to other jobs in rural economies. One study from Iowa reported that wages from wind-related jobs were in the 80th percentile statewide [146]. However, currently there are limited data to determine if wind energy jobs provide workers with living or family wages.²⁰

¹⁸ Community wind projects are partially or wholly owned by individuals and/or businesses in the state or area where the wind energy development is located. Absentee wind projects are owned by entities who are from outside the local community and state [80].

¹⁹ The measure of employment impacts (jobs per-MW) indicates the number of jobs created in a geographic region for every MW of installed capacity. Therefore, the projected number of construction jobs from a 50 MW wind energy facility would be between 7.5 and 129 at the county level, or between 140 and 210 at the state level.

²⁰ Living or family wages provide enough income to meet the basic needs of an individual or family, which include food, shelter, clothing, transportation, etc.

Data from
Oregon

Oregon's RPS legislation requires Oregon DOE to assess the impact of the standard on employment in Oregon. ODOE's employment assessment and recent data from the Oregon Employment Department indicate the following trends:

- RPS eligible facilities have increased employment and job training programs in Oregon's renewable energy sector [48]. Fourth-quarter employment in the renewable energy sector grew by 208 jobs (2%) between 2005 and 2010, while Oregon's overall employment decreased by 5% during the same time period [47].
- The wind energy industry accounts for most of the state's employment in renewable energy. These jobs have been concentrated in construction, operations and sales and marketing [48].
- The available data indicate that wind energy facilities in Oregon employ a large number of workers during the construction phase, and smaller number of permanent employees during the operations phase [48].
 - Records from three operating facilities under EFSC jurisdiction indicate an increase of 30-40 permanent jobs and 350-370 construction jobs since 2007.
 - At the time of the report's release, records from nine facilities in the planning, approval and construction phases suggested an increase of approximately 182-221 permanent jobs and 2,600 construction jobs [48]. This works out to approximately 4-5 permanent jobs and 58 construction jobs per 100 MW installed capacity.
 - Another survey found conducted in 2009 found that Oregon wind energy facilities employed 225 technicians and a small number of supervisory personnel [48].
 - There are limited data on wages at Oregon wind energy facilities. However, recent data indicate that median hourly wages are relatively higher in the renewable energy sector [47]. Eighty-two percent of renewable energy workers in the state earned at least \$20/hour, compared to 41% of workers across all sectors in Oregon [47].

3.1.b. Personal Income

Income from
land leases

The lease payments that landowners receive from wind energy developers vary quite widely across states [34]. One report found that typical lease payments are in the range of \$2700-\$2900 per-MW of generating capacity [144]. These payments may far exceed the typical revenue a landowner generates from agriculture on these lands, and may represent a significant change for rural economies [143]. According to industry sources, wind energy developers make over \$6 million in land lease payments a year in Oregon [2].

Property
values

Another potential impact to personal income or wealth is changes in property value. Land lease payments can significantly increase property values for some landowners. However, community members with properties adjacent to land leased for wind turbines or within sight of these facilities may have concerns that a facility near their home will result in a decline in their property values. Changes in property value can have a substantial impact on personal income, since residential property or land may account for a large portion of a person's or family's financial assets. To date, there have been few studies to evaluate the impacts of wind energy facilities on property values, and it is difficult to draw conclusions from this body of evidence because of methodological differences between studies and methodological limitations within studies [46]. Perhaps the most comprehensive study conducted to date is a 2009 analysis that examined whether concerns about area, scenic vistas, or nuisance affected property values at various distances and stages during a facility's development. The study analyzed 7,459 residential sales transactions near 24 existing facilities in nine states [46]. The 2009 analysis did not find evidence that post-construction property values were consistently or significantly affected by "either the view of wind facilities or the distance of the home to those facilities" [46]. The authors did find evidence that property values for homes closest to the facility decreased during the period after the facility was announced but before construction; they also found that the values of these homes increased after construction was completed. Other analyses have also found a decrease in property values during the time period between the approval and operation of a facility, and a subsequent recovery in value after the facility is in operation [45, 147].

While the studies reviewed for this report did not find an association between nearby facilities and long-term property values, this does not mean that property values near a facility have not or will not be impacted. Given the many factors that affect local property values, it is difficult to generalize these studies' findings to individual or local changes in property values at a given facility[34].

Distribution
of income
benefits and
losses

The distribution of positive or negative impacts to personal income is an issue of concern at many wind energy facilities. Landowners who lease their land to developers may accrue substantial economic benefits through increases in personal income or property values. However, landowners who do not lease their land will not directly experience these benefits, and may experience negative impacts if their property values decrease, or if they are adversely affected by unwanted noise, visual impacts, air pollution during construction, and other impacts.

3.1.c. Tax Revenue

Wind energy developments may generate property tax revenue for local governments. Governments often invest tax revenue from wind energy developments in schools, emergency services, health care, or public infrastructure, and sometimes provide direct payments to households in a jurisdiction [148]. However, the revenue generated from property taxes may be reduced if governments provide developers with tax breaks or credits to promote development in their region. The national average tax revenue from wind energy developments is estimated at \$8700/MW, though this amount varies across states and local jurisdictions [144].

By the end of 2010, wind energy facilities in Oregon had paid over \$55 million in property taxes to counties and the state [49]. Several facilities have entered into strategic investment plans (SIPs) with host counties. SIPs allow developers to pay a community service fee in lieu of property taxes on the full value of the project.²¹ SIP agreements are a mechanism to attract new development while allowing local governments to direct funds to programs and services that meet communities' needs.

The revenue from property taxes and SIPs is invested differently across counties; to date, there has not been a comprehensive assessment of how these payments are directed at the local level. One case example is Sherman County, which has collected over \$17 million in tax revenue, SIP fees, and lease payments from wind energy facilities in nine years [148]. The county has spent this revenue by [149]:

- disbursing yearly \$590 payments to each of the county's 706 households;
- making \$100,000 annual payments to the county's four towns;
- investing in capital projects and education;
- expanding government services.

To our knowledge, Sherman County is the county in Oregon that shares revenue in this way.

²¹ In rural areas, the community service fee equals 25% (or a maximum of \$500,000 per year) of taxes that would have been paid on a project's value over \$25 million. SIP agreements expire after 15 years, after which taxes are paid on the full value of the project.

3.1.d. Ownership

Some studies have examined the effects of ownership on local economic impacts. A review several county and state-level economic impact assessments found that community wind projects had 1.5 to 3.4 times the impact of absentee-owned projects. One model used by researchers in Minnesota predicted that local ownership would result in county-level economic benefits that were 3.1 to 4.5 times higher compared non-local ownership, and local employment increases that were 2.5 to 3.5 times greater [150]. Another analysis predicted that compared to wholly corporate owned projects, a 100% locally owned development would result in 164% greater annual economic benefits during the operation phase, while a project with 51% local ownership would result in a 79% more annual benefits [144]. Lantz and Tegen (2009) suggest that community-owned projects may increase acceptance and decrease opposition to wind energy development [145], though it is not clear if this based on observational information.

It is important to note that these assessments have a number of caveats and limitations. For one, most of these assessments are based on modeled predictions instead of observational data. While many of these models use site-specific information, they also incorporate assumptions on a number of factors (e.g., expected returns on investment, how returns and invested, etc.).

4. Conclusions and Recommendations

Key Findings

- Socioeconomic status (measured by income, education and employment) is a strong predictor of life expectancy and overall health at each stage of life [38, 39]. While the links between SES and health are complex and difficult to measure [40], public health studies have found that as SES increases, the risks for premature mortality, disease, disability, and unhealthful behaviors decrease.
- Higher levels of income inequality are associated with poorer health outcomes [41].
- Data from Oregon indicate that personal income and employment levels in the state are lower compared to the U.S., though educational attainment levels in the state are higher compared to the nation as a whole [42, 43]. Within Oregon, there are noticeable disparities in SES between urban and non-urban areas. Compared to urban areas of the state, non-urban areas have relatively lower levels of personal income, lower wages, and higher rates of unemployment [42, 44].
- Wind energy facilities could result in positive local economic impacts if they increase local jobs, personal income, and local tax revenue. Some evidence suggests that community owned wind projects may have relatively larger economic benefits for local communities compared to absentee-owned projects.
- Decreased property values are often an issue of community concern. Economic studies have not found an association between nearby wind energy facilities and changes in long-term property values [45, 46]. However, because property values are influenced by many factors, and it is difficult to generalize these findings to individual or local changes in property values near a given facility [34].
- Data from Oregon indicate that wind energy facilities have increased employment in Oregon's renewable energy sector and the economy as a whole [47, 48]. Wind energy facilities increased personal income for landowners who obtain lease payments and for workers employed by wind energy facilities [47], and increased tax revenue for local government through property taxes and other fees [34, 49].

Conclusions

1. Wind energy developments could indirectly result in positive health impacts in Oregon communities if they increase local employment, personal income, and community-wide income and revenue. However, these positive effects may be diminished if there are real or perceived increases in income inequality, or an uneven distribution of costs and benefits, within a community.

Recommend-
ations

1. Local officials, decision-makers and other stakeholders should consider strategies to increase community-wide economic benefits from wind energy developments. These strategies may include:
 - provisions or incentives for hiring local labor, purchasing goods and supplies from local or state businesses, and investing in training programs to prepare local workers for jobs in the wind energy sector;
 - investing tax revenue in public services (e.g., education and health-care);
 - disbursing regular cash payments to local residents;
 - considering the feasibility of community ownership models in which a wind energy project is partially or wholly owned by community members.

F. Community Conflict

1. Introduction
2. Community Conflict from Siting and Environmental Decisions
3. Health Effects from Community Conflict
4. Summary
5. Conclusions and Recommendations

1. Introduction

While wind energy developments often have support from the general public, there are numerous accounts of projects in the U.S. and around the world that have faced strong local opposition [50, 51, 151-153]. For example, a 2010 public opinion poll found that 78% of Oregon respondents in rural areas and 82% of respondents in urban areas would support having wind turbines erected within sight of their homes or near their communities, with nearly 50% of these respondents expressing strong support [154]. However, during three community listening sessions in central and eastern Oregon, PHD staff heard first-hand accounts of the conflict in some (though not all) communities due to the development of wind energy facilities. One of these sessions was held in a county where voters appeared to be almost evenly divided in their support for a proposed wind energy development. [155].

A few researchers have noted that conflicts over wind energy developments are similar to those seen during the siting of cell phone towers, transmission lines, pipelines, concentrated animal feeding operations, and other facilities [50, 51, 95]. This section describes the similarities between conflicts over wind energy facilities and other environmental/natural resource decisions in rural communities. We then present information stress-related health effects from community-level conflict. This section concludes with suggested strategies to mitigate potentially negative impacts from community conflict.

2. Community Conflict from Siting or Environmental Decisions

Community conflicts over siting or environmental decisions often stem from the following issues and concerns [156, 157]:

- tension between regional/national priorities and local interests and values;
- uncertainty or differing views about risks and benefits;
- concerns about fairness and the distribution of risks and benefits in a community;
- type-casting of project opponents as “NIMBY”s (Not-In-My-Backyard);
- feelings of mistrust in developers and decision-makers;
- feelings of powerlessness, and perception that there are limited opportunities to influence decisions;
- involvement of a wide range of stakeholders, interests and perspectives from within and outside the community.

Conflict in
rural areas

Rural communities may be disproportionately impacted by community-level conflicts [54]. Urban populations tend to have better access to governmental and other resources to solve environmental issues or problems, and may be less reliant on geographically defined communities for social support. Residents in rural communities may rely more heavily on community interactions, resources and support to address environmental and other challenges. Therefore, conflicts in small communities may be more disruptive if they erode traditional sources of social and interactional support [54].

2.1. Controversies at renewable energy facilities

Siting controversies over renewable energy facilities have some unique characteristics compared to “traditional” siting conflicts. For one, renewable energy has broad support from the public, government, industry and environmental groups, who view these developments as a sustainable and clean source of energy, a necessary step towards energy independence and security, and as a source of local economic investment and benefits [158]. Because of these positive aspects of renewable energy facilities, people who oppose a local development are likely to be type-casted as NIMBYs by project proponents within and outside a community [50]. However, local opponents to a project may support renewable energy development, but have genuine concerns about the local effects of a project, the motives of the developer, and the planning process [51, 158].

Conflict at
wind energy
developments

Haggett (2004) and other researchers have highlighted some recurring themes in local conflicts and opposition to wind energy development [50, 51, 158]:

- Local risks vs. global benefits: For people living near wind energy developments, the potential risks are more tangible and apparent than long-term or global benefits. For example, residents' concerns about global climate change may be far outweighed by concerns about property values or impacts to health and the environment.
- Ownership and perception of developer: Community members may be more likely to oppose wind energy facilities that are wholly owned by "outsiders", in part because of suspicions of exploitation or profiteering at the community's expense.
- Place and identity: People's sense of individual and community identity is shaped by an area's social, cultural, historical and environmental characteristics. Wind energy developments may be perceived as "large-scale technologies that intrude, spatially and culturally, on accustomed ways of life", and threaten community identity [51, 159].
- Landscape impacts: As noted by many researchers, visual and landscape impacts from wind energy facilities are a concern for many communities. This often has little to do with the visual aspects of turbines themselves. Instead, it is related to how people value and identify with the local viewshed and landscape, and whether they feel that a wind energy facility will disrupt or damage an important community resource. This issue overlaps with concerns about wildlife impacts (particularly killing of local and migratory birds).
- Degree of consultation: The nature and extent of community consultation and participation in a decision-making process may affect both the outcome of the decision, and the likelihood of opposition from the community. Community consultation is important for decisions about individual projects, and for long-term planning decisions about the direction and development of the community.

3. Stress from community conflict ²²

Primary and secondary stress

Stress is a potential health impact in communities involved in environmental or natural resource disputes [52, 53]. There are at least two sources of stress that act at the individual and community levels. Primary stress is caused by real or perceived risks from environmental hazards, while secondary stress is caused by social and community responses to a site or incident [53].

Health effects from chronic stress

Scientists also distinguish between acute and chronic stress. Acute stress occurs in response to sudden or catastrophic events, and is commonly known as the "fight or flight" response. Chronic stress occurs when there is long-term or repeated activation of the normal stress response [52, 160]. Scientists believe that chronic stress occurs from persistent feelings of anxiety and lack of control, or from repeated exposures to stressful situations or environments [160]. Over time, prolonged stress responses can wear down the organs and systems of the body, and compromise its ability to respond to environmental threats. Clinical studies have found that chronic stress decreases immune function, increases risks for cardiovascular disease and endocrine disorders, and affects how the brain and body age. Further, it impairs cognitive functions such as memory and concentration, and can trigger or worsen mental illnesses such as anxiety disorders and depression [52, 160].

Indirect effects of chronic stress

Chronic stress also has indirect effects on health. Stress can increase people's vulnerability or sensitivity to environmental stressors, and lower people's response thresholds to stressors like noise and pollution [52, 53]. Chronic stress may increase risks for unhealthy behaviors such as smoking, excessive alcohol consumption, drug abuse, and overeating [52, 160]. Finally, stress can erode a person's sources of familial and social support, and limit their engagement with their community. This can amplify the effects of primary stress, and worsen secondary stress at the individual and community levels.

²² See Appendix E for more detail on stress and health.

4. Summary

In summary, community conflict over wind energy facility siting decisions may stem from: concerns about the distribution of risks and benefits (local risks vs. global benefits); mistrust of developers and regulatory authorities; the importance and value of “place” and landscape for local identity; the degree of consultation and participation in the decision-making process [51]. Community conflict over wind energy developments could potentially result in individual and community-level stress. If this stress is long-term, it could result in adverse physical and mental health effects, which include decreased immune function, increased risks for cardiovascular disease and endocrine disorders, mental illness, increased vulnerability to environmental stressors, and increased risks for unhealthy behaviors.

4.1. Strategies to address community conflict

While there may be uncertainty about health impacts, community conflict can have a number of other negative impacts that affect community members, planners, decision-makers, developers, and other stakeholders. Since the degree of consultation has been identified as a potential cause of conflict, strategies centered on public participation and consultation are often recommended to facilitate siting deliberations and decisions [50, 51, 69, 95]. These strategies are relevant in the context of this report for the following reasons:

- Meaningful community engagement and participation in decision-making processes is an underlying value of HIA [161, 162];
- Effective public participation has been shown to improve the quality, legitimacy and acceptance of environmental decisions [56];
- Public participation is a recommended strategy to reduce community members’ stress by giving people a sense of control [53], and this may indirectly affect people’s perceptions and response to noise and visual effects from wind turbines;
- Public participation and involvement were identified as a need by Oregonians who attended PHD’s community listening sessions, or responded to the online questionnaire.

Dietz and Stern (2008) note that there is no single strategy, technique, or tool to ensure meaningful public participation in a decision or process. However, they note that any process should be based on: “inclusiveness of participation, collaborative problem formulation and process design, transparency of the process, and good faith communication [56].”

Resources for
public
participation

Dietz and Stern's book for the National Research Council entitled *Public Participation in Environmental Assessment and Decision-Making* provides a useful guide for planning and implementing public participation in environmental assessment and decision-making [56]. There also are examples of community consultation and involvement processes that have been implemented in communities near wind energy developments in the U.S. One example is an effort by the Oregon Consensus Program to assess and recommend a mediation process for an Eastern Oregon community that was divided between supporters and opponents of a proposed wind energy development [163]. Other examples were highlighted in a 2011 workshop on "Facilitating Wind Energy Siting"; the workshop's presentations and guidelines for public involvement in wind energy facility siting are available online [55].

5. Conclusions and Recommendations

Key Findings
and
Conclusions

1. Community conflicts over wind energy developments have many similarities to conflicts over other controversial siting or natural resource decisions in rural communities [50, 51]. These similarities include: tensions between local risks vs. global benefits, mistrust of developers or owners, and limited opportunities for community members to influence the decision-making process [50, 51].
2. Long-term stress from real or perceived environmental threats can increase risks for cardiovascular disease, endocrine disorders, reduced immune function, mental illness, and other negative health effects [52, 53]. Community conflict over controversial siting or environmental decisions may contribute to or exacerbate this stress, and thus increase risks of these negative health effects [53].
3. Rural communities may be disproportionately impacted by community-level conflicts because these conflicts may erode traditional sources of social and interactional support that community members rely on [54].
4. Based on experiences from other controversial environmental and siting decisions, public participation that is inclusive, collaborative, and transparent is an effective strategy to improve the quality, legitimacy and acceptance of environmental and siting decisions [50, 51, 55, 56].

Recommendations

1. Planners, developers, decision-makers, and government agencies involved in wind facility siting decisions should consider and use strategies to anticipate, understand, and manage conflict and stress in communities near proposed developments. If done well, public participation and community consultation are strategies that can minimize negative and maximize positive impacts (health and otherwise) for local communities, decision-makers, developers, and other stakeholders.

III. Appendices

- A. Additional Information on Health Impact Assessment
- B. Methods
- C. Research Questions
- D. Data from Community Listening Sessions and Questionnaire
- E. Additional Information on Stress and Health

Appendix A. Additional Information on Health Impact Assessment

HIA HIA is "a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects" [6]. HIA is a prospective assessment that predicts how a plan, project or policy could affect a community's health in positive and negative ways, and recommends measures to maximize beneficial and minimize harmful effects [6, 164].

Health and Health Determinants

The World Health Organization (WHO) defines health as: "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."²³ This holistic definition recognizes that health and health inequalities are influenced by interactions between individual, environmental and social factors [6, 164]. These factors, or "health determinants", include personal lifestyle, income, education, employment, housing, and access to health care and public services (Figure 6).

Figure 6: Determinants of Health [161].

Fixed Individual Factors	Individual Health Behaviors	Public Services and Infrastructure	Environmental Conditions	Social, Economic, and Political Factors
Genetic Makeup	Diet	Education	Housing Adequacy	Poverty
Gender	Physical Activity	Public Transportation	Air, Soil and Water Quality	Inequality
Age	Addictions	Health Care	Community Noise	Social Cohesion & Inclusion
Existing Health conditions and Disabilities	Coping Transportation	Parks Community Centers Economic Development	Disease vectors	Political Participation

²³ Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946. Available from: <http://www.who.int/about/definition/en/print.html>. Accessed November 16, 2011.

Why conduct
HIA?

HIA is a tool to help decision-makers understand the root causes of health and ill-health in a population, identify how a specific policy, program or project could affect these causes, and take action to avoid adverse and promote positive health consequences [6]. HIA is based on the premise that “all public decisions should consider and account for their consequences to human health” [161]. HIA is a tool that can inform and improve planning and policy decisions, especially in "non-health" sectors like energy, transportation, land-use, and agriculture [164]. HIA can provide decision-makers with information to [161, 164]:

- identify potential health risks and health benefits from a project or proposal, and how these will be distributed in a population
- identify alternatives and strategies to prevent or reduce any identified health risks, and promote or enhance potential health benefits
- identify alternatives or strategies to minimize health inequalities from the unequal distribution of risks and benefits
- identify and address potential social, environmental and economic impacts from a project that could directly or indirectly affect health

Features of
HIA

HIAs are similar to other types of impact or risk assessments in that they: 1) evaluate a proposed action, and usually one or more alternatives; 2) follow a defined process; 3) identify positive and negative impacts; and 4) provide evidence-based recommendations. However, HIA has some distinct characteristics and functions [161, 162]:

- **HIA has a broad and holistic view of health**, and considers impacts to physical, mental and social well-being. In addition, to evaluating the risks from specific hazards, HIA considers how a project's social, economic, and environmental impacts could indirectly affect health.
- **HIA has an explicit focus on equity**, and examines if certain populations are particularly vulnerable or disproportionately affected by a development's impacts.
- **HIA supports inclusive, transparent and democratic decision-making**. HIA seeks to engage communities in the decisions that affect them, and increase dialogue, cooperation, and partnerships among stakeholders with different backgrounds and interests.
- **HIA is evidence-based, structured, and impartial**. While an HIA may draw on draws on information and methods from different disciplines, any findings and recommendations should reflect the best available evidence.
- **HIA is usually conducted on a specific project, plan or policy**. This ensures that any evaluation of health impacts is site and community-specific, and that the assessment addresses the priorities and realities of the communities and stakeholders involved.

Strategic HIA

In some cases, decision-makers need a broad evaluation of the impacts of a policy or development, and general guidance to manage these impacts at individual sites or projects. In these cases, a “strategic” or “programmatic” assessment can provide a framework to guide subsequent assessments and decisions for individual projects. Strategic assessments are usually conducted early in the implementation of a policy or process that affects multiple sites or communities.

One advantage of this approach is that the findings and recommendations from a strategic assessment “cascade” down to project-level decisions; this reduces redundancy and improves consistency between projects [165]. A disadvantage of strategic assessments is that they lack the site-specific information and context needed to evaluate and address the potential impacts of a project on a specific community. Therefore, strategic HIAs do not replace or diminish the value of a project-level HIA.

Appendix B. Methods

HIA is a structured process that typically involves five steps. In this section, we state each step's objective, and briefly outline PHD's activities and major outcomes for this strategic HIA.

Screening

The objective of screening is to decide if a HIA is feasible, timely and will add value to a decision-making process.

The screening step for this HIA took place in several stages, beginning with a convergence of requests to examine the potential health impacts from wind energy facilities. PHD evaluated several strategies to address these concerns, including a limited health consultation on noise and health, a site-specific HIA on a proposed development, and a strategic HIA. After consulting with internal and external stakeholders, PHD determined that a strategic HIA was the best mechanism to respond to these requests.

Scoping

The objective of the scoping step is “to create a plan and timeline for conducting a HIA that defines priority issues, research questions and methods, and participant roles” [161]. The major activities for scoping this HIA were to: 1) identify the potential health impacts and health concerns related to wind energy developments; 2) convene a steering committee, and establish roles and responsibilities; 3) establish objectives of the HIA; and 4) develop research questions for the HIA, and identify methods and data sources.

1. Identification of potential health impacts and concerns, and major domains

To identify as many health-related questions, issues and concerns related to wind energy in Oregon as possible, PHD gathered community data and feedback during three community listening sessions in Eastern Oregon, and through an online questionnaire (see Appendix D). A literature search was used to identify potential health issues reported in research studies, reports, and other sources.

Scoping
 contd.

2. Convening of steering committee

PHD convened a steering committee to help define the objectives, scope, and research questions for this HIA, identify research studies and resources for the assessment phase, and review and provide input on the HIA report. The steering committee, whose members are listed in Table 13, met four times from December 2010 to July 2011.

Table 13: Wind Energy HIA Steering Committee members.

Name	Organization/Affiliation
John Audley	Renewables Northwest Project
Casey Beard	Community Member
Barry Beyeler	EFSC Member; City of Boardman Community Development Director
Jae Douglas (Facilitator)	Research and Education Services Section Manager, Oregon Office of Environmental Public Health
Charles Gillis	Community Member; Friends of the Grande Ronde Valley
Scott Hege	Wasco County Commissioner
Laura Madison	Community Member; Private Wind Energy Developer
Brendan McCarthy	Portland General Electric
Doris Penwell	Association of Oregon Counties
Leann Rea	Morrow County Commissioner
Gail R. Shibley*	Administrator, Oregon Office of Environmental Public Health
Tom Stoops	Oregon Department of Energy
Teri Thalhofer	North Central Public Health District
Steve White	Oregon Public Health Institute

*Ex-officio member

Scoping
contd.

3. Wind HIA objectives and Definition of Health

The steering committee approved the following objectives and definitions for the Wind HIA on February 3rd, 2011, and agreed that changes or additions could be made, if needed, in the future:

1. Identify community questions and concerns about the health impacts from wind energy facilities, and assess the available evidence for priority health impacts.
2. Develop evidence-based recommendations for elected officials, ODOE, EFSC, PHD, and community members in the consideration and assessment of health in future wind energy facility siting decisions.
3. Invite community members to participate in the HIA process, and provide community members and other stakeholders with timely and useful information.
4. Increase awareness and knowledge about HIA among community and government stakeholders, and assess its use for specific wind farm siting decisions

The steering committee agreed to adopt the World Health Organization's definition of health for this HIA: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."²⁴

4. Research questions, data and resources

During February and March 2011, Oregon Office of Environmental Public Health staff and the steering committee developed and refined research questions for five domains assessed in this HIA: noise, air pollution, visual impacts, economic effects, and community conflict. Each steering committee member independently provided a list of potential research questions for domain. PHD staff compiled these questions, and narrowed the list using the following filter questions:

- 1) Does this question focus on local health impacts?
- 2) Is this question answerable with available resources?
- 3) Will answering this question now help state and local decision-makers with future siting processes?
- 4) Does this question reflect input or concerns from members of the public?


The final list of research questions was finalized on March 11, 2011. See Appendix C for the full list of questions.

²⁴ Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948. Available from: <http://www.who.int/about/definition/en/print.html>. Accessed November 16, 2011.

Assessment

The objective of assessment is to “provide a profile of existing conditions data, an evaluation of potential health impacts, and evidence-based recommendations to mitigate negative and maximize positive health impacts” [161]. PHD included baseline data on current conditions and existing policies when available and appropriate. To evaluate potential health impacts and identify recommendations, we conducted a literature review of evidence from a number of sources. This review focused on research and publications in peer-reviewed public health, engineering, social science, and other journals, and on reports and studies by state, federal and international governmental agencies. In addition, we considered information published by industry groups, community members, and non-profit agencies. We used the “hierarchy of evidence” shown in Table 14 to prioritize our information sources.

Table 14: Hierarchy of evidence used in Wind Energy Strategic HIA.

Weight	Study Type	Measurements	Source
<p>More</p>  <p>Less</p>	Population-based	Measured	Peer-review Journals
	Risk assessment	Validated model	Public health/medical reports
	Case series/ case reports	Non-validated model	Publications by public health authorities
	Animal studies		Publications by other groups (Industry, community members)
			Other: Web sites, news articles, opinions, etc.

Reporting

The objective of reporting is to develop a HIA report, and communicate findings and recommendations to decision-makers and other stakeholders [161]. For the reporting phase, PHD will release an initial draft of the report to the public, and accept comments on the report public for up to 90 days. We will use this feedback to make appropriate revisions for a final version of the HIA report. In addition to the report, we will identify other venues to discuss the HIA’s process, findings and recommendations. These venues may include public meetings, community availability sessions, and presentations to county or state level agencies.

Monitoring
 and
 Evaluation

The objective of monitoring is to “track the impacts of the HIA on the decision-making process...and the impacts of the decision on health determinants” [161]. PHD will monitor the impacts of this HIA by tracking whether, how, and how often decision-makers use the HIA in specific siting decisions. Some potential measures are: 1) the number of site-specific HIAs conducted for new wind energy developments in Oregon; and 2) the number of siting decisions in which health was explicitly considered, or public health representatives were involved during the decision-making process.

In summer 2011, PHD's Program Design and Evaluation Services completed a process evaluation of PHD's effectiveness in meeting the Wind HIA objectives and engaging and communicating with our stakeholders during the screening, scoping and assessment phases of the HIA. PHD will use this information to improve our strategy, communications and activities for future state-led HIAs.

Communications

Throughout the HIA process, PHD communicated with stakeholders about our activities and progress using the methods and venues shown in Table 15.

Table 15: Communication methods for Wind Energy Strategic HIA.

Venue	Audience	Communications
Press	General Public	Announcement of meetings, report release
Website	General Public	Description of process, announcement of meetings, updates, invitations to provide feedback, links to electronic versions of report
Public meetings	General Public in North Central/ Eastern Oregon	Opportunity for community members to share thoughts, questions, concerns
General Listserv	Interested parties	Announcement of meetings, survey, progress updates, report release
Steering Committee Listserv	Steering committee	Meeting logistics, announcement of meetings, training opportunities, information sharing
Personal Communications	Interested parties	Response to individual calls, emails, and letters

Appendix C. Wind Energy HIA Research Questions (3/7/2011)

Domain: Noise

- 1) What types of noise do wind turbines generate, and how do they compare to other sources of community noise?
 - a) What are the sources of noise from wind turbines, what types of noise are they, and how does wind turbine design affect noise generation?
 - b) How does noise from wind turbines compare to other types of noise (e.g., noise from other industrial facilities, typical sources of noise in rural/urban environments)?
 - c) What factors, if any, affect how wind turbine noise propagates through the environment?
 - d) What factors, if any, affect how people experience or perceive noise from wind turbines (e.g., background noise levels, distance from turbines, living in rural vs. urban environments, ability to see turbines, etc.)?
 - e) Which metrics can best measure noise generated by wind turbines?
- 2) What is the current scientific evidence on the health impacts from noise of the type and nature generated by wind turbines?
 - a) What health effects, if any, have been identified or reported in the literature?
 - b) At what thresholds (level of magnitude, duration, etc.) do these effects occur?
 - c) Which populations or groups, if any, has the literature identified as being potentially more vulnerable or likely to be affected by the noise signatures generated by wind turbines?
 - d) What are data gaps/uncertainties/limitations in the current literature?
- 3) What are health-based recommendations to prevent, reduce, or mitigate noise exposures that could cause adverse health effects?
 - a) What levels or thresholds, if any, do state, federal or international public health organizations recommend to protect human health from noise exposures (including vulnerable groups)?
 - b) How applicable are these guidance levels for evaluating noise generated by wind turbines?
 - c) What factors or strategies, if any, are effective to reduce or mitigate noise exposures from wind turbines?

What methods or data sources could help answer the research questions? What agencies might provide access to this data?

- Literature on health effects from noise (in general) and noise generated by turbines

**Domain:
Visual
Impacts**

- Subject-matter experts on noise and noise generated by wind turbines; suggestions from steering committee:
 - a. Jim Cowan and Mark Storm, URS Corporation, Acoustics and Noise Control
 - b. Kerrie Standlee, PE
 - c. Mark Bastasch, PE
 - d. Jim Cummings, Acoustic Ecology Institute
 - e. George Kamperman and Richard James
 - f. Others (PGE technical staff, turbine manufacturers)
- Health-based guidelines from state/federal/international organizations (e.g., CDC, EPA, WHO)
- The Noise Manual (ISBN:0-931504-02-4)

- 1) What is shadow flicker from wind turbines?
 - a) What factors, if any, affect whether or how people experience shadow flicker from wind turbines?
 - b) Which metrics, if any, can be used to measure shadow flicker from wind turbines?
- 2) What is the current scientific evidence on the health impacts from shadow flicker from wind turbines?
 - a) What health effects, if any, have been identified or reported in the literature?
 - b) At what thresholds (level of magnitude, duration, etc.) do these effects occur?
 - c) Which populations or groups, if any, has the literature identified as being potentially more vulnerable or likely to be affected by shadow flicker from wind turbines?
 - d) What are data gaps/uncertainties/limitations in the current literature?
- 3) What are health-based recommendations to prevent, reduce, or mitigate exposure to shadow flicker that could cause adverse health effects?
 - a) What levels or thresholds, if any, do state, federal or international public health organizations recommend to protect human health from shadow flicker (including vulnerable groups)?
 - b) What factors or strategies, if any, are effective to reduce or mitigate potentially harmful exposure to shadow flicker from wind turbines?

What methods or data sources could help answer the research questions? What agencies might provide access to this data?

- Research literature on shadow flicker

**Domain: Air
Pollution**

- 1) What is the current scientific evidence, if any, on how wind turbine developments affect emissions of air pollutants in local communities? Specific pathways to evaluate include: a) replacement of gas/coal-fired units in the state; b) construction equipment and vehicular traffic during construction and operation and maintenance phases; c) changes in road conditions/infrastructure in local communities.
 - a) Which air pollutants, if any, would be measurably changed in each pathway?
 - b) What information is available on the magnitude and direction of these changes, if any, in local communities?

- 2) What is the current scientific evidence on the health impacts from changes in air pollutant levels, if any, due to wind energy development?
 - a) What health risks and effects, if any, are associated with air pollutants of interest?
 - b) At what thresholds (air concentrations, duration of exposure) do these effects occur?
 - c) Based on the available evidence, what impacts, if any, would estimated changes in air pollutant levels have on human health?
 - d) Which populations or groups, if any, has the literature identified as being potentially more vulnerable or more likely to be affected by changes in these air pollutants?
 - e) What are the data gaps/uncertainties/limitations in the current literature?

- 3) What strategies have been identified in the literature to maximize positive and mitigate potentially negative health impacts from changes in air pollutant levels in local communities?

What methods or data sources could help answer the research questions? What agencies might provide access to this data?

- Literature on impacts of wind energy developments on air pollution (focus on replacement of gas/coal-fired energy sources, construction/vehicle-related impacts, changes in road conditions)
- Environmental impact assessments from existing developments (identified with assistance from DOE/other steering committee members)
- Literature on human health risks/effects from identified air pollutants
- Subject matter experts

**Domain:
Community
Livability/
Cohesion**

- 1) What factors related to community livability and social cohesion, if any, are known to be linked to human health outcomes (particularly in rural areas)?
- 2) What information is known about how wind energy developments (or similar development projects) measurably affect these identified factors in local communities in the short and long-term, and how could these changes, if any, impact human health?
- 3) What factors or strategies have been identified in the literature to maximize positive and mitigate potentially negative impacts from changes in community livability/cohesion due to development projects?

What methods or data sources could help answer the research questions? What agencies might provide access to this data?

- Research literature on community livability, cohesion and health
- Data from PHD community listening sessions/survey
- Data from local/regional polls, surveys, reports
- Assessments of the impacts of other wind energy projects or similar development projects on community cohesion

**Domain:
Economic
Effects**

- 1) What is the evidence, if any, on the links between human health and the following priority economic factors: ²⁵
 - a) Personal income and assets
 - b) Jobs, employment, and local business
 - c) Revenue and liability for local and state jurisdictions (including education and other districts)
- 2) What information is known about how wind energy facilities (or similar projects) affect these factors in local communities in the short and long-term, and how could these changes, if any, affect human health?
- 3) What strategies have been identified in the body of evidence to maximize positive and mitigate potentially negative health impacts from economic changes in local communities due to development projects?

What methods or data sources could help answer the research questions? What agencies might provide access to this data?

- Literature on economic determinants of health
- Labor statistics/data on economic trends (Oregon Employment Department/other state and federal resources)
- Key informant interviews/survey (local economic development depts., county officials, chambers of commerce, developers)

²⁵ Priority economic factors were identified during community listening sessions/literature review

- Financial information and reports from city/county/state governments
- Data from Strategic Investment Plan
- Private land owner turbine projects
- Land owners (public and private) who economically benefit from wind turbine developments
- Project data on employment from Oregon Dept. of Energy

Parking Lot

1. Impact on darkness from flashing lights
2. Looming
3. Scale of developments

Appendix D. Community Data

This section provides a brief summary of the methods and data PHD collected during three community listening sessions and an online questionnaire. There are some important limitations in the information collected from community members. Due to time and resource constraints, PHD did not collect data that are representative of the state of Oregon. The community listening sessions were held in geographic areas where wind energy development is concentrated (the Columbia River Gorge and north central/northeast Oregon), while the questionnaire was open to anyone in the state. The data are qualitative in nature, and reflect the opinions and views of the respondents. Because these data were not collected in a systematic way, we did not analyze, quantify or rank responses.

Methods

We gathered community data and feedback during semi-structured listening sessions in three communities in Eastern Oregon, and through an online questionnaire. The listening sessions were held on November 3rd and 4th, 2010, in LaGrande, Pendleton, and Arlington; the LaGrande and Arlington meetings lasted 1.5 hours and were held in the evening, while the Pendleton meeting lasted one hour and was held in the afternoon. The goals of the sessions were to:

1. Provide a meeting format that helps community members feel heard;
2. Gain an understanding of the experiences, questions, and concerns in communities that are living with and developing wind energy facilities;
3. Explain the Public Health Division's process and timeline.

The meetings began with introductions, a brief overview of the purpose of the listening sessions, and an overview of our agenda. The meeting participants broke into small groups, with one or more PHD staff as group facilitators. In the small groups, participants were asked to answer the following questions:

1. Why do you live where you live? (*Prompting questions: What are some things you value about the place you live? What are some of your community's strengths?*)
2. What are some challenges your community is facing?
3. What are some ways that wind farms impact a community? (*Prompting questions: What are some positive changes wind farms can bring to your community? What are some challenges wind farms can create in your community?*)
4. What specific questions, comments, or experiences do you have about the potential health impacts of wind turbines?
5. What else do you think we should consider?

PHD staff documented participants' answers on large easel pad papers and posted these around the room. Participants could also write their responses on handouts and returning these to the group facilitators. Each participant was given three stickers and asked to read other groups' responses. Each participant used their stickers to "vote" on their top three priorities or issues. PHD staff closed the meeting by reconvening the large group and asking if participants wanted to share or communicate anything else. After receiving information on PHD's next steps and contact information, participants were asked to complete a meeting evaluation.

Online
questionnaire

PHD used an online questionnaire to provide a second opportunity for community members to share information, questions, and concerns. Respondents were asked for information on their county of residence and zip code, and their responses to the following open-ended questions:

1. What do you value most about the place you live?
2. What do you see as the challenges your community is facing right now?
3. In general, what are the major impacts a wind farm can have on a community?
4. What are the major issues, questions or concerns you have about the health impacts from wind energy facilities?
5. What else should we consider?
6. Is there anything else you would like to share with us?

Summary of Community Responses

*Why do you
live where
you live?*

Some common responses to "Why do you live where you live?" included: rural, wide open spaces; solitude; small towns; slow pace of life; and the peace and quiet. Respondents emphasized the ways in which rural areas differed from urban parts of the state. People reported that they valued the beautiful landscapes, starry skies, and having easy access to outdoor recreational activities. Many people live in the region because of its nonindustrial, agricultural base. Several people mentioned freedom, property rights, property value, and low cost of living. Many respondents were born in the area they live, and continue to live in the region because of their relationships to their families, friends and neighbors. People felt their community is a wonderful place to raise a family because of low crime and strong ties and support from family, neighbors and friends.

What are the challenges your community is facing right now?

The major challenge in respondents' communities is the economy. Respondents noted that rural Oregon has historically faced a number of economic challenges (e.g., loss/decline of logging and other industries, limited support for local businesses), the rural economies have been hit particularly hard by the recent recession. Further, people reported that there is a severe lack of family wage jobs, and limited funds for basic services like schools and infrastructure. Respondents felt that economic and other challenges have contributed to a declining population in their communities. Young adults in particular are leaving in large numbers because of a lack of educational and work opportunities. Social issues, such as an aging population, drug use, and child abuse were noted as issues of concern in respondents' communities.

What are the major impacts a wind energy facility can have on a community?

Respondents noted both positive and negative impacts from wind energy facilities in their communities. Some respondents felt that wind energy development have a positive economic impact from the creation of family wage jobs, increased tax income for the counties, and land lease payments for some community members. People said that increased money in the community could benefit local businesses, increase local hiring, and improve a community's infrastructure and services. Many respondents noted that wind energy is a clean and sustainable source of energy that could improve local and regional environmental quality and help to address climate change.

On the other hand, some community members felt that wind energy facilities won't have the level of economic benefits promised. These respondents had concerns that new jobs would go to outsiders, tax revenues will be less than promised, and that the community would ultimately bear the costs of expanded infrastructure and public services. Some respondents worried that local property values will be negatively impacted. There also were concerns that not everyone will benefit equally, and that some community members will bear a greater burden than others. Some respondents questioned the environmental benefits and reliability of electricity from wind energy facilities.

Most respondents acknowledged that wind energy development come with some level of disruption during construction and an aesthetic cost; however, there were differing views on the relative importance of impacts to the landscape and viewshed. Some people expressed concerns that these developments could negatively impact local tourism and harm birds, bats and other wildlife.

Wind energy development was mentioned as a challenge to community cohesion, and there was a shared concern about the negative feelings and stress in some communities divided by proposed or existing development. Several people felt that a major component to these conflicts is a lack of participation and influence in the decision-making and siting process. Other people mentioned that siting decisions could potentially create winners and losers. Several people mentioned that they fear a loss of quality of life because of the wind development.

What questions, issues, or concerns do you have about health?

Respondents were divided on whether or not there are health impacts from wind turbines, although people on both sides of the issue had concerns about the lack of data and scientific studies on potential health impacts. Some specific health issues related to wind turbines included the following: noise, low frequency noise, inaudible noise, sleep disturbance, fatigue, shadow flicker, dizziness, migraines, vibration, blinking lights, and mental health impacts including depression, anxiety, and stress. Some people mentioned the potential for 24-hour exposures and had questions about cumulative impacts from multiple facilities and effects on vulnerable populations such as elders, children, and people with pre-existing conditions. Some people expressed concerns about worker safety during the construction phase and during regular maintenance. There was a shared concern about the impact of community conflict and stress on health.

Many respondents noted that wind energy can have positive health impacts from improved environmental quality and improved economic outcomes. Some people said that any negative health impacts from wind energy are small and less severe than those from coal and other fossil-fuel based plants. Several people had no questions, issues or concerns about health.

What else should we consider?

PHD received many responses to this question. Many of the responses fell into the following topic areas:

- Need for more local consultation and involvement in siting process and decisions
- Accurate consideration of local conditions
- Strategies to reduce visual impacts on landscape
- Need for more studies of health and other impacts from wind energy developments in local communities
- Cost-benefit comparisons with other energy sources, and assessments of how risks and benefits are distributed in a community
- Decommissioning wind energy facilities
- Concerns about quality of life and rural lifestyle

Many people expressed some level of distrust with “outsiders”; these outsiders included developers, government agencies, people from urban areas of Oregon, etc. This distrust extends to this office, and several respondents asked the Oregon Public Health Division to stay out of local development decisions. Others, however, were appreciative of PHD’s intent to conduct a HIA on wind energy development in the state, and asked to be kept informed throughout the process.

Appendix E. Additional information on stress and community conflict

Definition

A clinical definition of stress is "a state of activation of physical and psychological readiness to act in order to help an organism survive external threats" [52]. This definition highlights the important role of stress in maintaining physical and mental health, and in surviving challenges encountered in everyday life. However, public health research on the health effects of stress tends to focus on a more everyday definition - "a state of physical or psychological strain or tension" [53].

Primary stress

Researchers who study stress related to environmental risks or hazards have identified at least two types of stress that act at the individual and community levels. Primary stress is caused by real or perceived risks from environmental hazards. Primary stress is influenced by characteristics of the individuals or groups exposed, and the circumstances of the exposure. Individual or group characteristics that affect primary stress response include age, place and length of residence, proximity to the hazard, socioeconomic status, pre-existing physical and mental health status, the presence of other life stressors (e.g., stress related to income, employment, family/neighborhood stability, discrimination), and ability to cope with stress [53]. Exposure-related factors that appear to increase negative responses and stress are exposures that are [52, 53]:

- involuntary vs. voluntary
- manmade vs. natural
- new or poorly studied vs. familiar and well-understood
- catastrophic and acute vs. slow-moving and chronic
- life or health-threatening vs. relatively benign
- controlled by others vs. individually controlled
- unequally distributed vs. fairly distributed
- sources of information untrustworthy/biased vs. sources that are trustworthy/unbiased
- decision or response process that is unresponsive/exclusive vs. responsive/inclusive

Secondary Stress

Secondary stress is caused by social and community responses to a site or incident. Researchers have found that secondary stress may result in the splintering of some communities into different factions, while in other communities, it may result in community-wide mobilization and response [53]. As with individual responses to stress, each community's response is unique and influenced by a number of factors. These include:

- the social, historical and cultural context of a community, which influences how people value and relate to each other, their community, their surroundings, and to people or interests from outside the community;
- availability of social support, information and resources;
- presence of community-wide stressors (e.g., poor or lagging economy, crime, existing sources of environmental stigma or blight);
- levels of pre-existing divisions, disparities or marginalized groups within a community;
- the level of dependence on government or outsiders for information or assistance;
- level of trust within community, and with government/outside entities;
- implementation of strategies that disrupt or preserve existing social norms or structures.

Acute stress response

Researchers and clinicians distinguish between acute and chronic stress responses. Acute stress usually occurs in response to sudden or catastrophic events, and is commonly known as the "fight or flight" response. This reaction activates the endocrine and sympathetic nervous systems, which release adrenaline, noradrenaline, cortisol, glucocorticoids, and other hormones. These hormones cause physiologic changes that include increased heart and lung function, constriction of blood vessels in some parts of the body, dilation of blood vessels to the muscles, increased availability of glucose to the muscles, dilation of pupils, slowing of digestion, and increased awareness or vigilance [52, 53]. Acute stress reactions tend to resolve within hours of removing a stressor.

Chronic stress response

Chronic stress occurs when there is long-term or repeated activation of the normal stress response. Scientists believe that chronic stress occurs from persistent feelings of anxiety and lack of control, or from repeated exposures to stressful situations or environments [160]. Over time, prolonged stress responses can wear down the organs and systems of the body, and compromise its ability to respond to environmental threats. Clinical studies have found that chronic stress decreases immune function, increases risks for cardiovascular disease and endocrine disorders, and affects how the brain and body age. Further, it impairs cognitive functions such as memory and concentration, and can trigger or worsen mental illnesses such as anxiety disorders and depression [160].

In addition to directly causing or exacerbating physical or mental illnesses, stress affects health indirectly. Environmental epidemiologists have found that stress can increase people's vulnerability to environmental stressors. With chemical exposures, people may "take in" more chemicals from the environment because of increases in respiration, perspiration or consumption, or have lowered abilities to counteract harmful effects from these exposures [52]. Chronic stress may also lower people's response thresholds and ability to cope with stressors such as noise and air pollution. Chronic stress may increase risks for unhealthy behaviors such as smoking, excessive alcohol consumption, drug abuse, and overeating [52, 160]. Finally, stress can erode a person's sources of familial and social support, and limit their engagement with their community. This can amplify the effects of primary stress, and worsen secondary stress at the individual and community levels.

Epidemiological studies of stress from environmental hazards

A few epidemiological studies have examined the health effects of chronic stress in communities affected by environmental incidents or contamination. Researchers have found that residents near these sites had increased biological and psychological indicators of stress compared to control groups. These included psychological distress, anxiety, depression, difficulties concentrating, increased blood pressure, and higher levels of cortisol and other stress hormones in urine [53]. Many of these studies have focused on large or relatively high-profile incidents, such as the Three Mile Island accident or the Love Canal Superfund site. However, researchers have found these effects in communities where an environmental threat was perceived, but not real [52]. These studies do not appear to distinguish between primary and secondary stress. Therefore, we cannot determine the relative importance of stress from community-level conflict compared to stress from perceived or real exposures.

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Union County Community Wildfire Protection Plan

A working document that will serve as a resource for providing information to enhance community safety through hazard and risk reduction in the wildland-urban interface areas of Union County

08-10-05



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A special thank you to the Community Wildfire Protection Plan Steering Committee and Resource Committee who dedicated their time and effort to this project while continuing to carry out the duties of their everyday jobs.

Recognition also goes to the many citizens of Union County and to local, state and federal government organizations who assisted in this planning effort by providing historical and technical information for the project.

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Individual Wildland Urban Interface Area maps are provided in Section VII.

Signature Page

Transmitted herewith is the *Wildfire Protection Plan for Union County*. The Wildfire Protection Plan provides a framework in which Union County can assess the risks and hazards associated with Wildland-Urban Interface areas and identify methods of reducing the risk of ignition or eliminating hazards.

The Union County Board of Commissioners has approved this plan and both wildland firefighting agencies and the County's structural fire protection services have agreed upon the contents. The plan contents will be revisited annually and projects will be revised and updated as necessary. All recipients are requested to advise the Union County Emergency Services Office of any changes that might result in its improvement or increase its usefulness.

Colleen MacLeod, Union County Commissioner

Steve McClure, Union County Commissioner

John Lamoreau, Union County Commissioner


Ray Hamann, Union County Fire Chief


John Buckman, District Forester, NE Oregon District, Oregon Dept. of Forestry

BE IT REMEMBERED, that at a regular term of the Board of Commissioners of the State of Oregon, for the County of Union, sitting for the transaction of County business, begun and held at the Joseph Building Annex in the City of La Grande, in said County and State, on Wednesday of said month and the time fixed by law for holding a regular term of said Commission, when were present:

The Honorable Colleen MacLeod, Chair
Steve McClure, Commissioner
John Lamoreau, Commissioner

WHEN, on Wednesday the 10th day of August 2005, among others the following proceedings were had to wit:

IN THE MATTER OF A RESOLUTION)	RESOLUTION
ADOPTING THE UNION COUNTY)	2005-25
COMMUNITY WILDFIRE)	
PROTECTION PLAN AND ESTABLISHING)	
AN ANNUAL REVIEW BOARD)	

WHEREAS, the Union County Board of Commissioners allocated *Title III County Project* money from the *Secure Rural Schools and Community Self-Determination Act of 2000* to complete a Community Wildfire Protection Plan for Union County communities;

WHEREAS, the Union County Community Wildfire Protection Plan is a non-regulatory plan that identifies 16 Wildland-Urban Interface areas of high wildfire risk and hazard;

WHEREAS, the Union County Community Wildfire Protection Plan identifies potential projects that may reduce the hazards present in Wildland-Urban Interface areas and reduce the risk of wildfire ignition;

WHEREAS, the Union County Board of Commissioners establishes the project steering committee as the annual review board for the plan to be coordinated through the Union County Emergency Services office every spring;

BE IT RESOLVED that the Union County Board of Commissioners hereby adopts the Union County Community Wildfire Protection Plan and establishes the project steering committee as the annual review board.

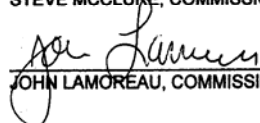
DATED this 10th day of August 2005.



COLLEEN MACLEOD, CHAIR



STEVE MCCLURE, COMMISSIONER



JOHN LAMOREAU, COMMISSIONER

I. Introduction

Plan Overview and Development

The Community Wildfire Protection Plan for Union County is the result of analyses, professional cooperation, collaboration and wildfire risk assessments considered with the intent to reduce the potential for wildfires that threaten people, structures, infrastructure, and values in Union County.

The project steering committee began meeting in October 2003 to first revise the Wildfire Annex for the Union County Emergency Operations Plan. Subsequent meetings were held to establish a project mission and goals and objectives for the Wildfire Protection Plan; develop the risk assessment; identify and prioritize WUIs; organize community workshops; provide guidance on plan content and organization; and prioritize risk reduction projects.

Data from numerous sources and time periods was used to prepare the plan. Because of the different sources and data periods the transition between data sets is not always fluid and there are many gaps in data collection. Where relevant, these gaps are identified and all sources are cited.

The planning committee, made up of collaborating partners, is responsible for implementing this project and includes:

Dara Decker	Union County Emergency Services	Co-Chair
Angie Johnson	Oregon Department of Forestry	Co-Chair
Paul Anderes	Union County Forest Restoration Board	Member
Larry Aragon	Wallowa-Whitman National Forest	Member
Jim Beekman	Umatilla National Forest	Member
Rob Burnside	Confederated Tribes of the Umatilla Indian Reservation Fire Dept.	Member
Jon Christensen	Private Forest Owner	Member
Ray Hamann	La Grande Rural Fire Protection District/Union County Fire Chief	Member
Gary Hansen	Cove Rural Fire Protection District	Member
Steve Henderson	Imbler Rural Fire Protection District	Member
Mark Jacques	Oregon Department of Forestry	Member
John Lamoreau	Union County Board of Commissioners	Member
John Manwell	Forest Capital	Member
Pat McDonald	Elgin City & Rural Fire Protection District	Member
David Quinn	Northeast Oregon Interagency Dispatch Center	Member
Jay Rasmussen	Wallowa-Whitman National Forest	Member
Ron Rochna	Citizen	Member
Trish Wallace	Wallowa-Whitman National Forest	Member
Mitch Williams	Oregon Department of Forestry	Member

Resource members serve in an advisory capacity to the planning committee and include:

Heidi Bigler-Cole	USFS Pacific Northwest Lab	Resource Member
John Buckman	Oregon Department of Forestry	Resource Member
Jim Carter	Medical Springs Rural Fire Protection District	Resource Member
Renae Crippen	Northeast Oregon Interagency Dispatch Center	Resource Member
Brett Brownscombe	Hells Canyon Preservation Council	Resource Member
Dale Eckman	Bureau of Land Management	Resource Member
Mike Hartwell	Bureau of Land Management	Resource Member
Chris Heffernan	Private Forest Owner	Resource Member
Bill Hooker	Union City & Rural Fire Protection District	Resource Member
Sonny Johnson	Cove Rural Fire Protection District	Resource Member
Lola Lathrop	911/Dispatch Manager	Resource Member
Colleen MacLeod	Union County Board of Commissioners	Resource Member
Michael McAllister	Citizen	Resource Member
Steve McClure	Union County Board of Commissioners	Resource Member
Paul Oester	OSU Extension Service	Resource Member
Boyd Rasmussen	Union County Sheriff's Office	Resource Member
Matt Reidy	Wallowa-Whitman National Forest	Resource Member
Ken Rockwell	Wallowa-Whitman National Forest	Resource Member
George Russell	North Powder City & Rural Fire Protection District	Resource Member
Ron Warnock	Cove Rural Fire Protection District	Resource Member
Bruce Weimer	La Grande Fire Department	Resource Member
Kurt Wiedenmann	Wallowa-Whitman National Forest	Resource Member
Judy Wing	Wallowa-Whitman National Forest	Resource Member

Plan Compliance

This community wildfire protection plan has been prepared in compliance with the National Fire Plan, the 10-year Comprehensive Strategy, the FEMA Tri-County Hazard Natural Hazard Mitigation Plan (Baker, Union, and Wallowa Counties), Union County Emergency Operations Plan, Oregon Senate Bill 360 (The Act of 1997), and Healthy Forests Restoration Act.

The Union County Commissioners with cooperation and input from the Community Wildfire Protection Plan Steering Committee endorse this plan. These representatives mutually agree to the final contents of the plan. The plan is not regulatory and does not create or place mandates or requirements on individual jurisdictions. This plan does not bypass the individual rules and procedures that govern the participating agencies, organizations and individuals. The role of the plan is to serve as a working document to coordinate fire and land managers and their efforts in Union County.

Preparing a Community Wildfire Protection Planⁱ

Both the *National Fire Plan*, and the *Ten-Year Comprehensive Strategy for Reducing Wildland Fire Risks to Communities and the Environment* place a priority on working collaboratively within communities in the WUI to reduce their risk from large-scale wildfire. The incentive for communities to engage in comprehensive forest planning and prioritization was given new momentum with the enactment of the *Healthy Forests Restoration Act* (HFRA) in 2003. The

language in HFRA provides maximum flexibility for communities to determine the substance and detail of their plans and the procedures they use to develop them. HFRA emphasizes the need for federal agencies to work collaboratively with communities in developing hazardous fuels reduction projects, the act also places priority on treatment areas identified by communities themselves in a community fire plan. Combine this with the direction by NFP and the Ten-Year Strategy, one can see the importance of preparing a plan.

Other local government planning considerations, such as FEMA's direction to prepare county hazard mitigation plans and the implementation of Oregon Senate Bill 360, has made it very important for local government to participate in the development and implementation of a community wildfire protection plan. A community wildfire protection plan inventories local conditions including fire risk, and coordinates fire protection and outreach projects across Union County communities.

Wildland-Urban Interface Loss in Oregonⁱⁱ

Oregon's *Natural Hazards Mitigation Plan* says wildland fires are a common and widespread natural hazard in Oregon; the state has an extensive history of wildfire. Significant portions of Oregon's wild lands and rural communities are dominated by ecosystems dependent upon fire for health and survival.

Oregon has over 41 million acres (over 64,000 square miles) of forest and rangeland susceptible to wildfire. In addition, significant agricultural areas of the Willamette Valley, north central and northeastern Oregon support grain crops that are prone to wildfire damage. Fire danger is not exclusive to land, communities are also at risk. A federal document titled *Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire* (listed in the 2001 *Federal Register*, 367) issued by the Department of Agriculture - Forest Service Department of the Interior - Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service and National Park Service states "Oregon has communities that are at risk of damage from wildfire".

The majority of wildfires occur between June and October. However, wildfires can occur at other times of the year when weather and fuel conditions combine to allow ignition and spread. Seventy percent of Oregon's wildland fires result from human activity. The remaining thirty percent result from lightning, occurring most frequently in eastern and southern Oregon.

The financial and social costs of wildfires demonstrate the need to reduce their impact on lives and property, as well as the short and long-term economic and environmental consequences of large-scale fires. Cost savings can be realized through preparedness and risk reduction including a coordinated effort of planning for fire protection and implementing activities among local, state, and federal agencies, the private sector, and community organizations. Individual

property owners have a major role to play in this coordinated effort, especially in wildland interface areas.

The wildland-urban interface (WUI) is the area or zone where structures and other human development meet or intermingle with wildland or vegetative fuels. As more people have moved into wildland urban interface areas, whether for lifestyle or economic reasons, the number of large wildfires affecting homes has increased dramatically. Many in the population migrating to rural Oregon from urban areas maintain the expectation of structural fire protection similar to the high-density areas they were leaving. Rural fire departments combined with local mutual aid agreements and finally the Conflagration Act attempt to fulfill these expectations. However, many homes are still located within areas with little or no structural fire protection.

Recent fire seasons bring the wildland interface problem and the problem of overabundant dense forest fuels to the forefront. The forest fuels issue is a major and continuing problem that has received presidential level attention. Work is underway to reduce fuels in WUI areas by way of community involvement and funding from the *National Fire Plan*. National Fire Plan goals are to:

- Ensure sufficient firefighting resources for the future;
- Rehabilitate and restore fire-damaged and fire-adaptive ecosystems;
- Reduce fuels (combustible forest materials) in forests and rangelands at risk, especially near communities; and
- Work with local residents to reduce fire risk and improve fire protection.

Community Assistance grants and other grant opportunities are available through *National Fire Plan* (NFP) to aid in achieving these goals. The goals aim high. They represent a substantial amount of work, and their ultimate success will depend on concerned individuals, agencies, and organizations working in concert. No agency or group working alone can achieve NFP's goals.

Conversion of Resource Lands in Eastern Oregon

The Oregon Department of Forestry completed a study titled, *Forest, Farms and People: Land Use Change on Non-Federal Land in Eastern Oregon, 1975-2001*ⁱⁱⁱ that studies the conversion of resource lands (farm, forest and range) to residential development in Eastern Oregon. The study used aerial photographs from 1975, 1986 and 2001 to examine land development before and after the implementation of land use laws to determine whether land use laws have been successful in slowing growth on Eastern Oregon resource lands. Ultimately, the report concludes that land use laws have slowed the conversion of resource land in Eastern Oregon, but while the rates of urban and rural residential development have declined statewide, they have increased in Eastern Oregon's non-federal

forests, leading to potential impacts like compromised forest management and fire protection capability.

Results from the study include the following facts:

1. In parts of Central Oregon, 60% of forest industry land has shifted from forest industry to non-industrial ownership.
2. There are now three times as many dwellings on non-federal wildland forest in Eastern Oregon as in 1975. This may lead to increased fire hazard, impacts to wildlife and their habitat, and a decreased timber supply.
3. Dwelling density is increasing at a faster rate in Eastern Oregon's fire-prone private wildland forests than in Western Oregon's private wildland forests.
4. As the number of structures in Eastern Oregon's forests increase, the propensity to manage for timber production decreases.
5. Along with decreasing inventory volumes on timber industry lands, timber harvests in Central Oregon have decreased dramatically, and may remain depressed.
6. The remainder of Eastern Oregon's private forests may experience the rapid development and other permanent changes currently occurring in Central Oregon.

The study results have implications for private forestland in Union County. Local land division ordinances currently contain fire-siting standards (see *Section V*) that stipulate the safest way for residential development to occur in forestland yet development is still occurring, which leads to structural protection challenges for local protection agencies. Additionally, timber production and wildlife habitat may decline as forestland is converted to residential development.

ⁱ <http://www.communitiescommittee.org/pdfs/cwpphandbook.pdf>

ⁱⁱ Oregon Emergency Management; *Emergency Management Plan, Natural Hazards Mitigation Plan, Fire Chapter*, (December 2003).

ⁱⁱⁱ Oregon Department of Forestry; *Forest, Farms and People: Land Use Change on Non-Federal Land in Eastern Oregon, 1975-2001* (August 2004).
http://www.odf.state.or.us/DIVISIONS/resource_policy/resource_planning/Annual_Reports/EORDZ.pdf

II. Union County Profile

Located along the Interstate 84 corridor in northeast Oregon, Union County is approximately 250 miles east of Portland, Oregon and 160 miles northwest of Boise, Idaho. Union County lies in the Grande Ronde River and Powder River Valleys just east of the Blue Mountains. Union County is bordered by Wallowa County to the north and east, Baker and Grant Counties to the south and Umatilla County to the west.

Union County is characterized by the ridges and valleys typical of the Blue Mountains, and is part of the Grande Ronde River Basin. Total area is 2,038 square miles, or 1,304,320 square acres. The Grande Ronde River runs south to north across Union County, and supports recreational, irrigation and livestock uses.

There are eight incorporated communities in Union County including La Grande, Island City, Elgin, Imbler, Cove, Union, North Powder and Summerville. Union County also contains eight fire districts/departments providing structural fire protection and three wildland fire agencies providing wildland fire protection. Fire Protection is discussed in greater detail under *Section IV – Emergency Management*. The area draws many visitors every year to enjoy outdoor activities such as skiing, hunting, fishing, hiking and biking. Aside from the natural beauty of the area, amenities like a university and hospital also draw visitors and new residents.



Figure 1 - Union County Vicinity Map

Climate

Union County enjoys four distinct seasons. Annual precipitation is approximately 18 inches in the valleys while high mountain areas rarely exceed 10 inches. Seasonal distribution is quite different from western Oregon. "Relatively low winter totals are nearly matched by rain from summer thunderstorms, which are much more common than western areas. Thus, much

of eastern Oregon receives almost uniform precipitation throughout the year."ⁱ Summer highs average in the 80s while winter highs linger in the 30s."ⁱⁱ Summer days are usually dry and clear with cool nights. The prevalence of thunderstorms in the mountainous and timbered regions of eastern Oregon suggests the potential for lightning-caused fires.

Land Use

Most of the county's development and population is located on the valley floor. Industrial, state and national forests occupy the higher elevations. National Forest land comprises almost all of the 49% publicly owned land.

Today's land uses in the Grande Ronde Valley reflect land uses of the valley's early settlers. The valley floor supports extensive agricultural activities, while

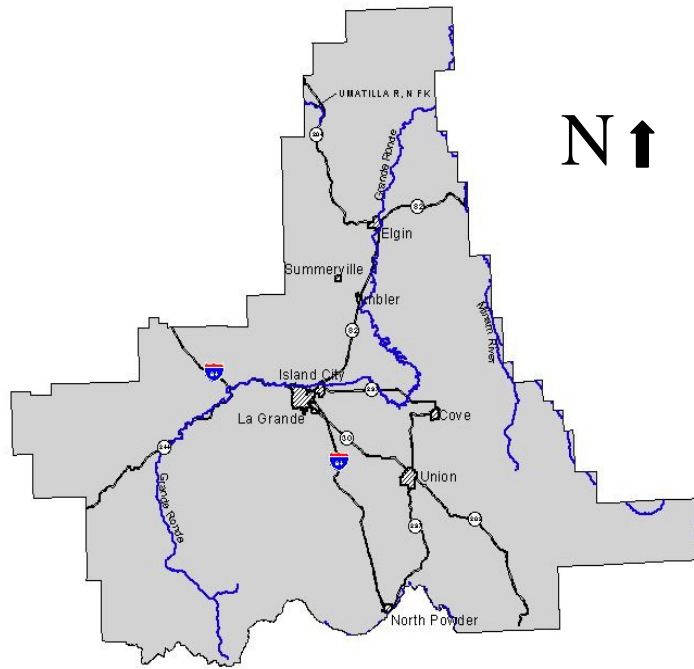


Figure 2 - Union County Map

livestock grazing on rangelands and timber resources flourish on the steeper slopes surrounding the valley. Historically, development in conjunction with farm and ranch uses occurred on the valley floor, but

today, most development occurs within cities' urban growth boundaries and rural residential zones identified in the Union County Land Use Plan. Most rural residential zones are located in wildfire risk areas due to density of development, vegetation, past fire occurrences, weather and topography.

Union County depends on the landscape to sustain its livelihood. Land is primarily suited for agriculture, but there are also forest/agriculture possibilities and mineral/aggregate locations throughout the county.

Table 1. Northeast Oregon Land Use

County	Percent Acreage in farms
Union	40.8%
State of Oregon	28.4%

Source: Reid, Rebecca L., *Oregon: A Statistical Overview: 2002*, Southern Oregon Regional Services Institute, Southern Oregon Regional Services Institute, Southern Oregon University. Ashland, Oregon, May 2002.

Forestland Ownership and Stewardship

Forestland in Union County is divided among federal, state and private ownership or stewardship. Table 2 displays federally administered land in Union County as compared with the state as a whole. Federal land managers include the United States Forest Service and the Bureau of Land Management. The Oregon Department of Forestry provides stewardship and fire protection patrol for state and private forestland throughout Union County.

Table 2. Federally Administered Land

County	Private % Total	BLM % Total	USFS % Total	Federal Land Total ⁱⁱⁱ
Union	52%	1%	47%	47.5%
State of Oregon	44%	25%	25%	50%

Source: Reid, Rebecca L., *Oregon: A Statistical Overview: 2002*, Southern Oregon Regional Services Institute, Southern Oregon Regional Services Institute, Southern Oregon University. Ashland, Oregon, May 2002.

Population and Demographics

The Grande Ronde Valley includes six of the county's eight incorporated communities, and most of the county's population. According to the Union County Population Analysis and 2020 Forecast, the county had a year 2000 population of 24,550 people^{iv}. See Table 3 for individual community populations.

Table 3. Union County Community Populations

Community	2000 PSU Revised	1990 U.S. Census	Population Change 1990-2000	Percent Change 1990-2000
Cove	595	507	88	17%
Elgin	1,655	1,586	69	4%
Imbler	285	299	-14	-5%
Island City	925	696	229	33%
La Grande	12,340	11,766	574	5%
North Powder	490	448	42	9%
Summerville	115	111	4	4%
Union	1,930	1,847	83	4%
Union County	24,550	23,598	952	4%
Incorporated	18,335	17,260	1,075	6%
Unincorporated	6,215	6,338	-123	-2%

Source: Union County Population Analysis and 2020 Forecast

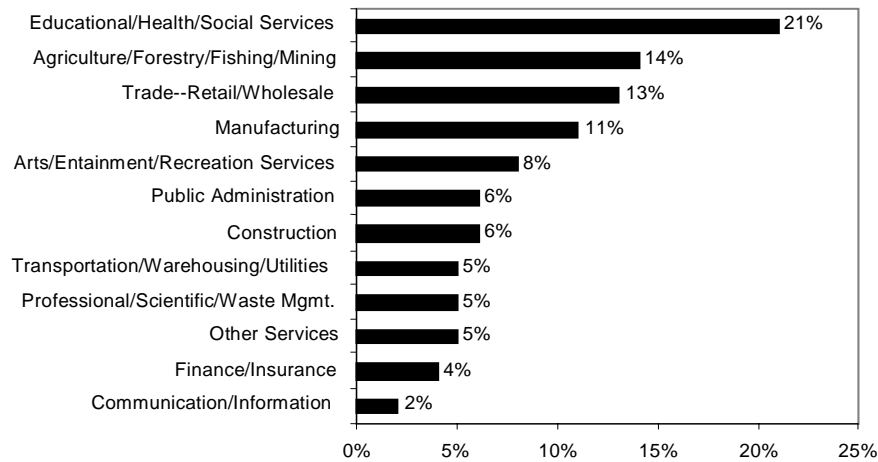
Increased growth (both urban and rural) impacts agency preparation for emergencies because increased population and development (especially within WUI's) greatly increases wildfire frequency and severity.

Employment and Industry

The region has historically been dependent upon agriculture and timber as the primary employment in the area. Currently prominent industries include public employment (government and education), agriculture and timber. Manufacturing, trade and services are the largest employment sectors in Union County.^v Timber played a key role in Union County's early economic development but has steadily declined in economic value since the late 1970s. Wood products, however, still remain as the most prominent manufacturing sector in Union County, and northeast Oregon as a whole.

Looking towards the future, agricultural, manufacturing, educational, healthcare, governmental, tourism, and retail trade sectors will continue to grow and provide goods, services and employment opportunities for area residents. Figure 4 provides a breakdown of the region's employment by industry for the year 2000:

Figure 3. Employment by Industry



Source: Oregon Labor Market Information System, Oregon Employment Department.

Fire History

Union County and the surrounding area have a significant history of both human and lightning caused fires. A combination of climate, fuels and terrain make Union County prone to wildfire. Figure 4 shows lightning vs. human caused fires for a ten-year period.

Figure 4 shows over 600 fire starts (human and natural) were reported during the years 1994 – 2003. During that time period human causes were responsible for approximately 200 starts and lightning strikes were responsible for approximately 400 starts. Figure 5 shows the interface areas and fires over ten acres in size.

Figure 5 illustrates Union County fires greater than 10 acres over the last 20+ years. Figures 4 and 5 illustrate a stark contrast. Though Union County annually endures many fire starts from both lightning and human sources the number of fires reaching the ten-acre threshold remains relatively low. This dichotomy is due to effective initial attack and coordinated local suppression efforts. It is worth noting that the recent absence of major fires does not indicate that major fires are not possible in the future. As illustrated in this document many areas are at high risk for a potentially catastrophic event.

Major Union County Fires

Over the past twenty-five years Union County has had five fires of major significance. The fires are: Rooster Peak – 1973, Mt. Harris – 1981, Frizzell – 1986, Boulevard – 2001 and Craig



Figure 4. Rooster Peak Fire photo courtesy of The Observer, August 18, 1973.

Loop – 2003. The fires were of significance for different reasons.

The lightning caused Rooster Peak fire was the largest and most destructive in recent history. The fire burned approximately 6,400 acres including six structures. Much of the fire was located near La Grande's southwest City Limits. Because structures were lost and the fire threatened the City of La Grande, this is the most significant fire in recent history.

The Mt. Harris fire was an 850-acre human caused fire resulting in significant timber loss. In addition to the timber loss the fire was highly visible from La Grande, Summerville, Imbler and Cove. Much of the Mt Harris burn has never recovered to support the timber once present. One ongoing effect of the two fires is a psychological one. The Rooster Peak fire's close proximity to La Grande and the Mt Harris fire's high visibility left a memorable impact on long time Grande Ronde Valley residents. These fires made the wildfire threat a much more tangible danger.

The Frizzel fire (250 acres, lightning caused) and the Craig Loop fire (43 acres, human caused) were not significant fires due to their size, but were significant due to their location and potential. Both fires took place in the Mt. Emily WUI. This interface is now recognized as one of Union County's most populated and most at risk interface areas. Though these fires were relatively small and quickly contained the potential for property damage and loss of life was substantial.

The Boulevard fire (150 acres, lighting caused) was another near miss for Union County. The fire threatened the La Grande watershed, a rugged and roadless area of high environmental value. Much like the previous fires the potential for a catastrophic fire was high, but for different reasons. The watershed contains substantial fuel and has very limited access. Had conditions been less favorable, a major event could have occurred.

Forest ecosystems depend on fires for certain functions. Under certain circumstances fire is a healthy and natural occurrence. Fast moving, low intensity burns clear understory and allow for new growth while not harming the larger fire resistant trees. The issue of reintroducing fire into an ecosystem where fire has been long absent is difficult. Resource managers must choose which fires to allow to burn and which to suppress. This decision is made taking into account a variety of factors and conditions. As increased mitigation steps are taken and plans such as this are put in place, that decision may become easier.

Economic Impact of Major Fires

Timber is a valuable resource in Union County representing an economic commodity in the form of raw materials and finished products, as well as an amenity resource appreciated for its scenic beauty and outdoor opportunities. Timber resources also play key roles in water quality and wildlife habitat.

A wildfire of any magnitude in Union County would severely impact the economy by reducing the amount of wood available for market. This in turn would limit the business relationships and opportunities of those who are dependent on forest resources as the amount of available timber is in decline. A catastrophic fire would also impact tourism and recreational opportunities over the long term. As forestland is consumed by wildfire wildlife habitat diminishes and the aesthetic value declines.

Suppression costs include all costs associated with controlling wildfire. The cost of suppression for land management agencies like the Oregon Department of Forestry and United States Forest Service can mount quickly depending on fire season severity.

When wildfire consumes physical property like structures, the associated costs rise dramatically, displacing people and businesses and contributing to higher overall economic losses. The assessed value of property in Union County totals \$1,140,900,882 and should be protected to the extent possible against loss from wildfire.^{vi}

ⁱ *The Climate of Oregon: From Rain Forest to Desert*, Taylor, George H. and Hannan, Chris, Corvallis, OR: OSU Press (1999) pp. 80.

ⁱⁱ *Ibid*, pp. 8-9.

ⁱⁱⁱ Taylor, *Climate of Oregon*.

^{iv} *Union County Population Analysis and 2020 Forecast; Final Draft*, The Benkendorf Associates Corporation, (January 25, 2001) pp. 1.

^v *Union County 2002 Strategic Plan*, Elesco Limited and Auyer Consulting, (June 2002) pp.15.

^{vi} Union County Assessment and Tax Collection Department, (March 2005).

III. Mission, Goals and Objectives

Mission Statement

Union County and partnering agencies are committed to creating a meaningful Community Fire Plan that serves to coordinate wild land fire agencies resources and educate landowners while enhancing community safety and values through hazard reduction, risk reduction, and fire prevention.

Goals and Objectives

Goals and objectives were formulated by the plan committee and were later refined using input from community workshops. The plan committee then prioritized the plan goals based on identified needs in Union County. Goals are listed in priority order.

1. Improve emergency response through the protection of life, property and natural resources:
 - a. Identify local equipment and training needs.
 - b. Promote cooperation and foster relationships among agencies, organizations, jurisdictions, and communities.
 - c. Improve interagency communications before and during emergency situations.
 - d. Improve pre-suppression planning strategies among all agencies with protection responsibilities.
2. Identify and reduce hazardous fuels in Wildland Urban Interface areas and coordinate risk reduction strategies across the landscape:
 - a. Share data and use a common set of base information for risk assessment.
 - b. Use local knowledge.
 - c. Prioritize hazardous fuel reduction areas.
 - d. Utilize fuel reduction material where suitable and cost-effective.
3. Foster widespread and consistent support of the Community Wildfire Protection Plan:
 - a. Form partnerships among agencies and citizens.
 - b. Collaborate with the community to develop a range of ideas/alternatives for protection from wildfire.
4. Use the community wildfire protection plan as a coordinated resource, tool and educational piece:
 - a. Fire prevention.
 - b. Landowner assistance.
 - c. Coordinated and consistent messages.

IV. Emergency Operations

Fire Protection

In October 2003, wildland and structural fire protection agencies in Union County began updating the Wildfire Annex to the *Union County Emergency Operations Plan*. The annex is a hazard-specific chapter that outlines the roles and responsibilities of the different agencies that may be involved in an urban/wildland interface fire, with the main goal of protecting life and property during a wildfire event. To read the annex in its entirety, see Appendix C.

Union County contains eight fire protection districts/departments providing structural fire protection. Additionally, the US Forest Service (USFS) and the Oregon Department of Forestry (ODF) provide wildland fire protection for timber resources. Though some rural fire protection districts have received wildland firefighting training, wildland firefighters have not been trained in structural protection, nor do they provide structural fire protection. The Bureau of Land Management (BLM) also manages land in Union County, but coordinate with the USFS for initial attack responsibilities on BLM land. An agreement is in place between the BLM and the USFS specifying that the nearest resources to the incident regardless of ownership or suppression responsibility are deployed for initial attack.

In Union County, fire protection can be found in three tiers: unprotected (without any protection for the land or structure); single protection from rural districts, city departments, or wildland agencies (structures are protected, but not the land; or visa versa); and dually protected (both structural and wildland protection). Union County contains approximately 50,890 acres of land not protected by a structural or wildland fire agency. To the extent possible, new development abutting fire districts is annexed into the district via landowner petition. When a wildfire reaches the threshold for declaring a conflagration (per the Oregon Conflagration Act), the Union County fire chief will request assistance and support for wildland fire suppression.

In order to meet the criteria set forth in 2005 by the Office of the State Fire Marshall for conflagration declaration, Union County is currently compiling this plan in accordance with the following:

1. FEMA National Fire Plan
2. The 10-year Comprehensive Strategy
3. FEMA Tri-County Hazard Natural Hazard Mitigation Plan (Baker, Union, and Wallowa Counties)
4. Union County Emergency Operations Plan

5. Oregon Senate Bill 360 (The Act of 1997), and
6. Healthy Forests Restoration Act.

Additionally, the Union County Planning Department has had in place since 1983 adopted minimum fire defense standards for new construction. These have been modified over time using Oregon Department of Forestry fire siting standards as development has increased. The County's IT Department is working on changing the designation that appears on property tax statements from "fire patrol" to "ODF non-structural protection". Other criteria required by the Office of the State Fire Marshall for 2006 include the active implementation of this community wildfire protection plan.

Infrastructure and Structural Protection Capabilities

The various fire agencies in Union County provide structural and wildland fire protection that also includes infrastructure like utilities, transportation corridors and water systems. Generally, the greatest issues for local fire districts are specific roads or bridges that have been identified as load limited or are too narrow for adequate ingress / egress.

Currently the fire districts throughout Union County are working on assembling an inventory of equipment and personnel qualifications. From this inventory, fire districts will be able to determine what their training and equipment needs are in order to improve fire services for Union County. When this project is complete, the inventory will be shared among all local fire agencies and become a part of this plan.

Defensible Space

Defensible space is the area around a structure where the vegetation has been reduced or modified to reduce the ability for flame conduction from the ground level to the tree crowns. The defensible space is designed to be a buffer between the fire and a structure. Creating and maintaining a defensible space takes many forms, from planting and maintaining a lawn to thinning and clearing underbrush. The space will often be layered in a vertical primary, secondary and tertiary format with different treatment and maintenance in each portion of the space. The size of a defensible space is dependent on many factors such as slope, fuels, climate and fire history. There is no standard size or type of defensible space. Dependant on conditions, each property's size and types of defensible space will vary greatly. From a tactical standpoint, the defensible space designed into a property's landscaping and management may be what allows a fire agency to save a structure. The number of resources needed to protect a structure with a properly maintained defensible space is lower. Given a major fire in a WUI, conserving resources will be a priority in an effort to defend as much improved property as possible.

V. Community Outreach and Education

Outreach

Education and community outreach were two areas of primary focus when creating this community fire protection plan. The local area can be the best source of information and encouraging community involvement is an important part of this plan. It is also important that this plan be viewed as valuable to public safety, and as a resource to mitigate wildfire hazards.

During the development of this plan, two rounds of community workshops were held throughout Union County. The workshops allowed the steering committee an opportunity to discuss the plan completion timeline, the high hazard area risk assessment, values threatened by wildfire risk, and any additional concerns related to emergency services and fire agency response. The first round of community workshops were held in Elgin, Imbler, Medical Springs and La Grande. Discussion topics included the importance of the planning effort, the local risk assessment and emergency operations related to wildfire events. The second round of community workshops were held in Cove, Elgin and Island City. Discussion topics included the risk assessment, formulation of WUI boundaries and potential projects (see Appendix B for Community Workshop Summaries).

In addition to community workshops, radio interviews and newspaper articles, the steering committee decided a website would also be an effective method for communicating with citizens throughout the evolution of the plan. In reality, both Union County's and the La Grande ODF Office's websites were used to support this project.

The steering committee also formulated a grassroots questionnaire identifying potential educational opportunities and gauging what citizens value most and how those values may be threatened by wildfire. The questionnaires were passed out at community workshops, available at all local libraries, city halls and community centers throughout Union County. The questionnaire was also printed in the newspaper on three occasions and posted on the website for download and completion (see Appendix B for questionnaire results).

Blue Mountain Wildland-Urban Interface Study

In September of 2003 the Oregon Department of Forestry completed the *Blue Mountain Wildland-Urban Interface Wildfire Study* (Appendix B). Grant funding from the National Fire Plan were used to conduct this study in cooperation with Union County and Baker County OSU Extension Services. Contact Paul Oester at 963-1010 for more detailed information. This study was conducted using statistical methods for scientific validity so potential respondents were targeted to receive the survey.

Surveys were mailed to 847 landowners within various WUI's in Baker, Grant, Umatilla, Union and Wallowa Counties. Approximately 225 individuals responded to the survey indicating wildfire priorities and values. The study shows substantial concern for fuel loads on adjacent properties and response time/equipment/capabilities of local fire agencies. The study also indicates a majority of respondents do not have a plan for what they would do in case of a nearby wildland fire. The great majority is not concerned about the issues relating to creating defensible space such as cost, physical work, time and aesthetics and is interested in potential grant funding opportunities.

Union County Values-At-Risk Questionnaire

As a part of the public involvement associated with this plan the steering committee and staff crafted a *Values-At-Risk Questionnaire* to evaluate the concerns and values of Union County's WUI residents (Appendix B). Individuals listed resources valued most, such as aesthetics, outdoor recreation, clean air and water, vegetation and wildlife habitat and indicated all could be detrimentally affected by wildfire. Most have had limited, if any contact, with Fire Wise or other fire planning efforts and have only moderate concern for wildfire in their area. In addition a substantial number of residents are only somewhat or not at all aware of defensible space principles. This questionnaire was a grassroots effort and was not conducted using statistical methods; the questionnaire was made available to anyone who had an interest in filling it out.

Both the study and the questionnaire show concern for wildfire and the resulting consequences. Both highlight a need for additional education and outreach to those landowners in WUI's in order to promote the use of defensible space as well as other grant and educational programs.

Fire Programs and Policies

In order to address wildfire in Union County's wildland-urban interface (WUI), homeowners and landowners must understand the hazards around their homes and property that contribute to increased wildfire risk. As more people move into WUI areas the number of large wildfires potentially impacting homes have increased.

Across Union County, fire protection can be found in three tiers: unprotected (without any protection for the land or structure); single protection from rural districts, city departments, or wildland agencies (structures are protected, but not the land; or visa versa); and dually protected (both structural and wildland protection).

Finding areas with dual protection is limited to rural residential areas. Also, the large land area of the county causes increased response time and limits the capabilities of fire services.

Structural Vulnerability - a term that relates factors contributing to how and why a home is vulnerable to wildfire. Examples of factors that would make homes vulnerable in a wildfire event are access to the home, ladder fuels and vegetation within the landscape of a home, and whether or not fire protection

Union County citizens have available various prevention programs about self-preparation and property protection from the risk of wildfire. These programs are mentioned below. The best protection is prevention.

Living with Fire

This educational newspaper is available on-line. The newspaper displays step-by-step instructions on how to create a survivable space around your home taking into account topography and surrounding vegetation. Please visit www.or.blm.gov/nwfire/docs/Livingwithfire.pdf for more information.



Figure 5. Photo courtesy of California Department of Forestry and Fire Protection.

The pre-fire activities implemented by this homeowner included a green and well-maintained landscape, reduction of wildland vegetation around the perimeter of the property, a fire resistant roof, and a good access road with a turnaround area. The charred surroundings of the home show that these pre-fire activities effectively protected it when wildfire hit.

I'm Concerned....

ODF is currently using the "I'm Concerned..." campaign for its fire prevention program. "I'm Concerned..." offers quick tips for burning debris safely, seasonal property clean up, safely building and extinguishing a campfire, burn barrel safety, and home fire safety. ODF publishes "I'm Concerned..." ads in the local newspapers and on their website as the time of year dictates. You can visit www.odf.state.or.us/eastern/northeast/default.asp anytime to get a copy of the fire safety tips.

Firewise

Firewise promotes fire-wise practices by, 1) educating citizens about the dangers of a wildfire in the area; 2) encouraging residents to take responsibility in reducing the risk of a wildfire and creating survivable space around their residence; and, 3) increasing awareness of the natural role of low-intensity fires and the benefits of prescribed burning or occasionally managing natural wildland fires to achieve ecological benefits while maintaining firefighter and public safety (visit www.firewise.org for more information).

Structural Ignitability - a term that relates to the cause of a home igniting during a wildfire. Cause could be attributed to the building materials used for the home or the amount of combustible materials around the home.

A term that is emphasized in this prevention program is structural ignitability. Structural ignitability is the ability of the building materials used for a home, deck or attached outbuilding to combust.

Fire-Resistant Plants for Oregon Home Landscapes

When landscaping around a home, most homeowners are concerned primarily with aesthetics. When homeowners are advised to remove flammable vegetation, they are often worried that the aesthetics of their landscape will be compromised.

Flammable plant material on the landscape can dramatically increase the fire risk around homes. Homeowners can find information about fire-resistant plant materials that aid in improving the chances of a home surviving wildfire while providing aesthetically pleasing color, texture, flowers, and foliage for the landscape. For details please visit

www.extension.oregonstate.edu/emergency/FireResPlants.pdf.

Cost-Share Grant Programs through National Fire Plan

ODF provides homeowners within the WUI areas of Union County a free home site inspection. After the inspection, technical advice is shared with the homeowner as to what can be done to lessen the structural ignitability rating of the home. The amount and type of vegetation to be removed varies depending on the amount of survivable space needed to protect the home. This could entail a substantial cost to the homeowner; however there may be grant funds available to share in the cost of the project.

In addition to the above-mentioned program, there is a separate program for larger landowners that have land within a Union County WUI. The larger large block landowners become an even higher priority if located in a WUI and adjacent to federal land. This program offers cost-share incentives for pre-commercial thinning, slash removal, brush removal, and/or ladder fuel removal. Contact ODF in La Grande at (541) 963-3168 to find out more about these programs.

Land Use Planning

Land use planning is an important part of ongoing efforts to mitigate the impact of development in WUI areas. Development in concert with the physical landscape and its inherent risks is the first line of defense against a major fire resulting in extensive private property damage and loss of life. Oregon has instituted the statewide land use planning program, which is administered by county and city planning departments. Union County administers the program through the Comprehensive Plan instituted by Union County Zoning, Partition and Subdivision Ordinance (UCZPSO). UCZPSO requires all new development located within one quarter mile of forestland to meet Fire Siting Standards. Among other things the standards regulate access and building materials as well

as require on-site water for fire suppression. In addition they require a primary and secondary fuel break be maintained on the property.ⁱ

ⁱ Union County Zoning, Partition and Subdivision Ordinance, Siting Standards for Dwellings and Structures and Development and Fire Siting Standards (Adopted November 2, 1983).

VI. Wildfire Risk Assessment

Methodology for Hazard Assessment¹

To identify and prioritize wildland-urban interface areas-at-risk in Union County, an assessment of factors contributing to large wildfire events was conducted. This section will outline the process used and highlight any unfamiliar definitions. Two key documents were referenced for this process, as instructed by Oregon Department of Forestry:

- 1) *Field Guidance: Identifying and Prioritizing Communities at Risk*. National Association of State Foresters. June 27, 2003. (Available at: <http://www.stateforesters.org/reports>)
- 2) *Concept for Identifying and Assessment of Communities at Risk in Oregon*. Draft prepared by Jim Wolf, Fire Behavior Analyst, Oregon Department of Forestry. July 19, 2004. (Available by contacting Jim Wolf at jwolf@odf.state.or.us)

These documents were used to expand the assessment of communities-at-risk to also include the assessment of wildland-urban interface areas-at-risk.

In Union County, a **community-at-risk (CAR)** is defined as a group of homes or other structures with basic infrastructure (such as shared transportation routes) and services within or near federal land. A **wildland-urban interface area (WUI)** surrounds a community at risk, including a community's infrastructure or water source, and may extend beyond 1 ½ miles of a community, depending on topography, geographic features used as an effective firebreak, or Condition Class 3 land.

It is important that one understands the meaning of risk and hazard in relation to wildfire. Risk is the chance or probability of fire occurrence. Hazard is the exposure to risk, and in a wildfire those hazards can be related to the natural environment and the man-made environment. Natural hazards include fuel type and amount, topography, and weather. Man-made hazards include access to structures and wildland, availability of water, limited greenspace around structures, and ignitability of structures. Capability of firefighting resources will be compromised by the severity of both natural and man-made hazards.

Fire Occurrence

The rate of fire occurrence is an important component of the assessment. Fire history records for the last ten years (1994-2003) were used. Fire history data was compiled from the La Grande Ranger District and the Walla Walla Ranger District of the U, Oregon Department of Forestry-La Grande Unit, and the BLM. The fire occurrence rate (FOR) per 1,000 acres was used to yield a value of 1, 2, or 3 to be used to calculate overall hazard in the county.

The following are point assignments for fire occurrence per 1,000 acres for the 10-year period:

<i>Number of fires per 1,000 Acres (1994 – 2003)</i>	<u>Value</u>
1 – 2 fires for the 10 years	1
3 – 4 fires for the 10 years	2
5 + fires for the 10 years	3

Fuels

Data used to create a fuels inventory in a Geographical Information System (GIS) was derived from LandSat imagery provided by Oregon Department of Forestry for private lands and the

Wallowa-Whitman National Forest GIS and Oracle tables derived from stand exams and photo interpretation. For Union County, the increased risk of a large wildfire event is caused by the buildup of forest fuel and changes in vegetation composition over time. Unnaturally dense stands competing for limited water and nutrients are at increased risk of wildfire and insect and disease epidemics. Condition class for the county is minimal at level 1, while condition class 2 and 3 dominate. This also means that fire regimes are altered from their historic range, which in turn sets Union County up for wildfires that will be larger in size, more intense and severe, causing landscape patterns to change significantly. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects and disease, or other pest management activities.²

Both surface and crown fuels were considered for the vegetation hazard. Surface fuel hazard was determined by using fire behavior fuel models and/or potential flame length. The table below displays the grouping of fuel models to determine hazard. Values were assigned for each fuel group:

<u>Fuel Group</u>	<u>Value</u>
Group 1 (see Table 4)	1
Group 2 (see Table 4)	3
Group 3 (see Table 4)	5

Table 4. Fuel Group Descriptions

<i>Fuel Hazard Factor</i>	<i>Fuel Model Group</i>	<i>Fire Characteristics</i>
1	Grass, Low/less flammable brush, and short-needle timber litter (FM 1, 5, 8)	Typically produces a flame length of up to 5 feet; a wildfire that exhibits very little spotting, torching, or crowning, and which results in a burned area that can normally be entered within 15 minutes. Low severity.
2	Grass/Timber, Moderate brush, conifer reproduction, open sage and juniper (FM 2, 6, 9)	Typically produces a flame length of 5 to 8 feet; a wildfire that exhibits sporadic spotting, torching, or crowning, and which results in a burned area that can normally be entered within one hour. Mixed severity.
3	Tall, flammable grasses, Heavy/flammable brush, timber/slash (FM 3, 4, 10-13)	Typically produces a flame length of over 8 feet; a wildfire that exhibits frequent spotting, torching, or crowning, and which results in a burned area that normally cannot be entered for over one hour. Stand replacement severity.

Crown fuel hazard was derived from the vegetation conditions of the landscape and took into consideration the canopy closure and structure.

Total Vegetation Hazard was determined by combining the points assigned to the crown fuel hazard and points assigned to the surface fuel hazard. The total possible value for vegetation hazard is ten.

<u>Crown Fuel Group</u>	<u>Value</u>
Low	1
Moderate	3
High	5

Historical notes have been kept for the GIS processes used and are archived at the Union County Emergency Services Office or the Oregon Department of Forestry Office in La Grande.

Topographic Hazard

Slope and aspect affect both the intensity and rate of wildfire spread. The topography hazard factor was derived from the Digital Elevation Model for Union County; values were assigned to the combination of slope and aspect working together on the landscape.

<u>Slope</u>	<u>Value</u>
0 – 25%	1
25 – 50%	2
> 50%	3
<u>Aspect</u>	<u>Value</u>
N, NE	1
NW, E	2
W, SE	3
S, SW, Flat	4

Total Topographic Hazard was determined by combining the points assigned to the slope hazard and points assigned to the aspect hazard. The total possible value for topographic hazard is seven.

Overall Hazard

Fire occurrence, the total topographic hazard rating, and the total fuel hazard rating were combined using *Spatial Analyst* (an ESRI product) to determine an overall hazard display of Union County. The maximum points assigned for fire occurrence was 3, the maximum points assigned for total topographic hazard was 7, and the maximum points assigned for total vegetation hazard was 10. The breakpoint used to determine high hazard was 10.5. Hence, anything with 10.5 or higher was considered high hazard, and anything lower was considered moderate / low hazard.

Weather Hazard

In Union County, weather patterns produce summer lightning storms that start many fires. These multiple starts put a strain on the wildland firefighting resources. Add the drying of fuels over time and low relative humidity, and the probability for large fires has increased. The number of days per season that forest fuels are capable of producing a significant fire event is important to consider. Oregon Department of Forestry has already determined that Eastern Oregon is at the highest hazard rating for weather. This value was assigned by an analysis of daily wildfire danger rating indices in each regulated use area of the state. This value is constant across Union County; however weather patterns vary due to the mountainous landscape within the county. The high hazard value was offset with annual rainfall during the scoring of wildland-urban interface areas in order to effectively prioritize each WUI, as well as reflect a true assessment of the local weather hazard.

Overall Fire Protection Capability Hazards

In Union County, local fire departments determined their overall capability for responding to a fire in their district. Each district submitted information to the Oregon Department of Forestry that included an inventory of roads that prohibit access to structures, water shortages, unprotected locations, structure density, building materials and defensible space around structures, and any other issues that pose a hazard to the fire district.

The WUI boundaries were drawn to capture the overall limitations of each fire protection district, fuel hazard, communities at risk and values-at-risk. Logical anchor points on the landscape were used to designate WUI boundaries, including natural fuel breaks, ridge lines, roads, and 6th field hydrological unit code (HUC) boundaries (identified using the GIS layer available in the Oregon Department of Forestry GIS library).

Values at Risk

The economic viability of Union County would suffer if a large wildfire eliminated valuable timber and destroyed recreational areas that draw tourists to the county. Citizens of Union County consistently identified the beauty and scenery as being of value. From anywhere within the Grande Ronde Valley of Union County, the forested landscape is within the viewshed of a community. A large wildfire could significantly affect that scenic value. Values-at-risk are subjective based on community input; however, it was possible to use the input in the scoring and prioritization of each WUI area. For more detailed information regarding values-at-risk derived from community input, please review the Values-At-Risk Questionnaire results found in Appendix B of this plan.

Using the Hazard Assessment to Score and Prioritize WUI Areas

The hazard assessment information discussed previously was used to develop a scoring matrix that would provide results to be used for prioritizing the WUI areas within Union County. The weighting of each element of the matrix was based on input received from the community, steering committee, and statewide assessment information. The matrix is not statistically valid as the plan was designed to be community-driven. Community and steering committee input was captured in its raw form. The list of priorities helped the steering committee build a comprehensive inventory of projects and action items that could be implemented to protect the WUI areas from large wildfire. The categories for the scoring matrix are:

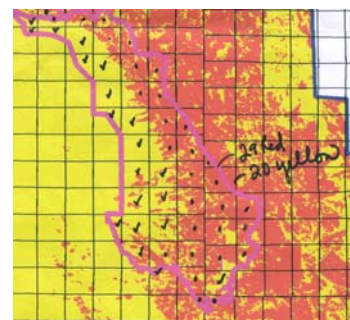
- ✓ Wildfire Hazard
- ✓ Overall Fire Protection Capability/Structural Vulnerability
- ✓ Values Protected
- ✓ Weather
- ✓ Opportunity for Fuels Reduction

A total of 150 points were established for the overall high score. Each of the categories was a percentage of that score. In Section VII of this document, the scoring matrix lists the scores received for each WUI, with a total of fifteen WUI's existing in Union County.

Category 1: Wildfire Hazard

Sixty points were possible for the category of wildfire hazard, yielding 40% of the overall total score. The wildfire hazard was based on the original layout done when total hazard was derived from ignition risk, topography, and fuels (see *Overall Hazard* in the *Methodology* section above.)

Cove Hazard Scoring



A simple GIS technique, known as majority rules, was used to determine whether a WUI area had a low/moderate wildfire hazard rating or a high hazard rating. Sections from the public land survey (PLS) layer were counted within a WUI. Each section was analyzed based on the amount of color it had that represented high (red) or low/moderate (yellow). The dominating color of that section determined whether a section should be counted as "red" or "yellow." Then the number of "reds" and the number of "yellows" were tallied. If an area had more "yellow" sections than "red" sections, it received a score of 30. If an area had more "red" sections than "yellow" sections, it received a score of 60.

Category 2: Overall Fire Protection Capability/Structural Vulnerability

This category of the scoring matrix consists of six areas to consider, with this category yielding 30% of the overall score. Different ranges represented low, moderate, and high risk. A score of 0-15 gave the WUI a low hazard rating; a score of 16-30 gave the WUI a moderate hazard rating; and a score of 31-45 gave the WUI a high hazard rating.

The six areas for consideration when assigning a score to Overall Fire Protection Capability/Structural Vulnerability are:

- ✓ Homesite Density
- ✓ Ignition Risk Factors
- ✓ Type Of Organized Fire Response
- ✓ Structural Fire Agency Response Time
- ✓ Level Of Community Preparedness
- ✓ Structural Vulnerability Factors

Category 3: Values Protected

When scoring a WUI for values protected, a list was comprised of the values that the public noted in the questionnaire and from information gleaned from the public meetings. Also, municipal watershed and major transmission lines and corridors were added as those values are part of the legislation that was put forth under the Healthy Forest Restoration Act (HFRA). This category was 15% of the total score, with the possibility of receiving a high score of 22.5 points. If a WUI had 0-3 of those values present, then a score of 7.5 was received; 3-5 present, then a score of 15 was received; and, 5 or more present, then a score of 22.5 was received. The scoring matrix in the appendix lists the values considered.

Category 4: Weather Factor

It was already mentioned in the *Methodology* section above that northeastern Oregon is considered to have a high hazard rating for weather. However, it was decided that the

high hazard rating should be offset with annual rainfall in order to reflect the unique weather patterns across Union County. This category is 10% of the overall total score, with 15 points being the most a WUI could receive for this category. If an area receives 25" or more annually, then a score of 5 was assigned. If an area receives 13-24" annually, then a score of 10 was assigned; and, if an area receives 12" or less annually, then a score of 15 was assigned. (Note: The layer used to determine annual rainfall came from the Oregon Department of Forestry GIS library).

Cove Annual Rainfall

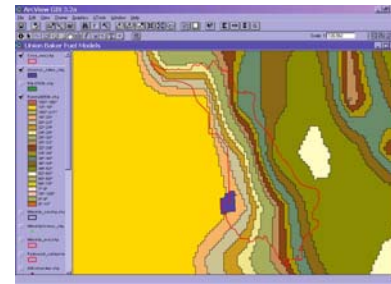


Table 5. Individual WUI Score Sheet

Score Sheet for Wildland Urban Interface Area at Risk	
1) Wildfire Hazard Rating (Ignition Risk, Topography, Fuels) = 40% of score Low/Moderate = Score of 30 High = Score of 60	Score: _____
2) Overall Fire Protection Capability / Structural Vulnerability Rating = 30% of score Low Risk: Score 0 - 15 Moderate Risk: Score 16 - 30 High Risk: 31 - 45	Score: _____
3) Values At Risk = 15% of score Low = Score of 7.5 Moderate = Score of 15 High = Score of 22.5	Score: _____
4) Weather Factor (High Hazard and Low Precipitation) = 10% of score Low = Score of 5 (25+" annually) Moderate = Score of 10 (13-24" annually) High = Score of 15 (0-12" annually)	Score: _____
5) Opportunity for Fuels Reduction Projects = 5% of score Yes for Private; Yes for Federal/Other = 7.5 Yes for one; No for one = 5.0 No for both = 2.5	Score: _____
Total: _____	

**Category 5:
 Opportunity for Fuels
 Reduction Projects**

To fully protect WUI areas from the risk of large wildfire, some level of fuels treatment will need to be conducted. Hence, this category was 5% of the overall total score (a high score of 7.5 is possible). If there was active fuels treatment taking place in a WUI or private landowners had expressed an interest in conducting a fuels treatment project and there was an adjacent planned or completed project on federal land, then the WUI received a score of 7.5. If there was a "yes" for one and a "no" for the other (with the same criteria as mentioned above), then the

WUI received a 5. If there wasn't any treatment being done or planned for the future and no interest on behalf of private landowners, then the WUI received a score of 2.5.

Prioritization

A list of priorities was established from the scores assigned to each WUI. The WUI with the highest score is at the top of the list and the WUI with the lowest score is at the bottom of the list. Projects and Action Items for each WUI were developed based on the reasons a WUI received a particular score in a particular category of the overall scoring matrix.

¹ This document was authored by Angie Johnson, Oregon Department of Forestry-Northeast Oregon District, and edited by Trish Wallace, US Forest Service-Wallowa-Whitman office. The hazard assessment was conducted by both Trish and Angie.

² *Expanded Fire Condition Class Definition Table*. Available at <http://www.frcc.gov>.

VII. Wildland-Urban Interface Areas

Wildland-Urban Interface Areas

Sixteen WUI's were identified which roughly correspond with rural residential areas in Union County. The Stubblefield Mountain and Beaver Creek Watershed areas tied for the sixth riskiest area. Table 6 identifies them in order of potential risk, with the highest risk listed first.

Each of the column headings corresponds with each category of the risk assessment. The key for Table 6 is:

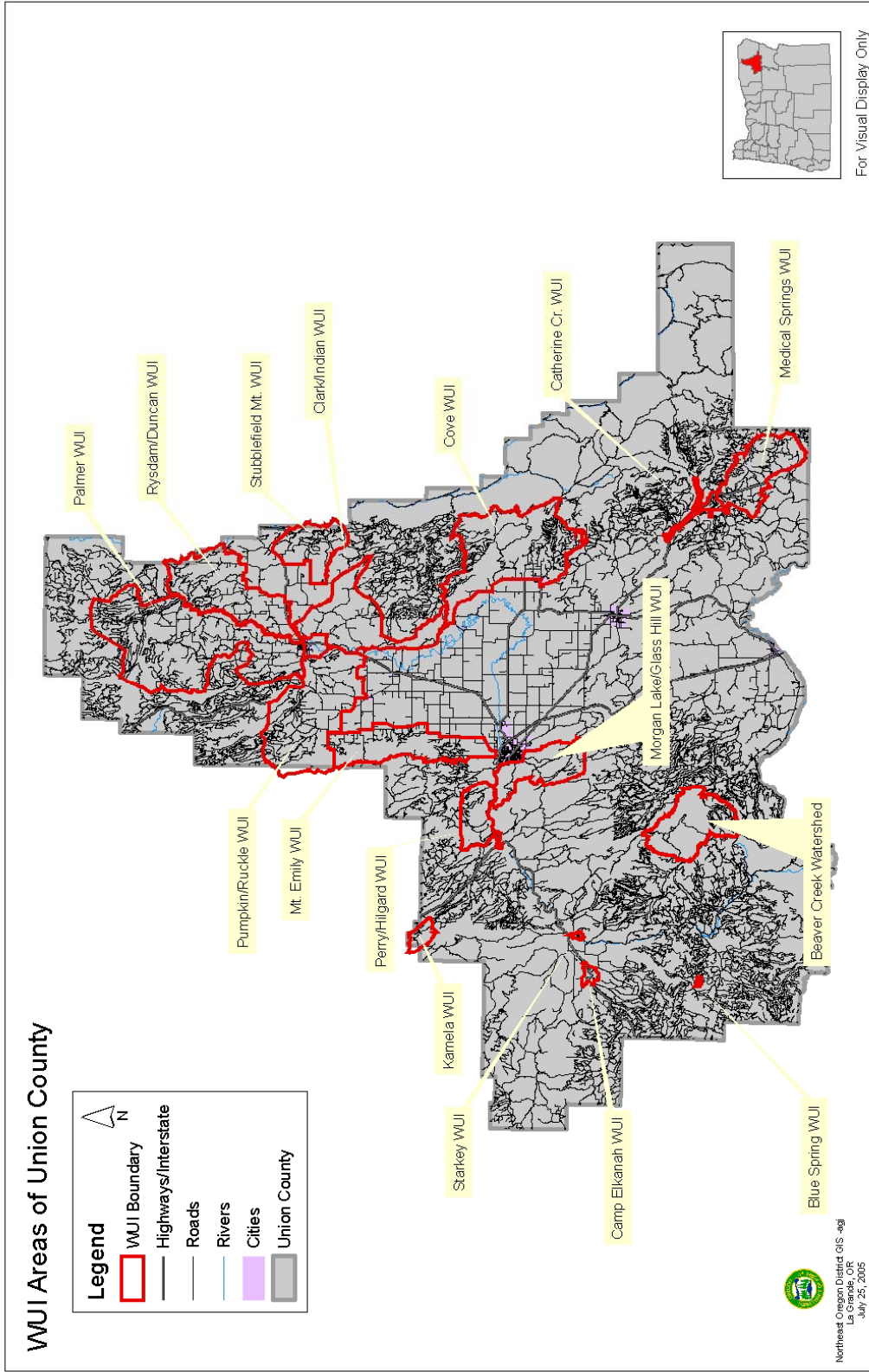
1. Wildfire Hazard = Fire occurrence, combined with vegetation and topography.
2. OFP/SV = Overall fire protection combined with structural vulnerability.
3. Values at Risk = Values at risk from wildfire as determined by VAR questionnaire.
4. Wx Haz. = Weather hazard.
5. Opp. FR = Opportunity for fuels reduction partnerships or projects.

Individual Interface Information

Each of the sixteen WUIs has a layout showing the boundaries and overall hazard of the region. Pertinent information about the interface areas is listed alongside the map. Risk assessment and project information is also listed here.

Table 6. Wildland-Urban Interface Ranking Summary

WUI Area	Wildfire Hazard	OPF / SVR	Values at Risk	Weather Hazard	Opp. FR	Total Score	Rank
	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>		
<i>Morgan</i>	60/H	37/H	22.5/H	10/M	5/M	134.5/150	#1
<i>Cove</i>	60/H	33/H	22.5/H	10/M	7.5/H	133/150	#2
<i>Mt. Emily</i>	60/H	35/H	22.5/H	5/L	7.5/H	130/150	#3
<i>Palmer</i>	60/H	29/M	22.5/H	10/M	7.5/M	129/150	#4
<i>Perry/Hilgard</i>	60/H	33/H	22.5/H	5/L	7.5/H	128/150	#5
<i>Stubblefield</i>	60/H	37/H	15/M	5/L	5/M	122/150	#6
<i>Beaver Creek Watershed</i>	60/H	32/H	22.5/H	5/L	2.5/L	122/150	#6
<i>Catherine Creek</i>	60/H	26/M	22.5/H	5/L	7.5/H	121/150	#7
<i>Blue Springs</i>	60/H	35/H	15/M	5/L	5/M	120/150	#8
<i>Medical Springs</i>	60/H	24/M	22.5/H	5/L	7.5/H	119/150	#9
<i>Kamela</i>	60/H	22/M	15/M	5/L	7.5/H	109.5/150	#10
<i>Pumpkin Ridge /Ruckle</i>	30/L-M	34/H	22.5/H	10/M	7.5/H	104/150	#11
<i>Elkanah</i>	30/L-M	39/H	15/M	10/M	7.5/H	101.5/150	#12
<i>Clark</i>	30/L-M	30/M	22.5/H	10/M	5/M	97.5/150	#13
<i>Rysdam</i>	30/L-M	29/M	22.5/H	10/M	5/M	96.5/150	#14
<i>Starkey</i>	30/L-M	33/H	15/M	10/M	7.5/H	95.5/150	#15
L = Low M = Medium H = High							



WUI Name: Morgan Lake / Looking Glass Hill

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	37	22.5	10	5	134.5	1

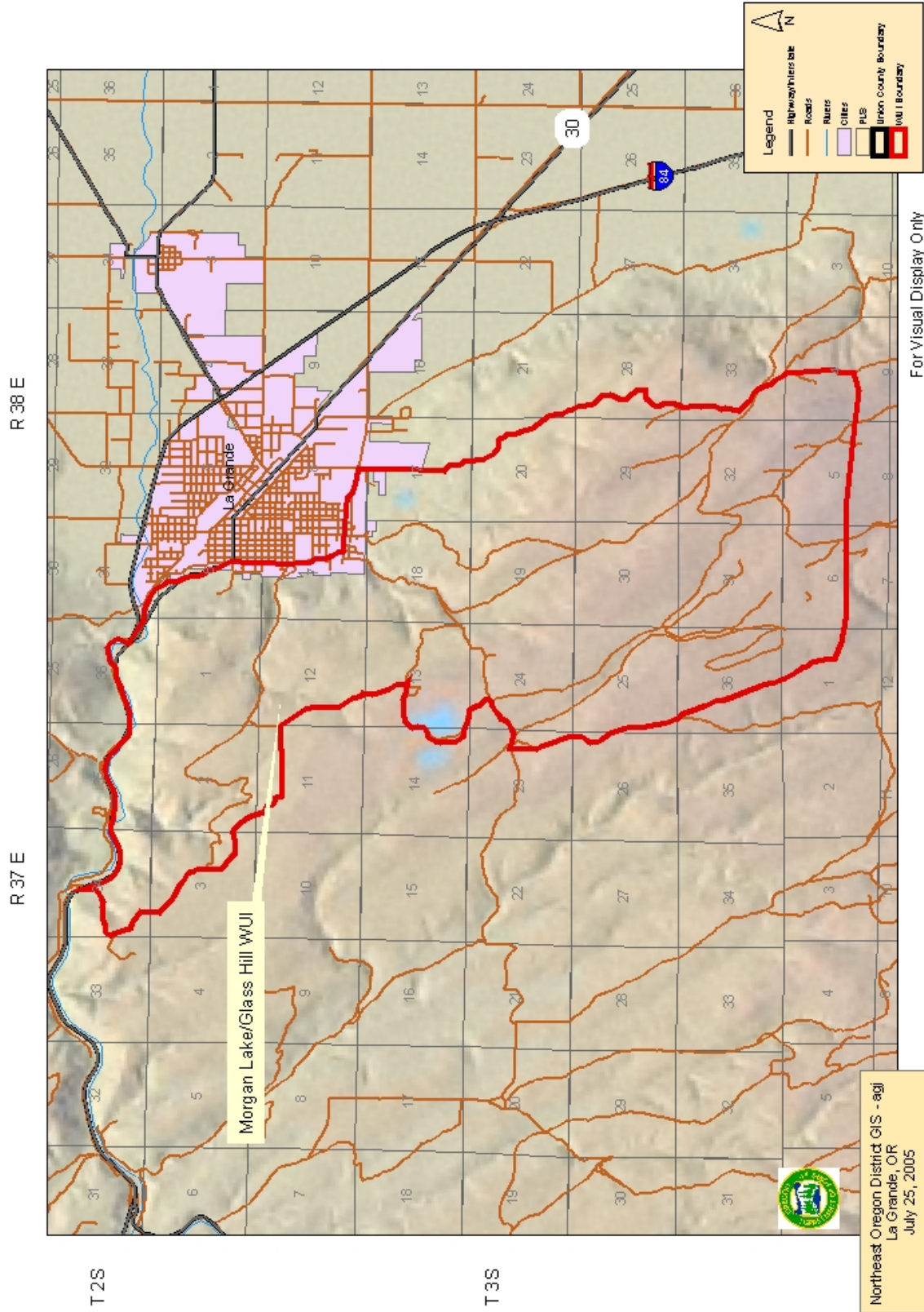
Communities at Risk: Morgan Lake, City of La Grande

Structural Fire Protection Agency: La Grande Fire Department protects to the City Limit; otherwise it is wildland fire protection only.

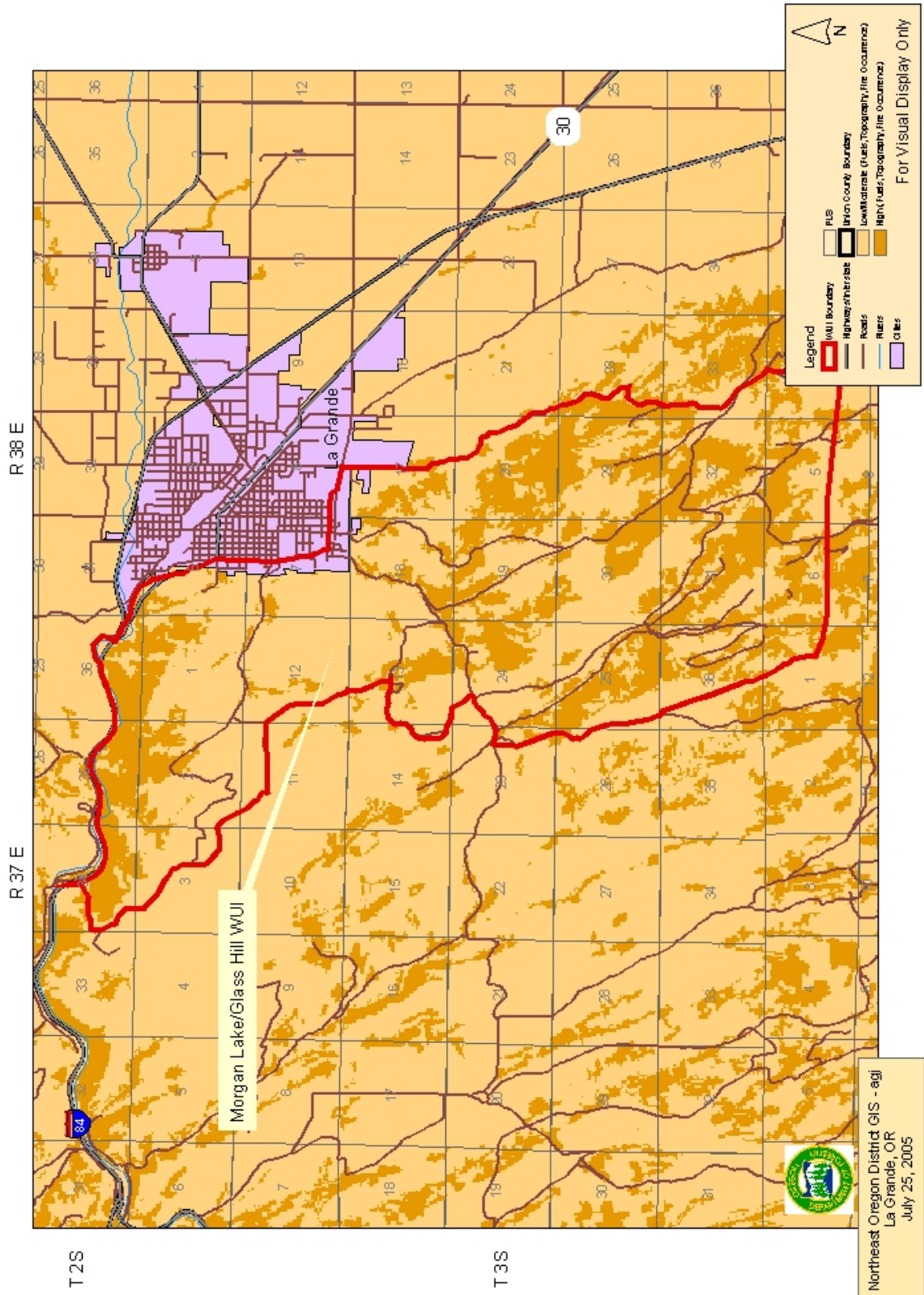
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Morgan Lake Private Lands	• 1-2 years	• ODF; Landowners, LGFD; LGRFPD
Prepare Morgan Lake Evacuation Plan	• 1-2 years	• UCES; UCPW; UCSO
Reconstruct Morgan Lake Road	• 3 + years	• UCPW; ODOT
Establish RFPD for Morgan Lake	• 3 + years	• Landowners; UC; Structural Agencies

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Cove

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	33	22.5	10	7.5	133	2

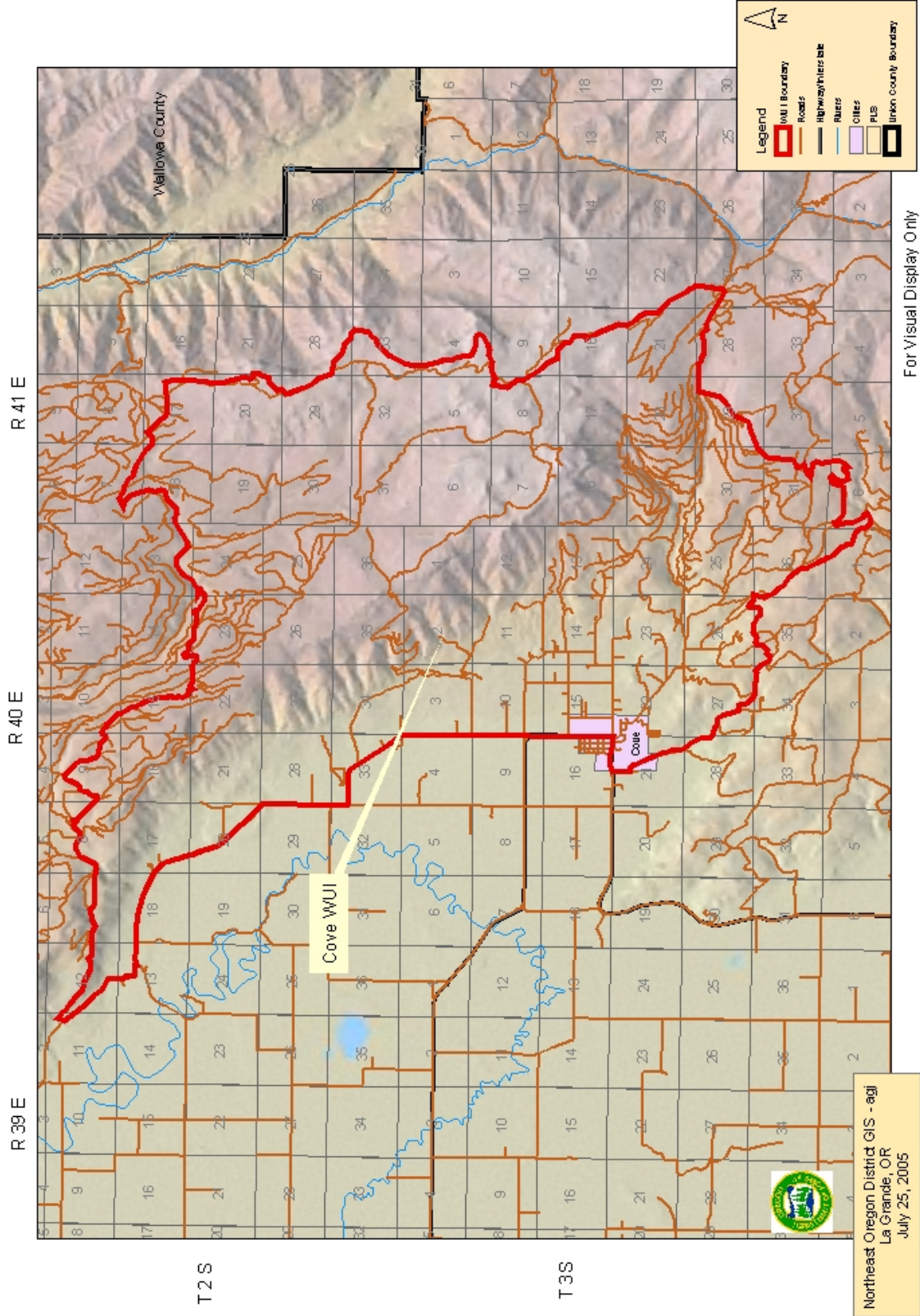
Communities at Risk: City of Cove, Lower Cove, High Valley and adjacent rural residential areas.

Structural Fire Protection Agency: Cove Rural Fire Protection District.

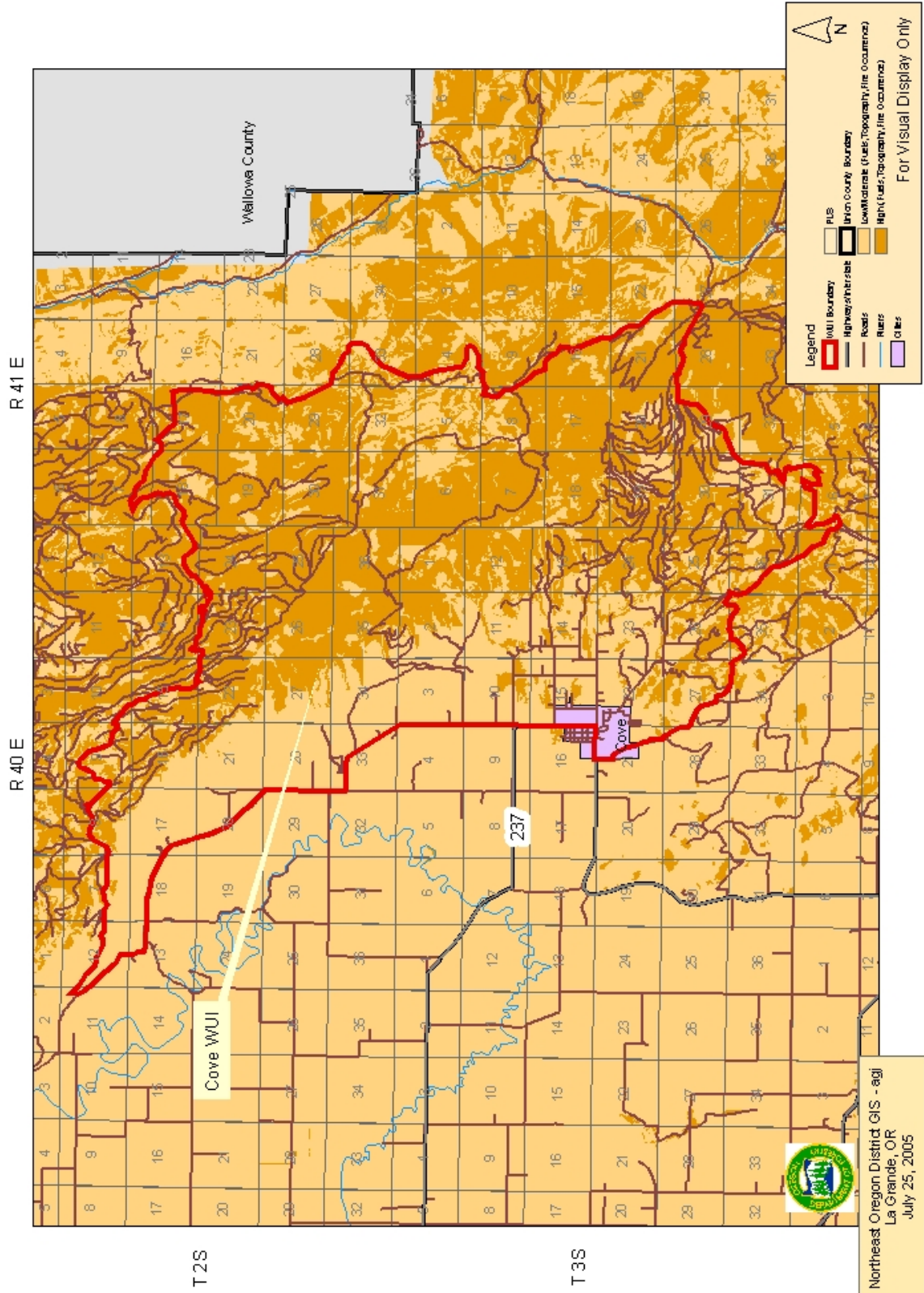
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Cove Treatment	• 3 + years	• USFS; ODF; Landowners, Cove RFPD; UC Forest Restoration Board; Industrial Forestland Owners
Cove Private Lands	• 1-2 years	• ODF; Landowners; Cove RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Mt. Emily

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	35	22.5	5	7.5	130	3

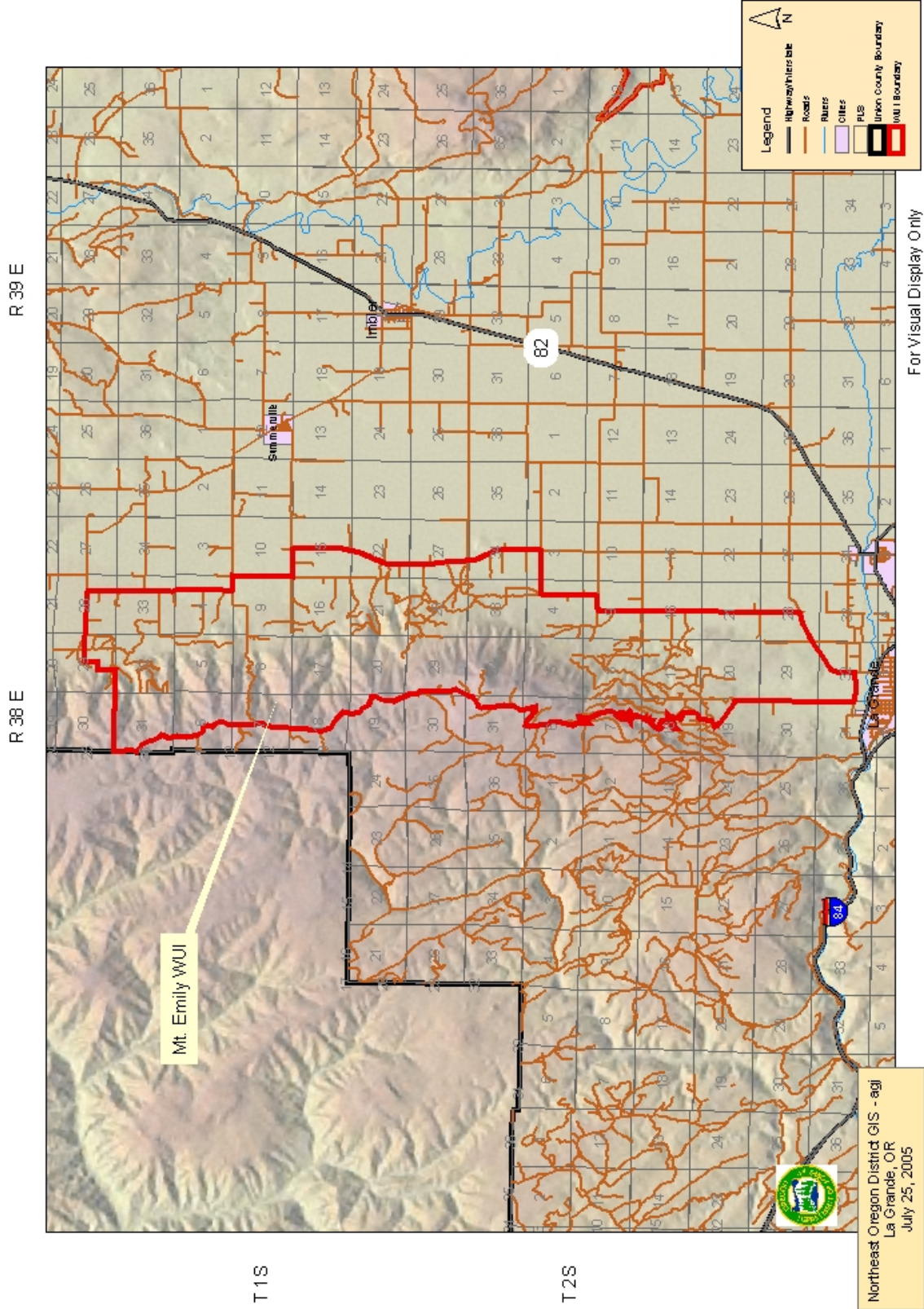
Communities at Risk: Mt. Emily, Owsley Canyon and adjacent rural residential areas.

Structural Fire Protection Agency: La Grande and Imbler Rural Fire Protection Districts.

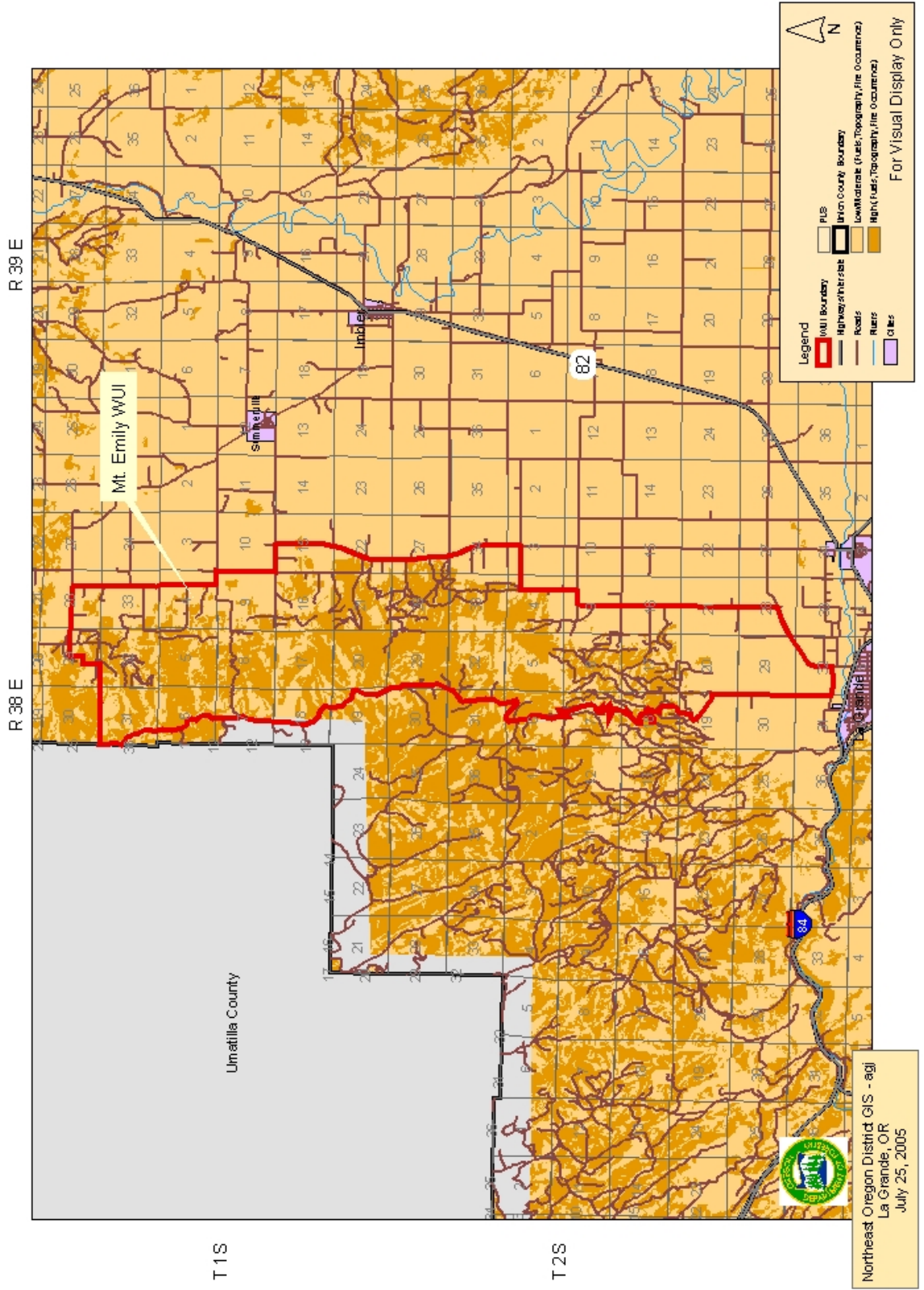
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Mt. Emily Treatment	• 3 + years	• USFS; ODF; Private & Industrial Landowners; LG & Imbler RFPDs; UC Forest Restoration Board
Mt. Emily Private Lands	• 1-2 years	• ODF; Private & Industrial Landowners; LG & Imbler RFPDs

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Palmer Valley / Valley View

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	29	22.5	10	7.5	129	4

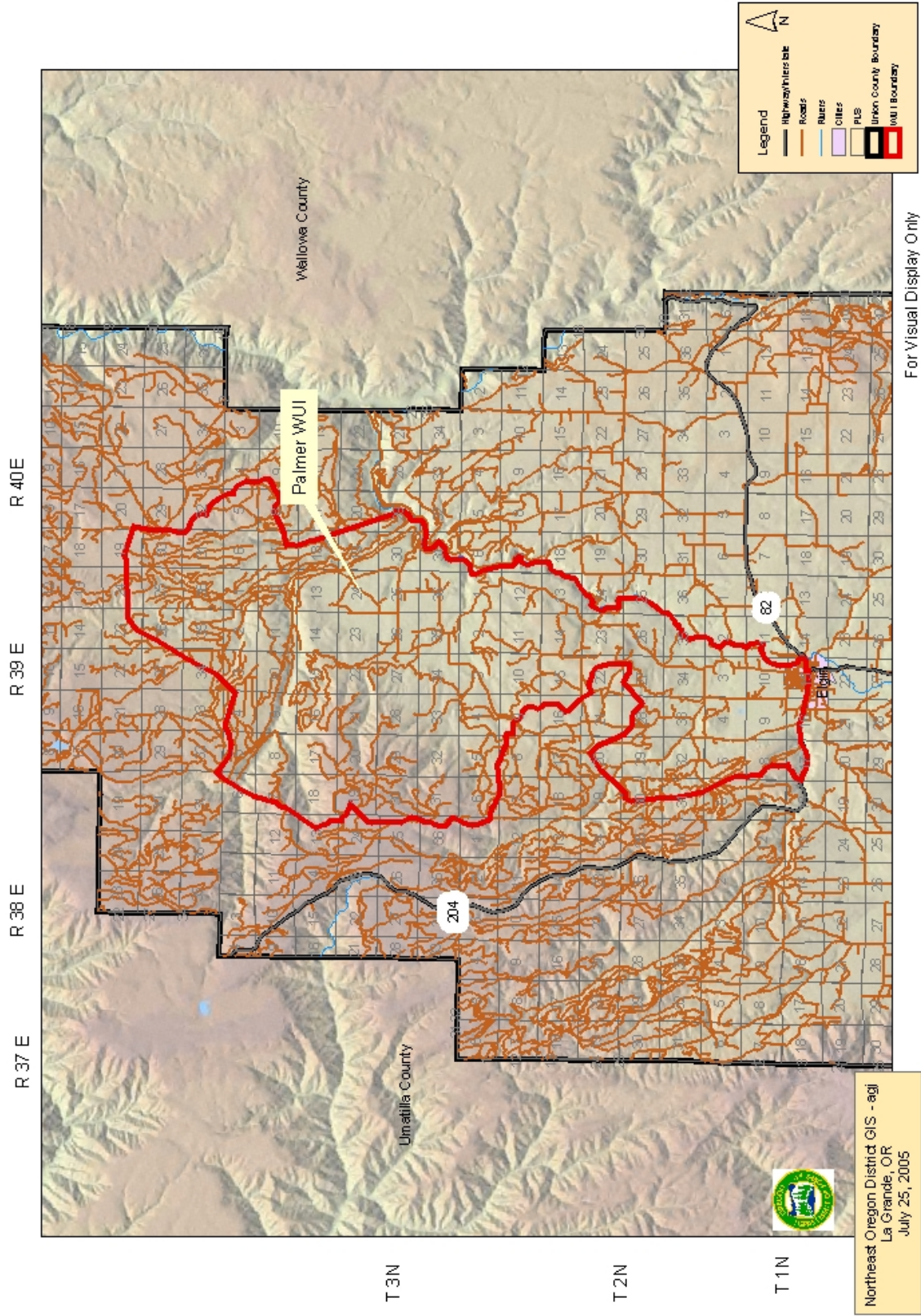
Communities at Risk: Palmer Valley, Valle View Road area, City of Elgin and adjacent rural residential areas.

Structural Fire Protection Agency: Elgin Rural Fire Protection District.

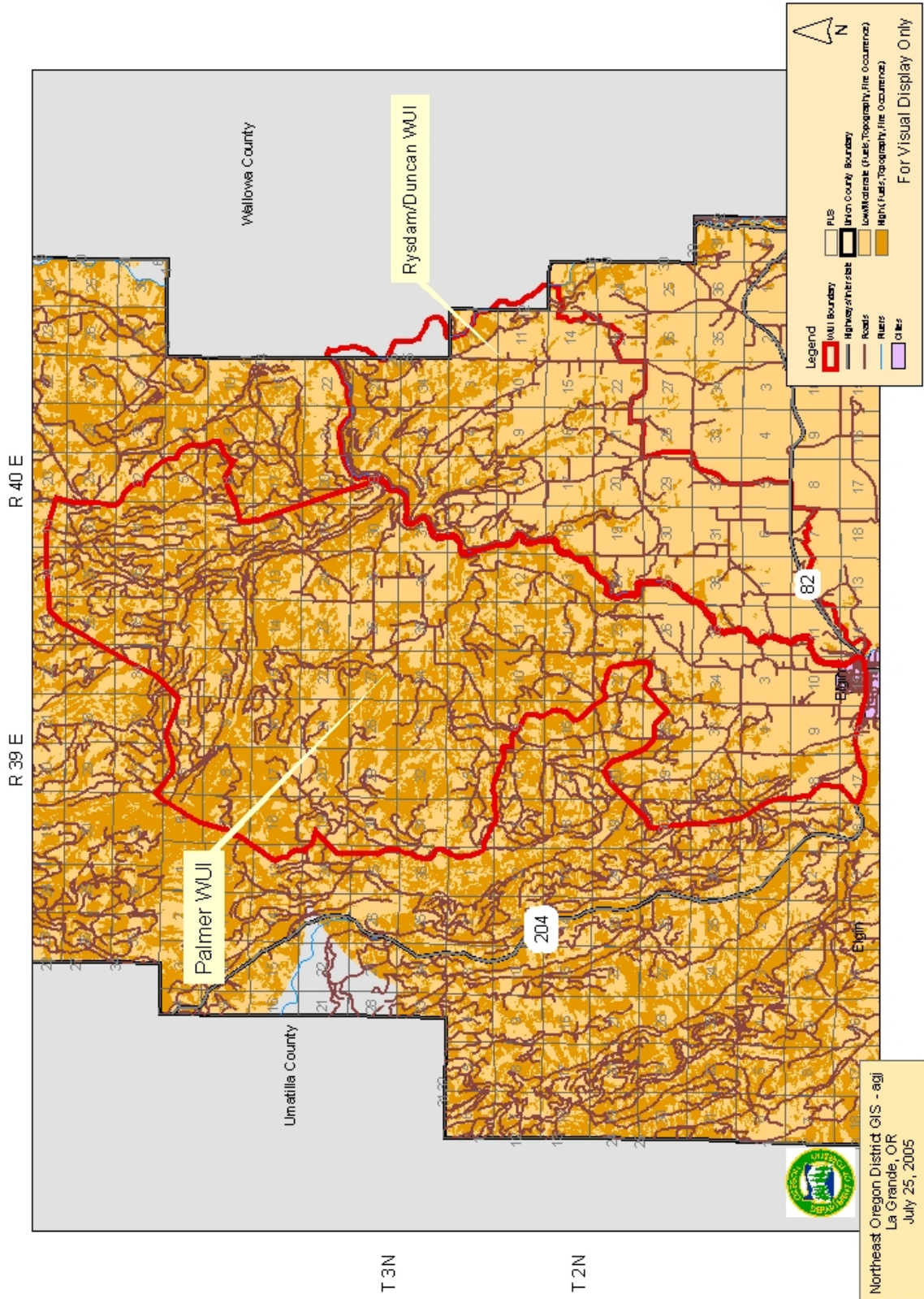
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Palmer Valley Private Lands	• 1-2 years	• ODF; Landowners; Elgin RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Perry / Hilgard

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	33	22.5	5	7.5	128	5

Communities at Risk: Upper and Lower Perry, Hilgard.

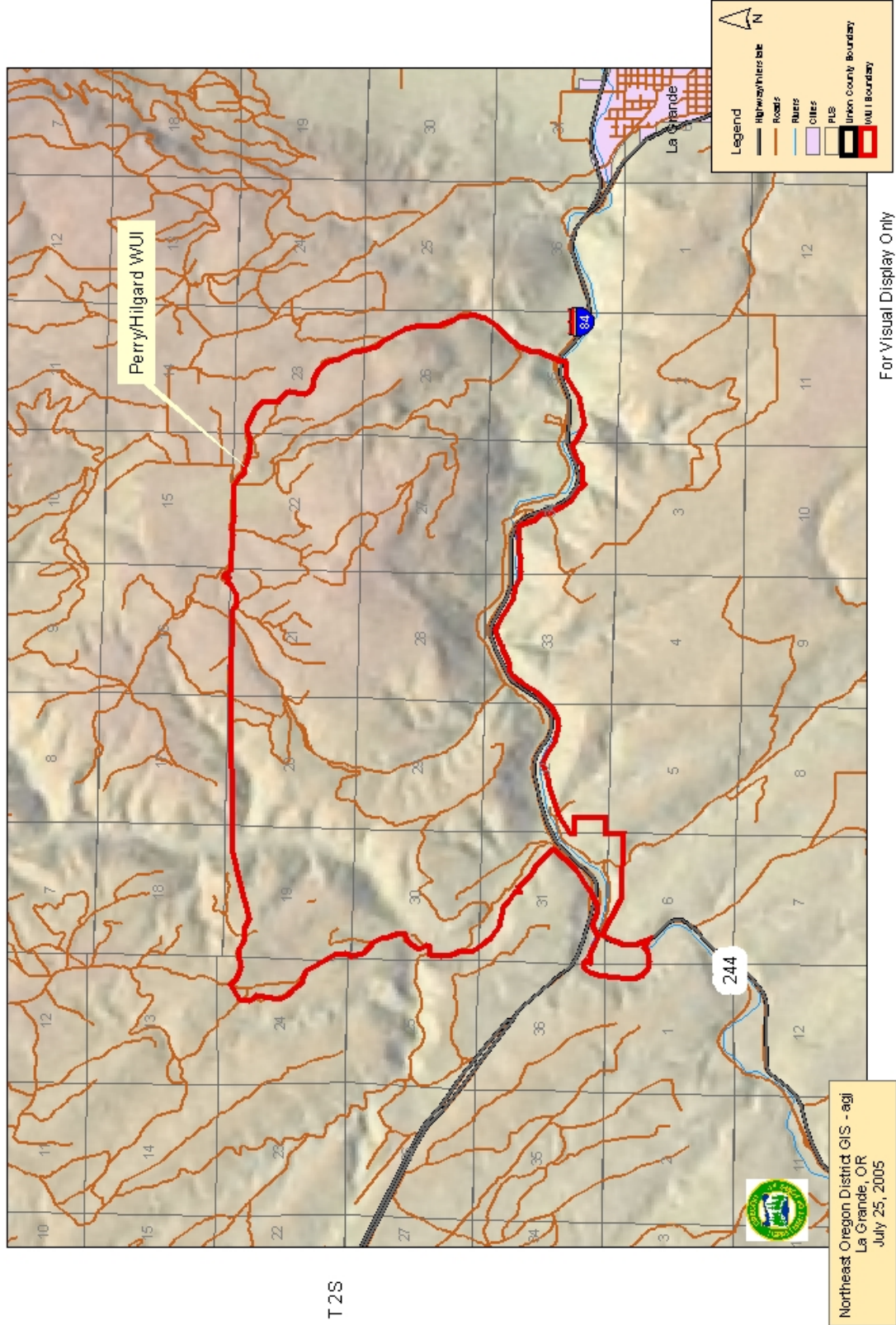
Structural Fire Protection Agency: Wildland fire protection only.

Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Establish a Perry / Hilgard RFPD	• 3 + years	• Landowners; UC; Structural Agencies
Pelican Creek Treatment	• 1-2 years	• USFS
Three Cabin Creek Treatment	• 1-2 years	• USFS

Union County WUI Boundaries (with Shaded Relief)

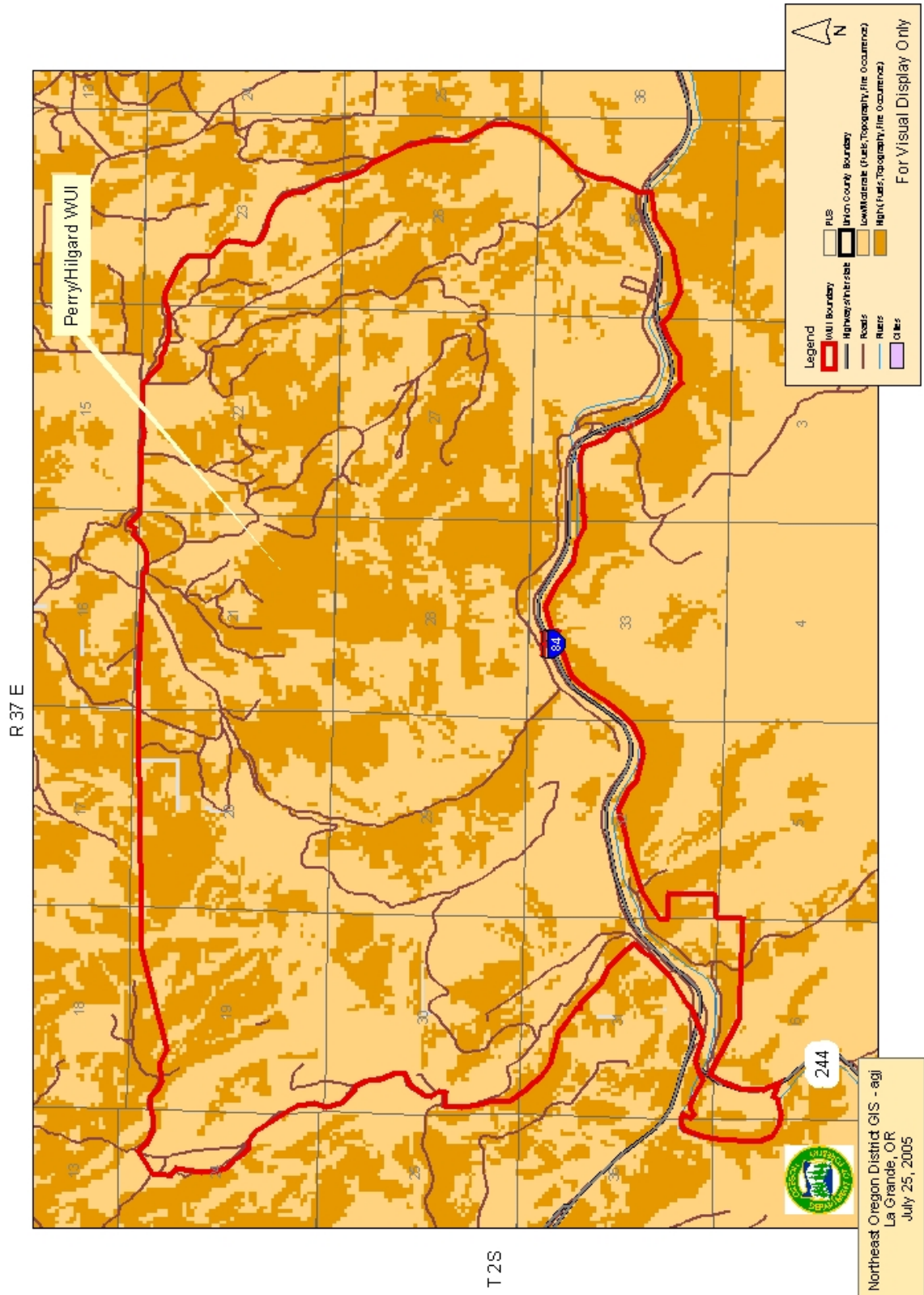
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La Grande, OR
July 25, 2005

Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Stubblefield

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	37	15	5	5	122	6

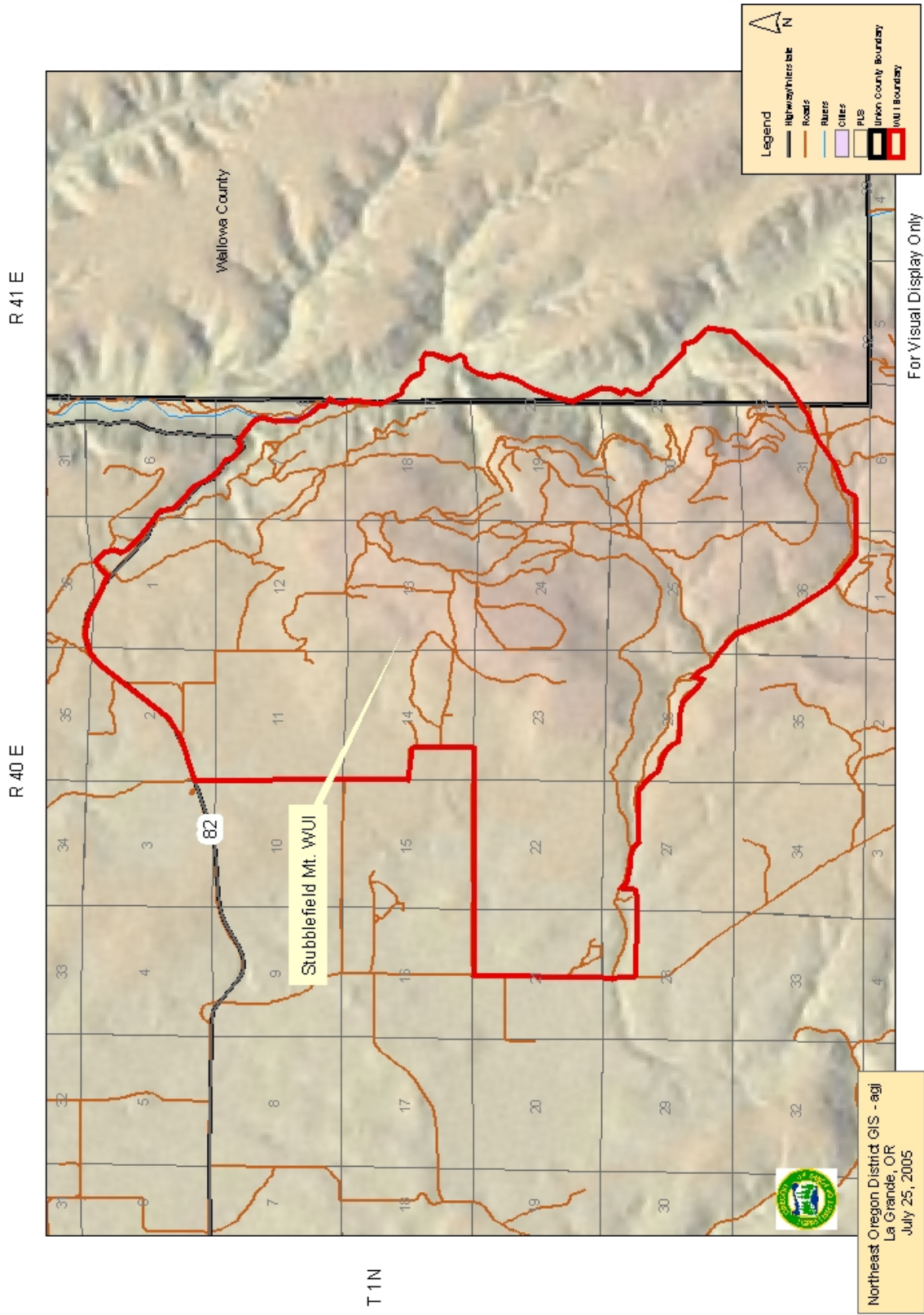
Communities at Risk: Stubblefield Mountain area.

Structural Fire Protection Agency: Wildland fire protection only.

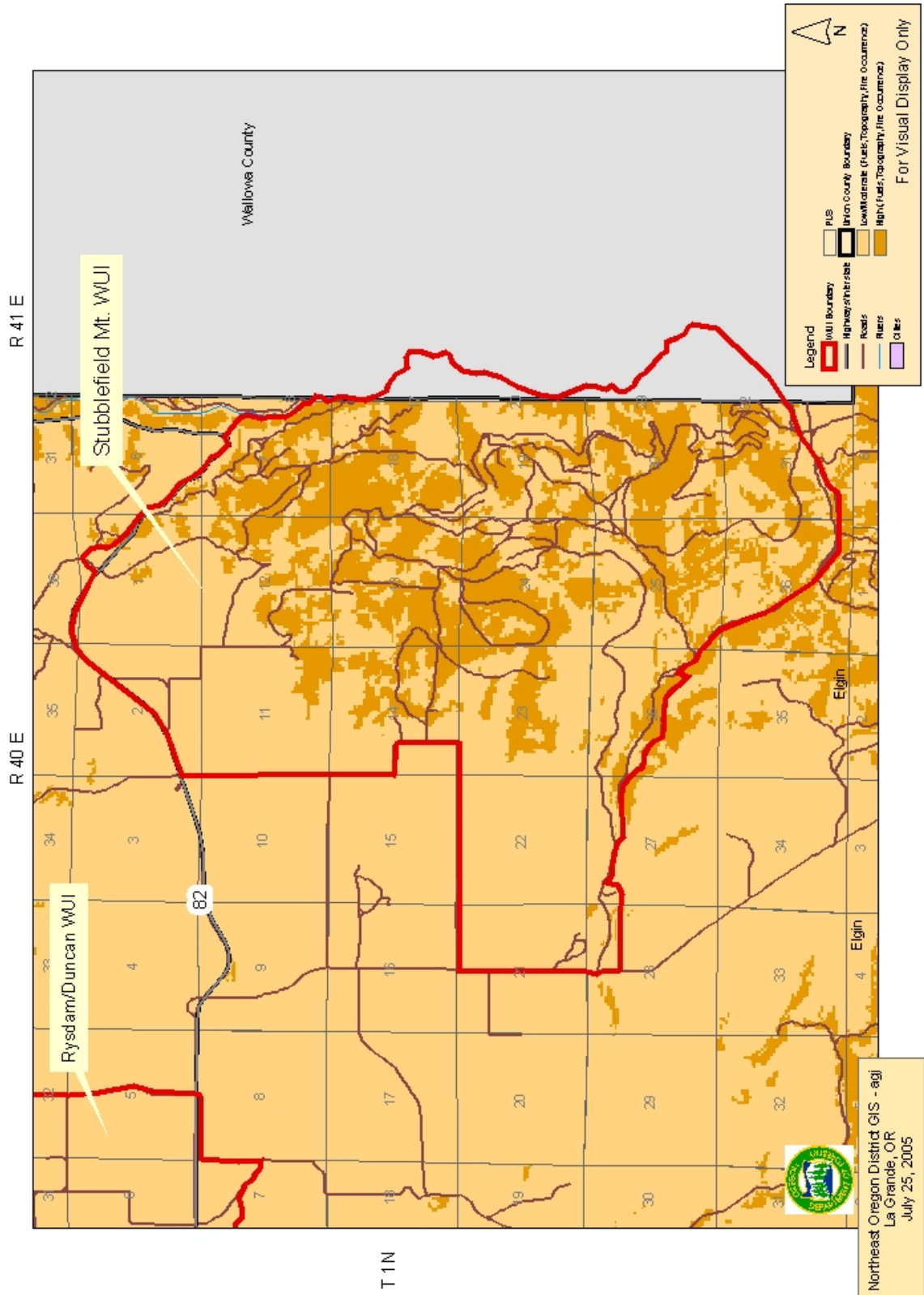
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



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 La Grande, OR
 July 25, 2005

WUI Name: Beaver Creek Watershed

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	32	22.5	5	2.5	122	6

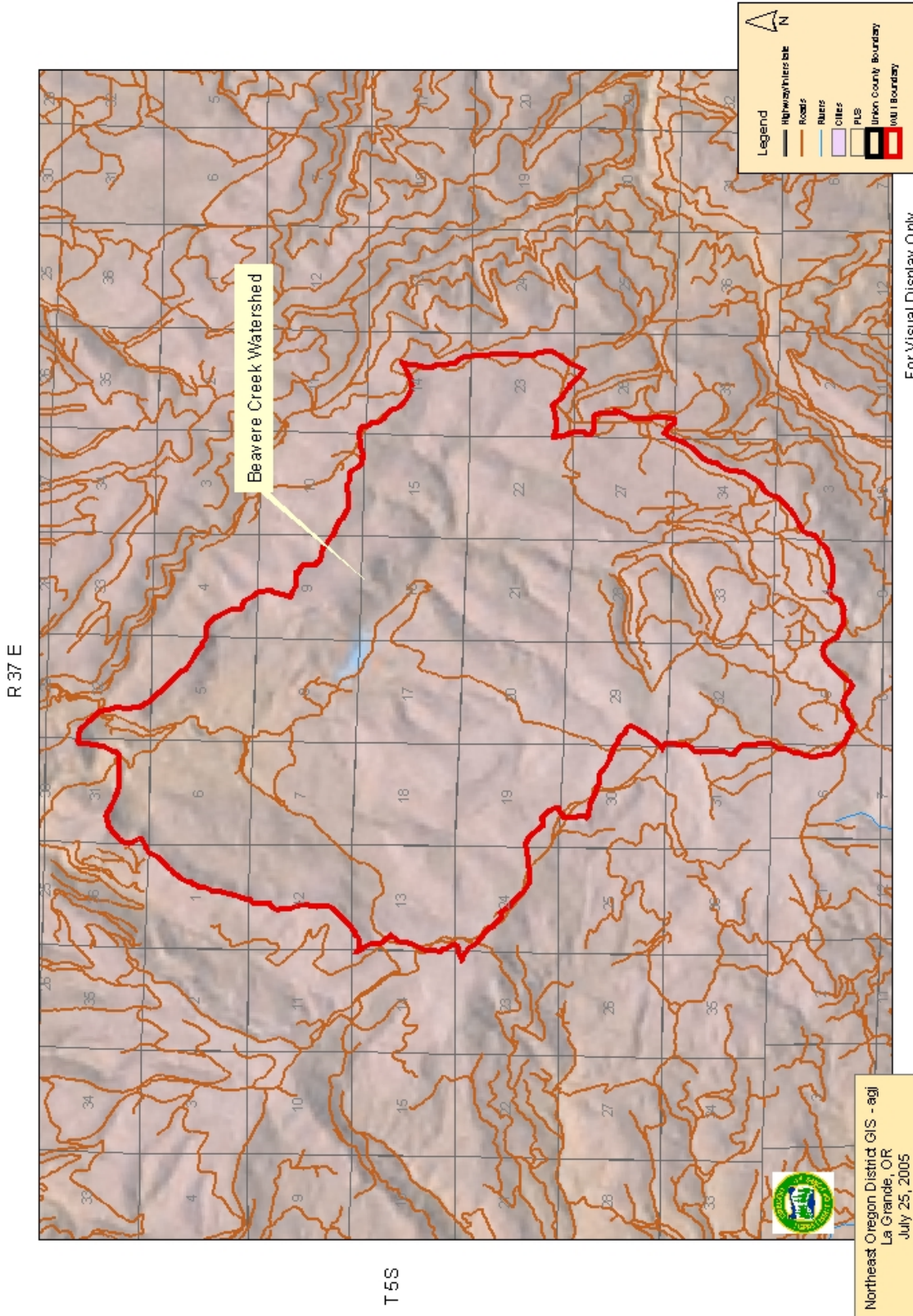
Communities at Risk: City of La Grande.

Structural Fire Protection Agency: Wildland fire protection only.

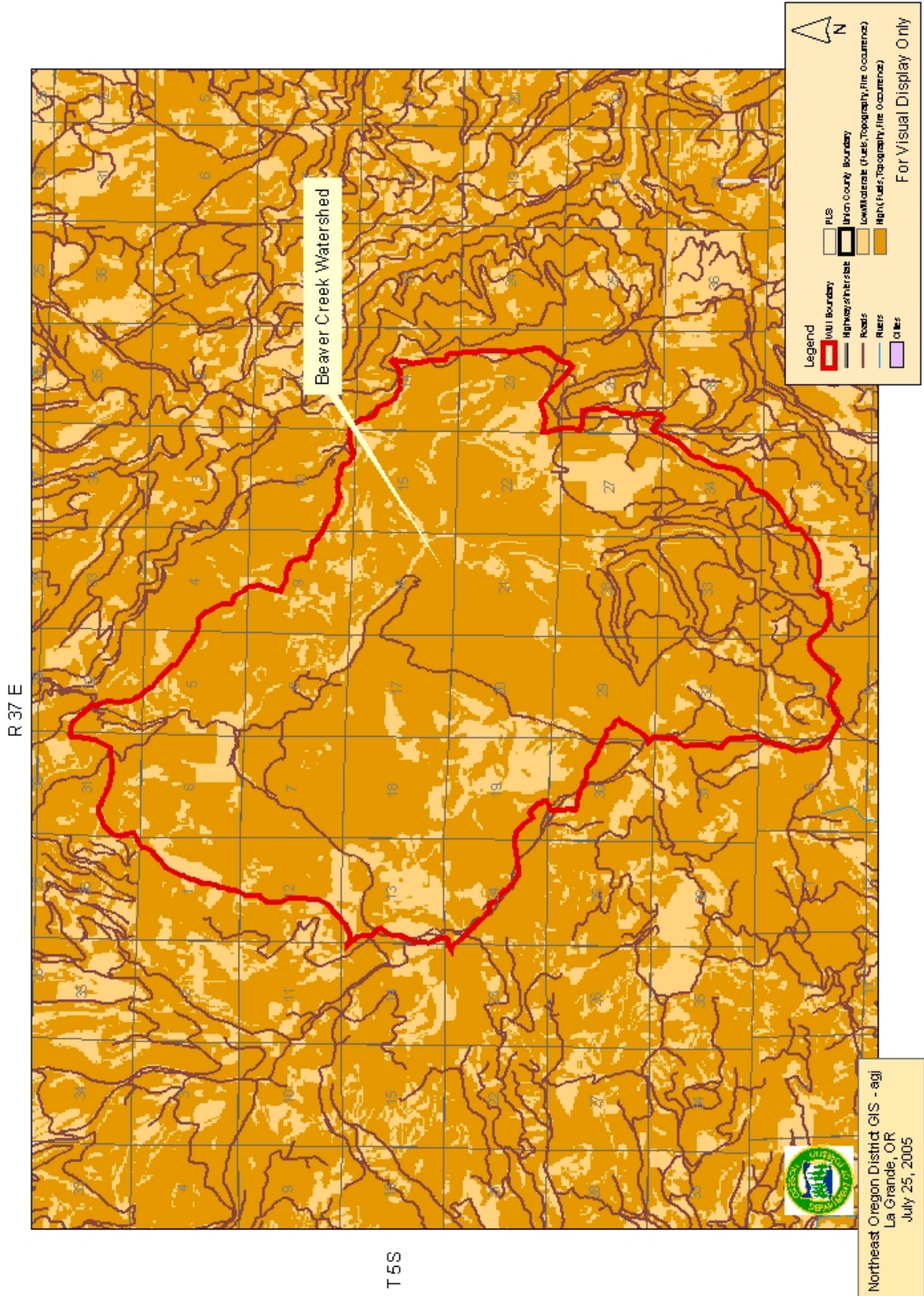
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Catherine Creek

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	26	22.5	5	7.5	121	7

Communities at Risk: Catherine Creek area.

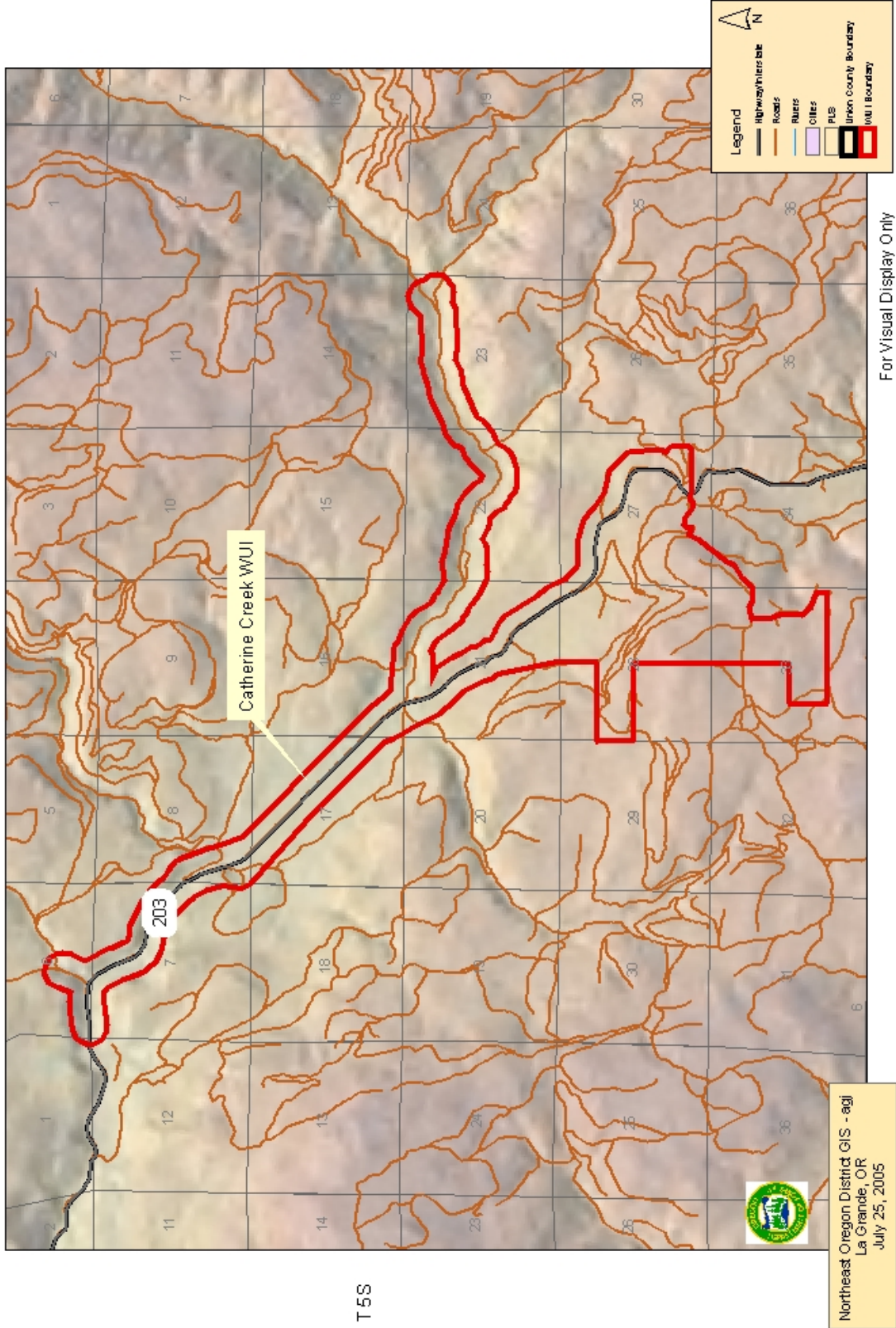
Structural Fire Protection Agency: Wildland fire protection only.

Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
South Fork Catherine Creek	• 3 + years	• USFS; ODF; Private & Industrial Landowners; Union RFPD; UC Forest Restoration Board
Catherine Creek Corridor Private Lands	• 3 + years	• ODF; Landowners; Union RFPD
Catherine Creek Corridor Mapping	• 1-2 years	• ODF; Landowners; Union RFPD

Union County WUI Boundaries (with Shaded Relief)

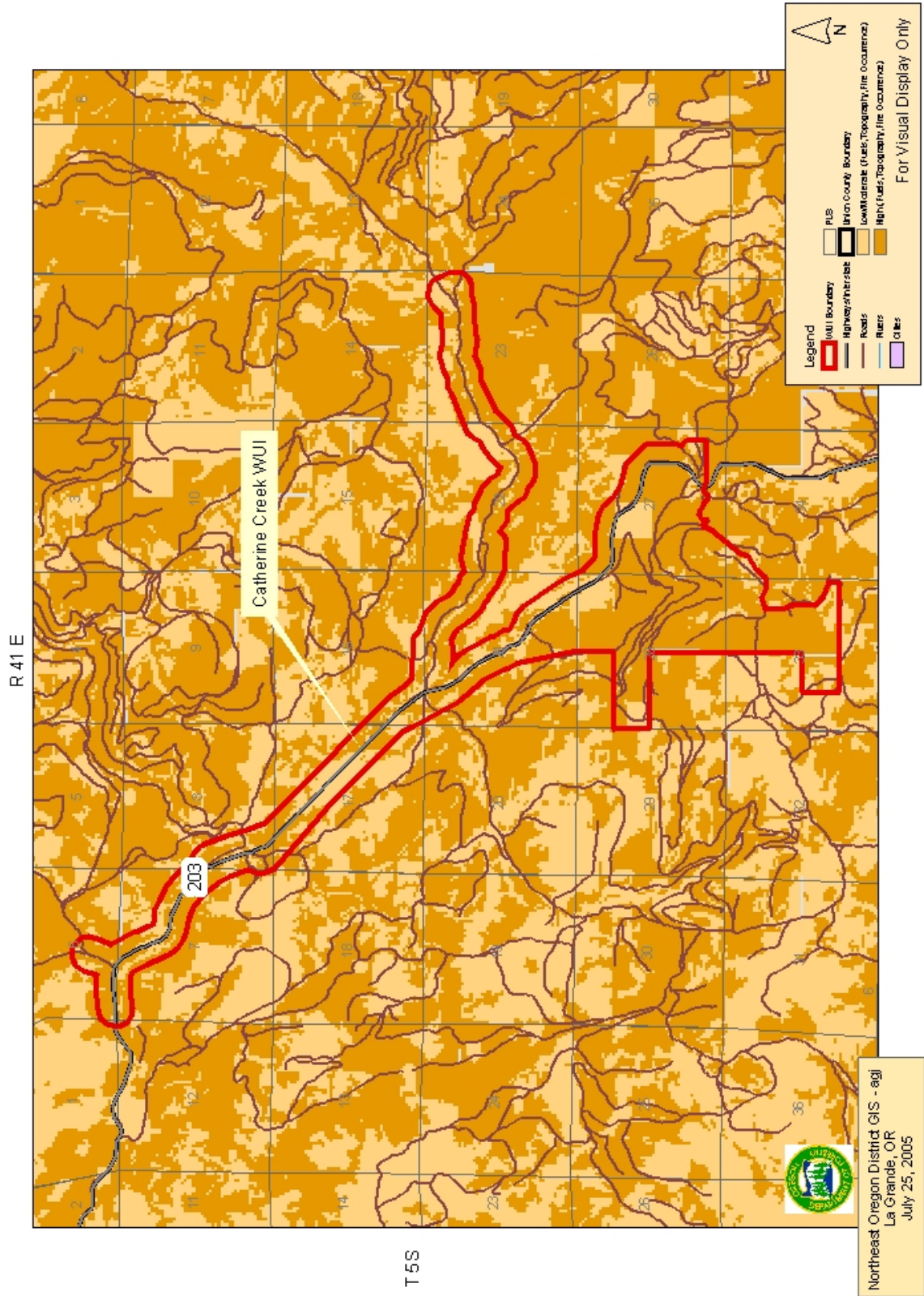
R 41 E



For Visual Display Only

T 55 S

Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Blue Springs

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	35	15	5	5	120	8

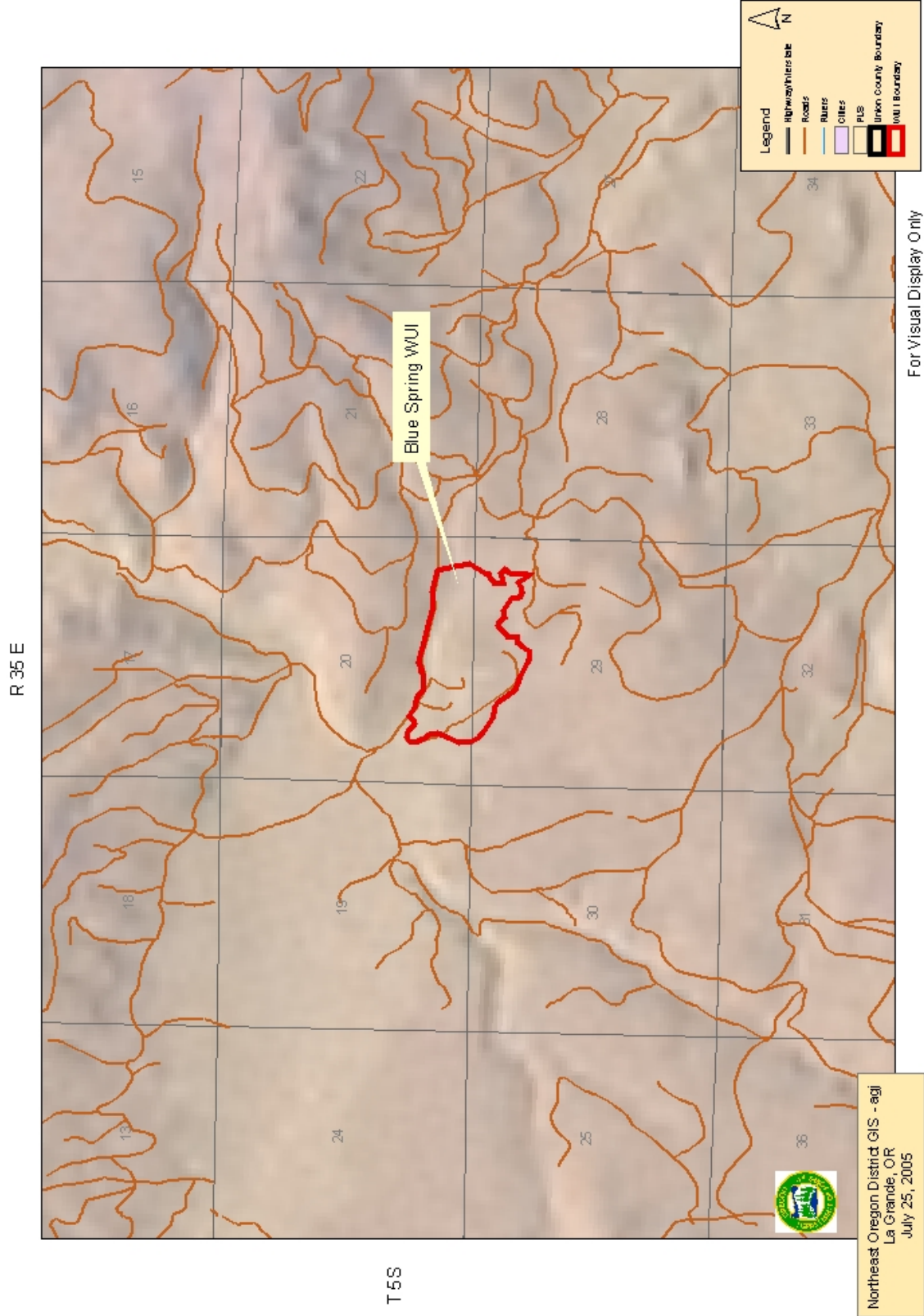
Communities at Risk: Blue Springs area.

Structural Fire Protection Agency: Wildland fire protection only.

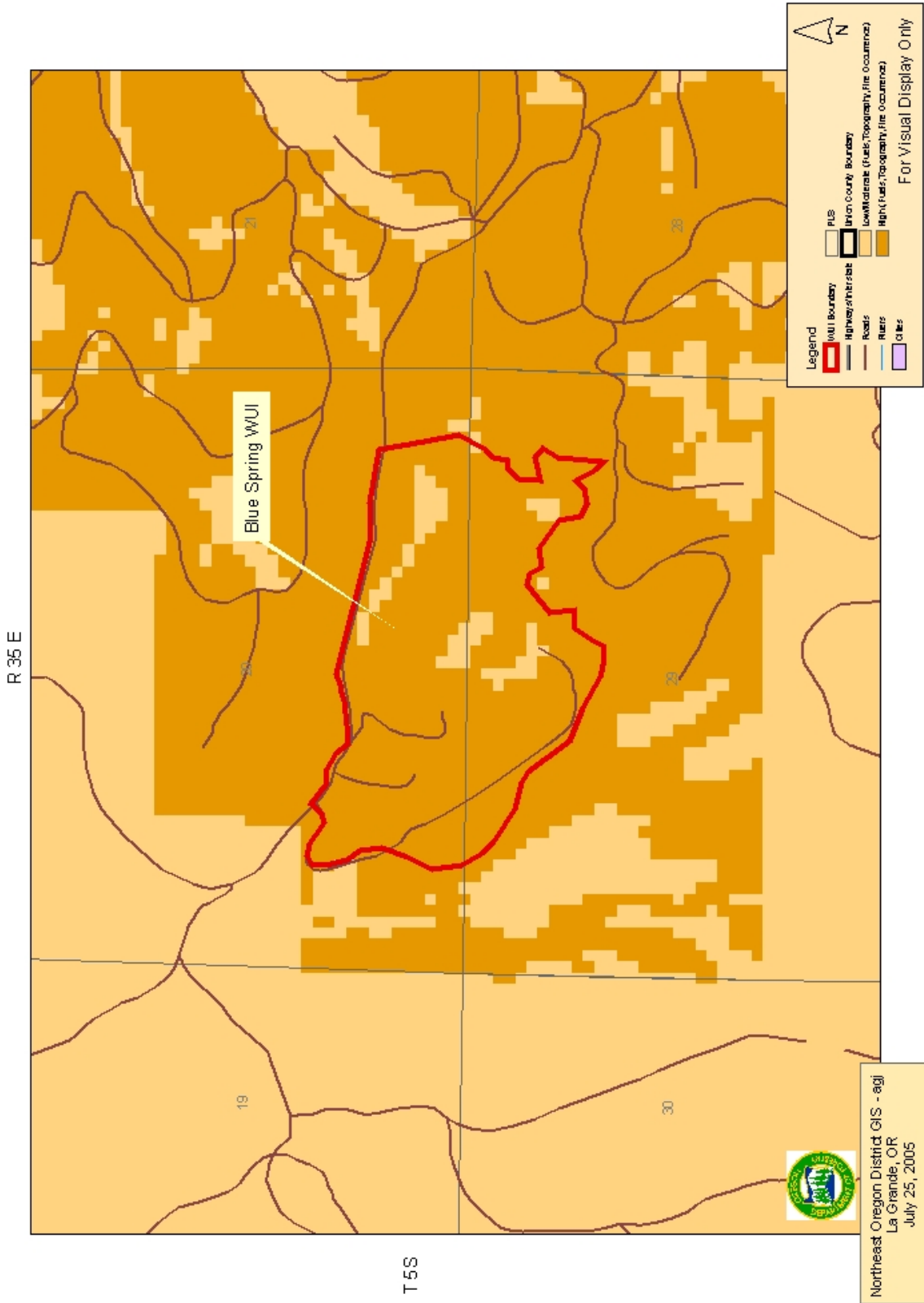
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Blue Springs Maintenance	• Ongoing	• USFS

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Medical Springs

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	24	22.5	5	7.5	119	9

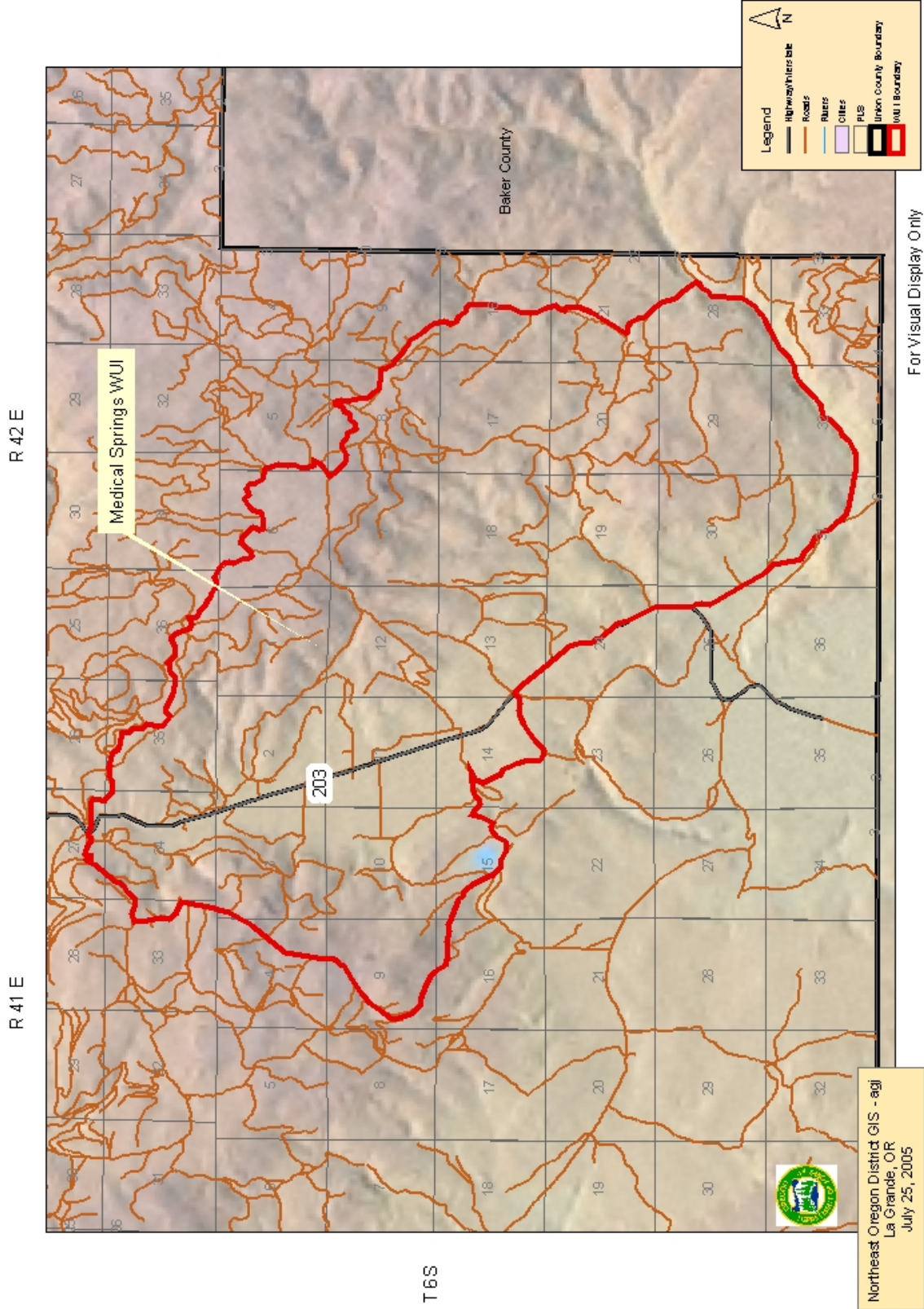
Communities at Risk: Medical Springs, Pondosa and adjacent rural residential areas.

Structural Fire Protection Agency: Medical Springs Rural Fire Protection District.

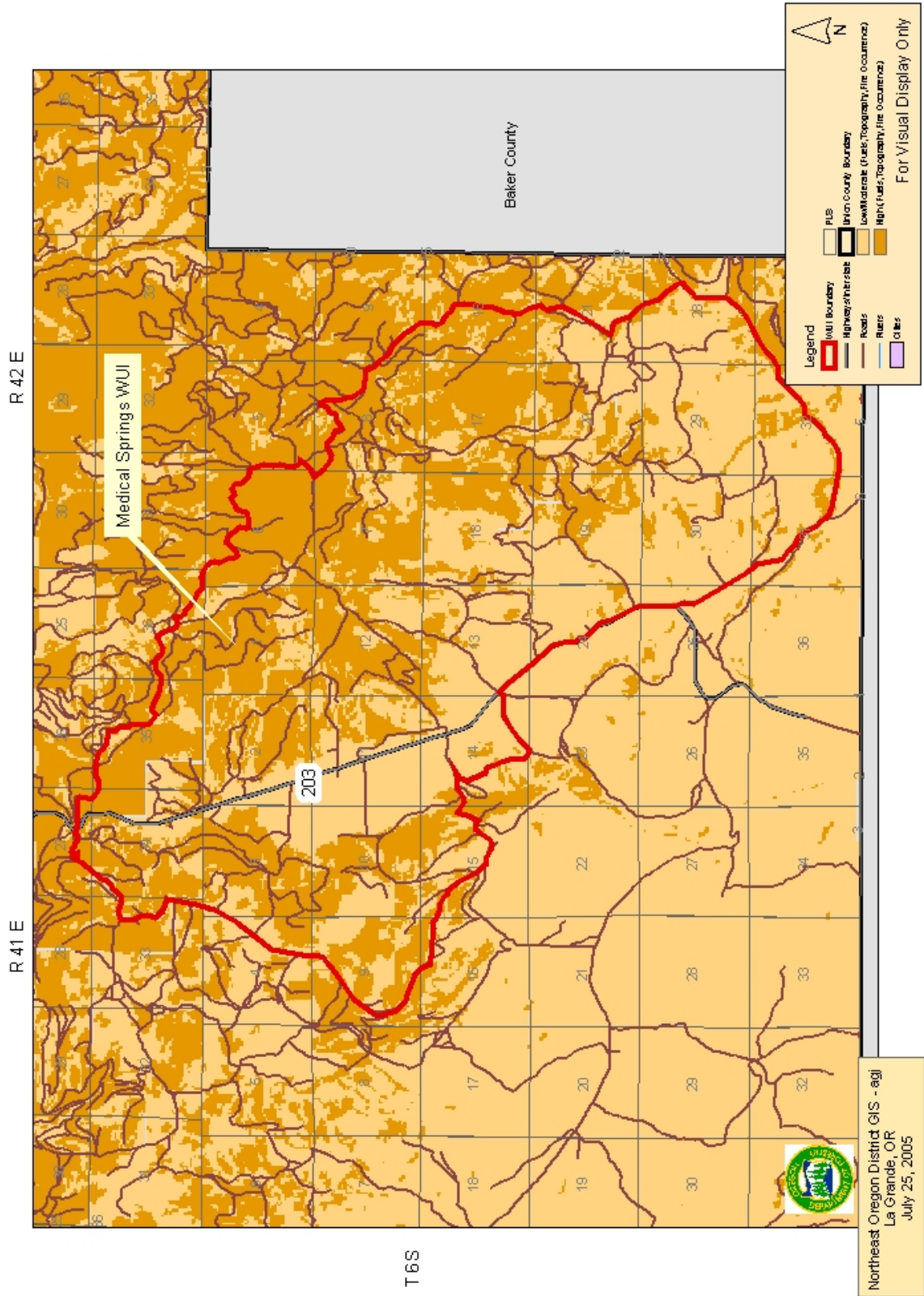
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Medical Springs (Bald Angel) - Planning	• 3 + years	• USFS

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Kamela

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	22	15	5	7.5	109.5	10

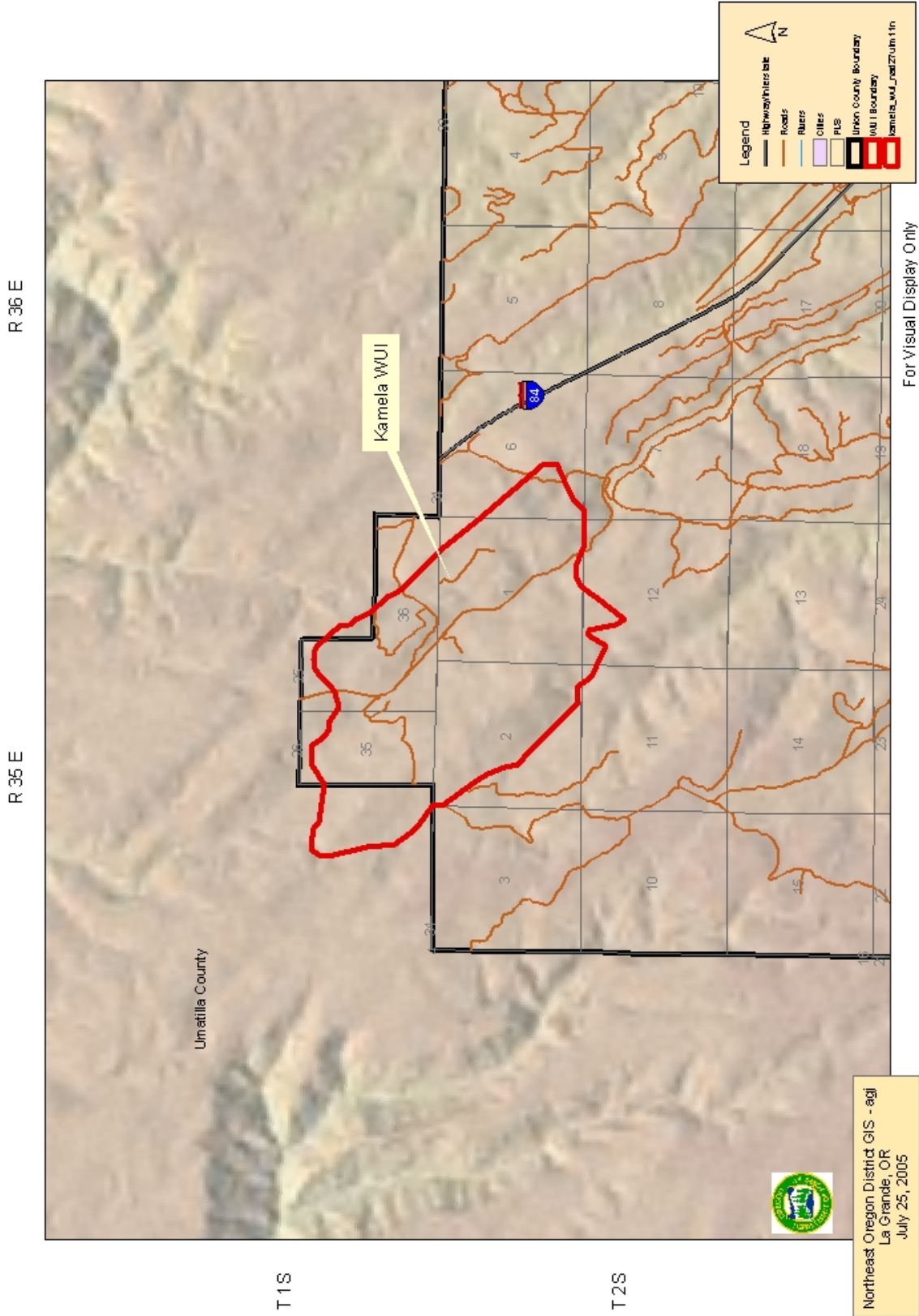
Communities at Risk: Kamela.

Structural Fire Protection Agency: Wildland fire protection only.

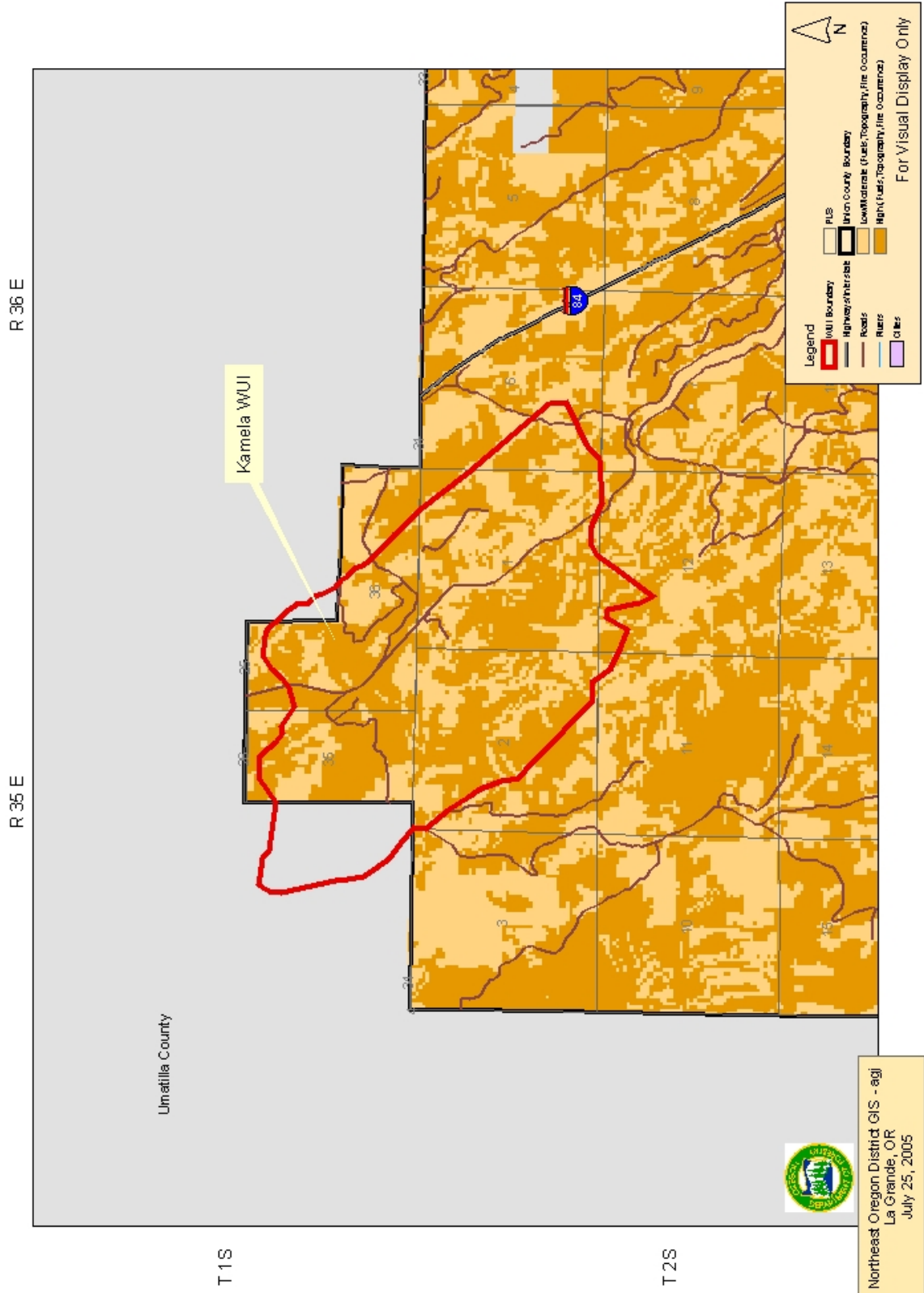
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Pumpkin Ridge

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	34	22.5	10	7.5	104	11

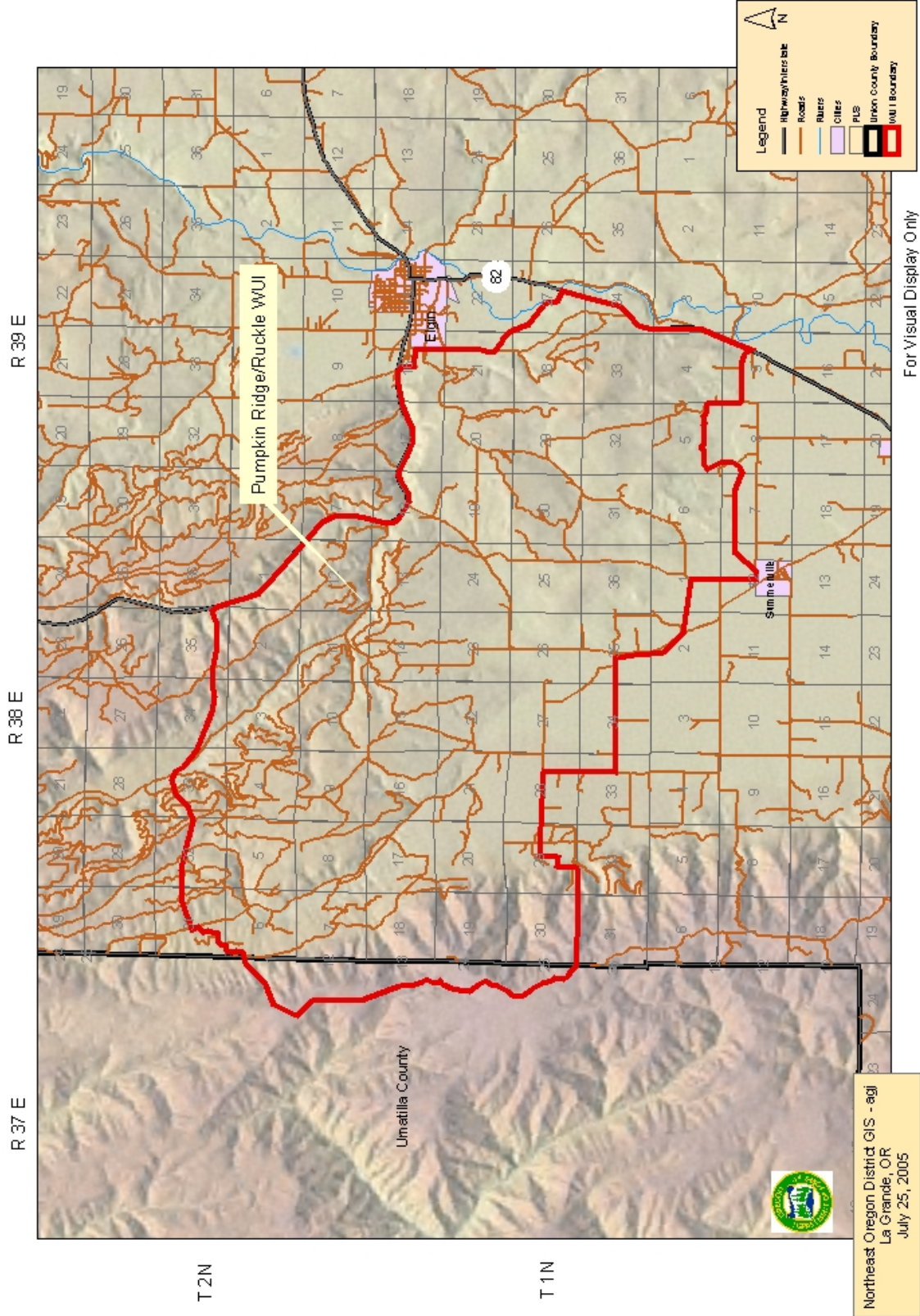
Communities at Risk: Pumpkin Ridge, Craig Loop, Ruckle Road and adjacent rural residential areas.

Structural Fire Protection Agency: Imbler Rural Fire Protection District.

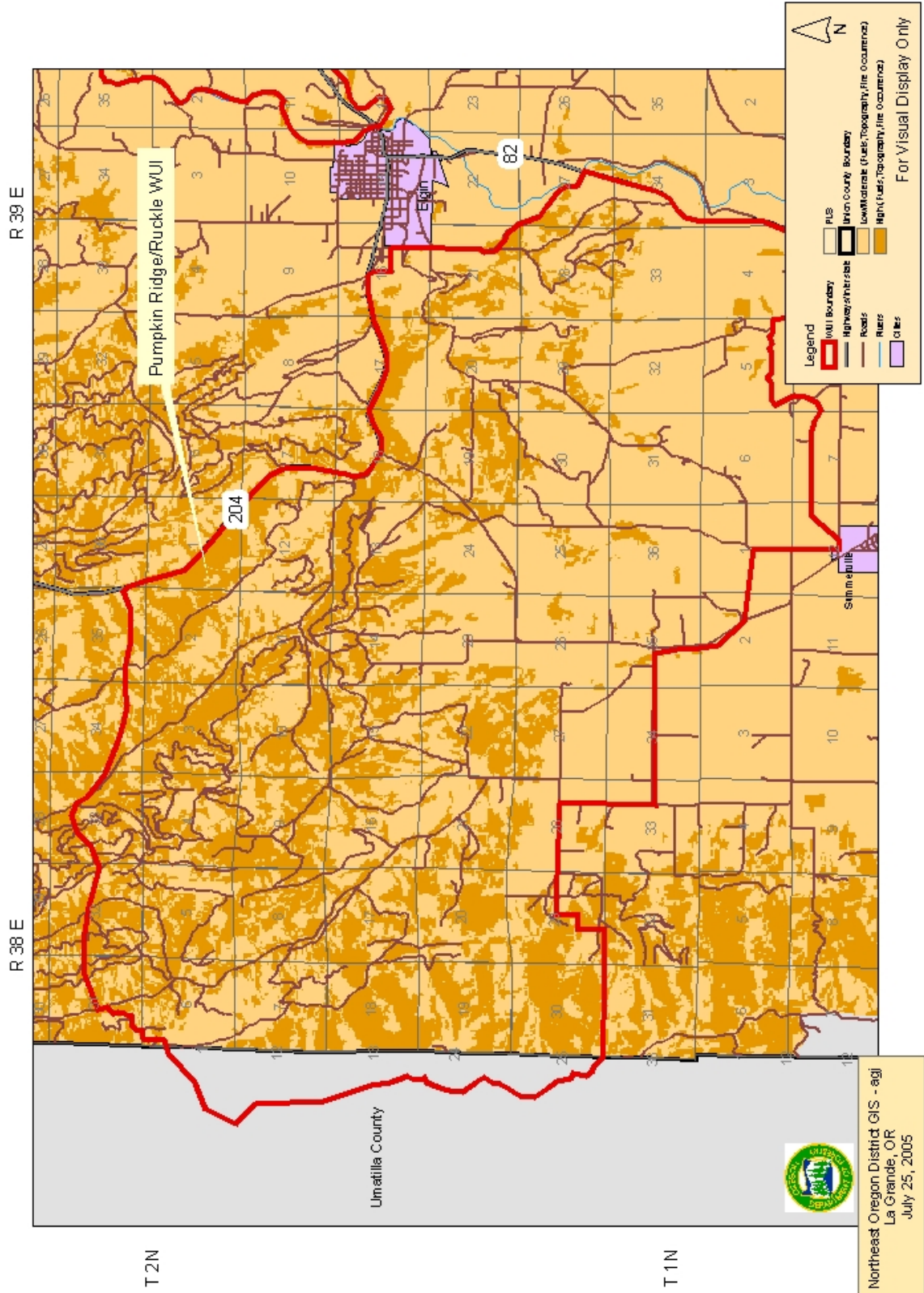
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Elkanah

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	39	15	10	7.5	101.5	12

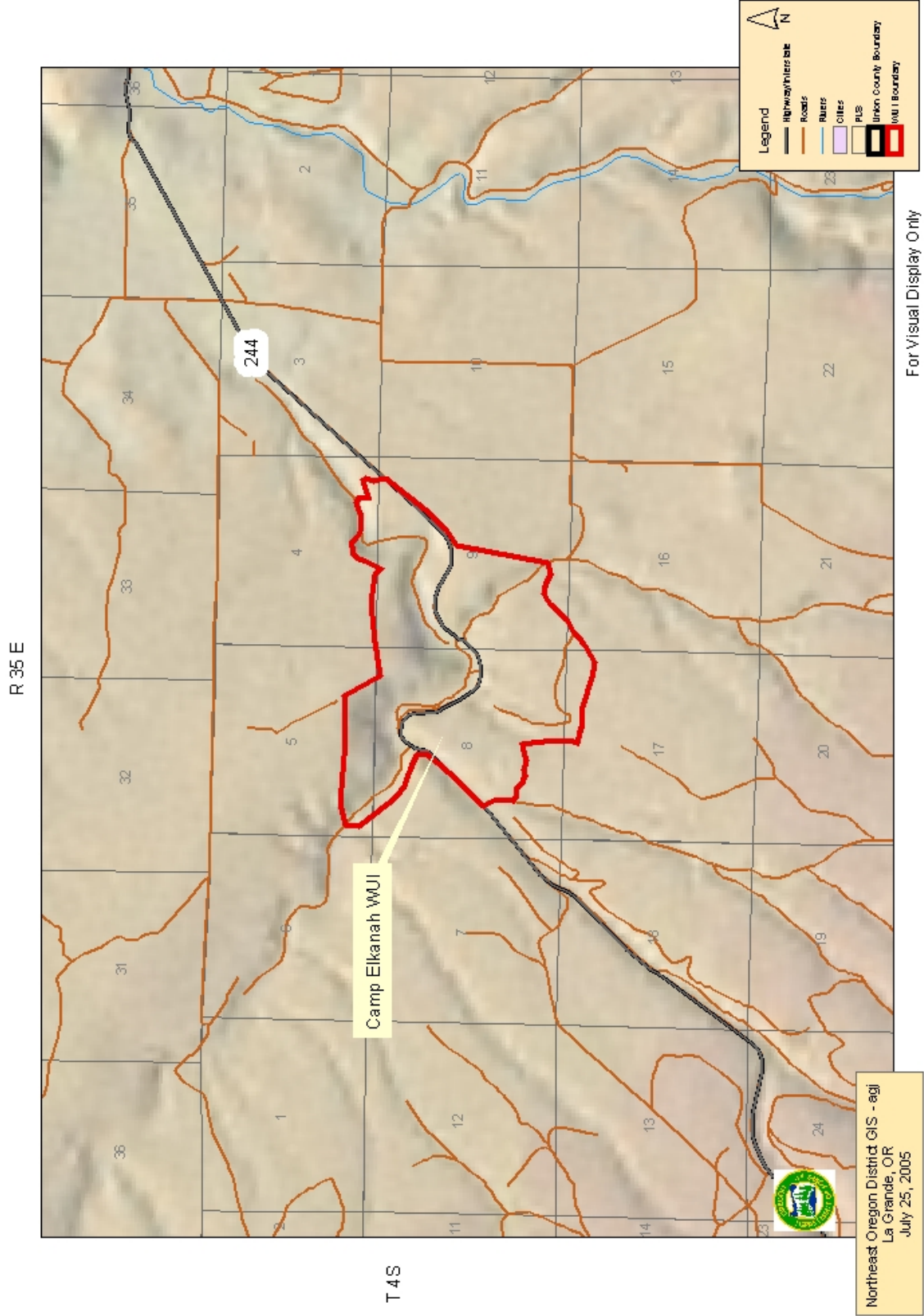
Communities at Risk: Camp Elkanah.

Structural Fire Protection Agency: Wildland fire protection only.

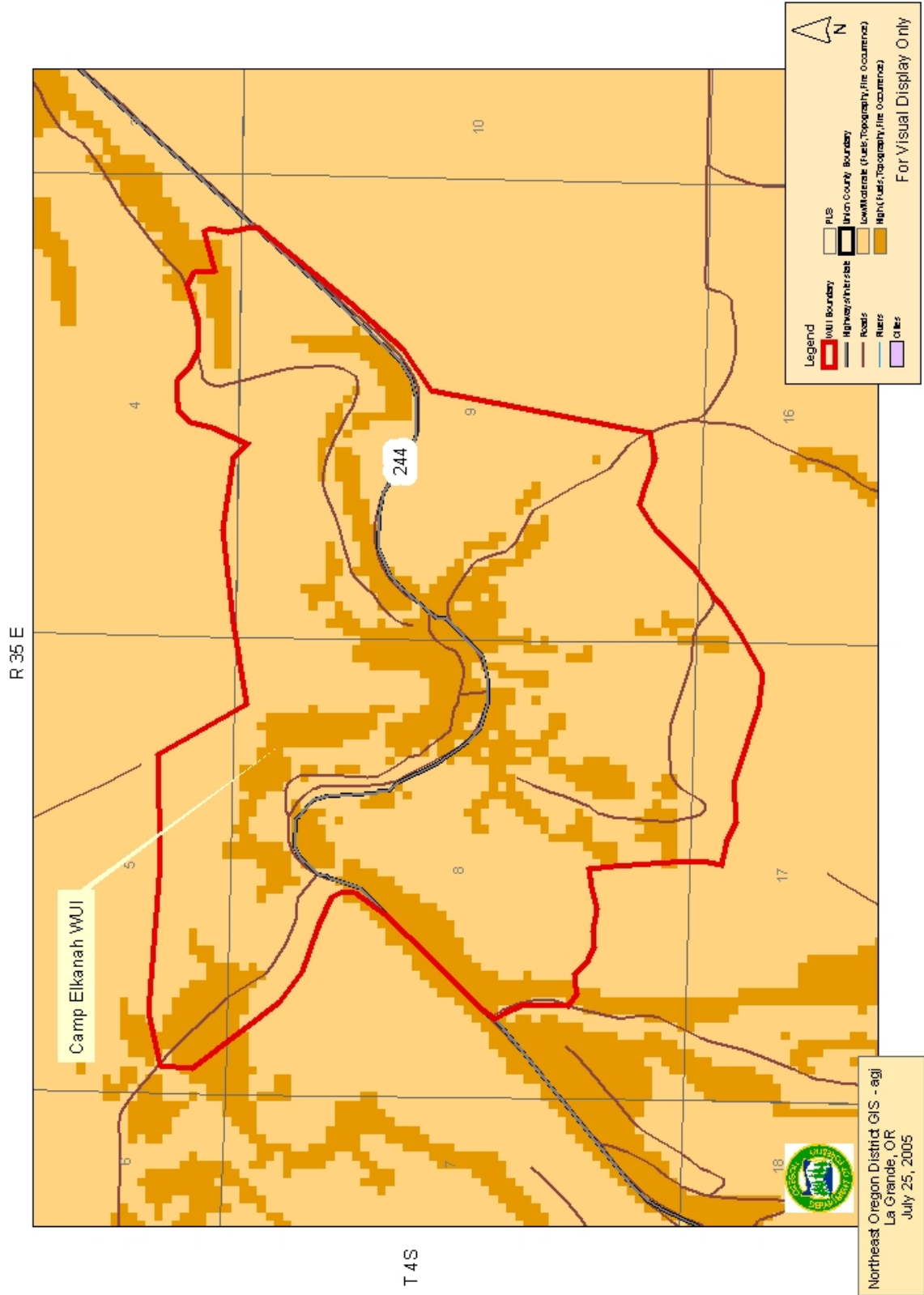
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Camp Elkanah (Texas Heat) Maintenance	• Ongoing	• USFS; Private Permit Holders
Grande Ronde River Corridor Private Lands	• 3 + years	• ODF; Landowners
Grande Ronde River Corridor Mapping	• 1-2 years	• ODF; Landowners; La Grande RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Clark/Indian Creek

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	30	22.5	10	5	97.5	13

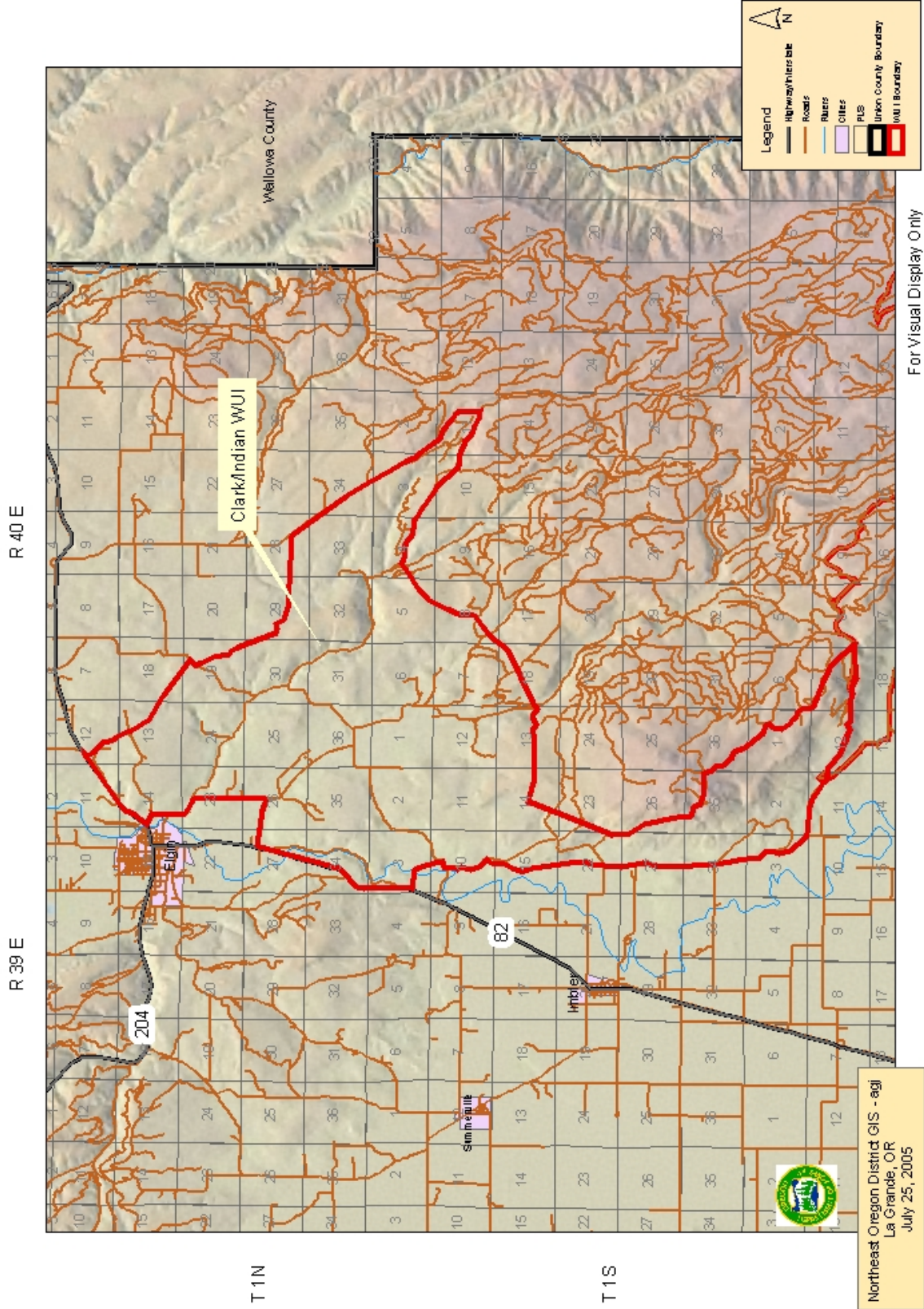
Communities at Risk: Clarks Creek, Indian Creek and adjacent rural residential areas.

Structural Fire Protection Agency: Elgin Rural Fire Protection District.

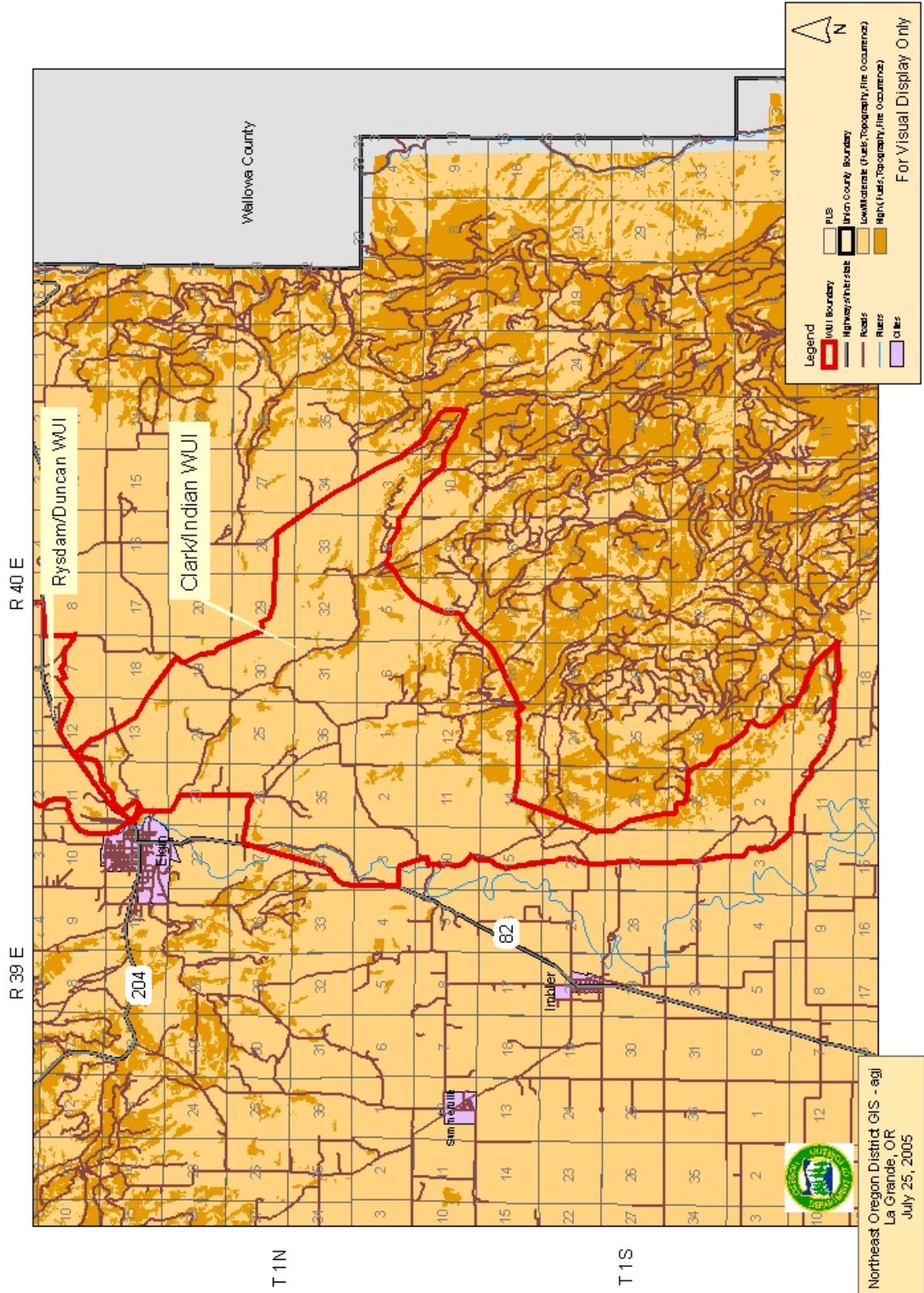
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Clark Creek Planning	• 3 + years	• USFS; ODF; Landowners; Elgin RFPD; UC Forest Restoration Board

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



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WUI Name: Rysdam

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	29	22.5	10	5	96.5	14

Communities at Risk: Cricket Flats, Thompson Road and adjacent rural residential areas.

Structural Fire Protection Agency: Elgin Rural Fire Protection District protects about ½ this WUI.

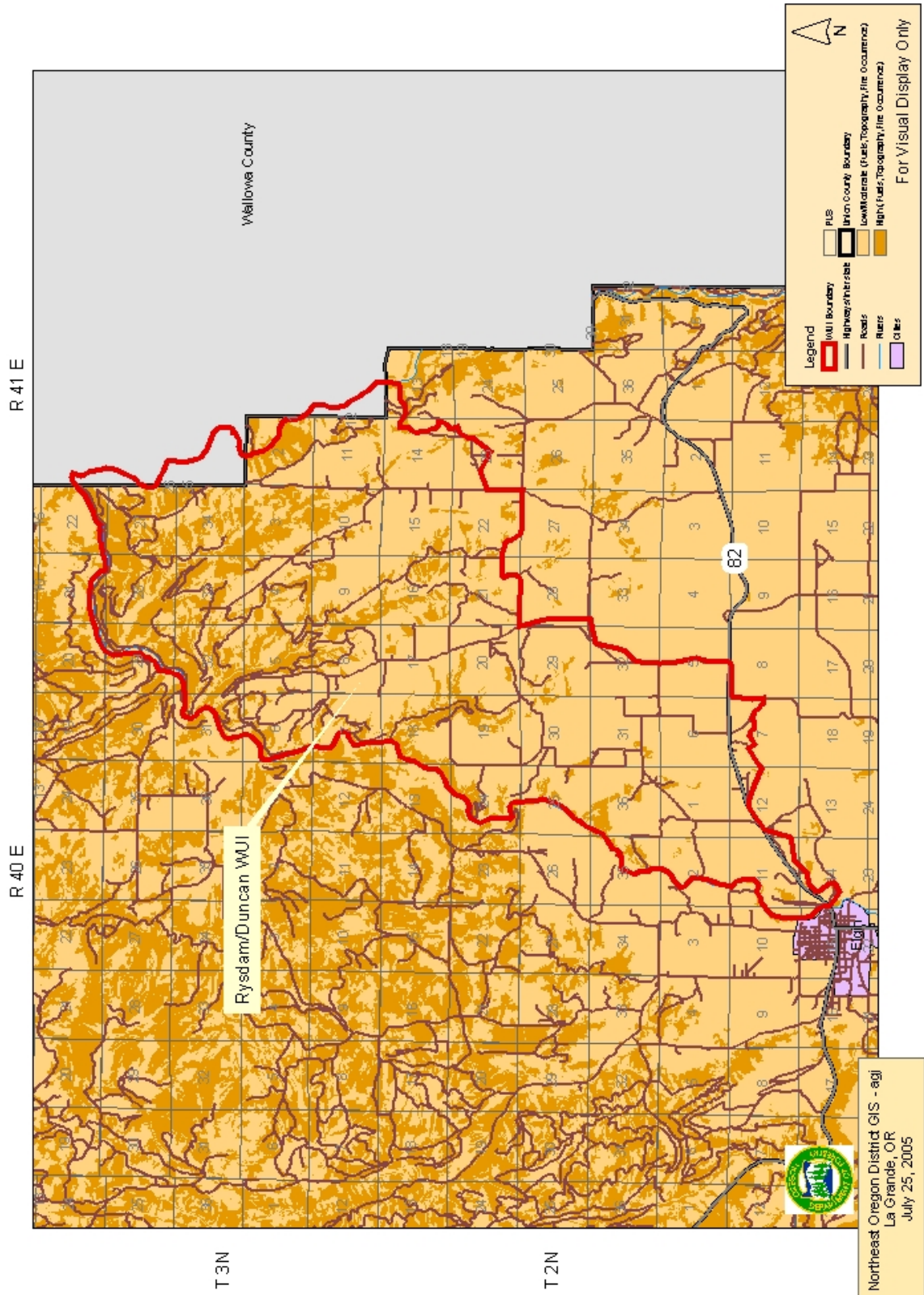
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Replace Yarrington Road Bridge	• 1-2 years	• UCPW; ODOT

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Starkey

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	33	15	10	7.5	95.5	15

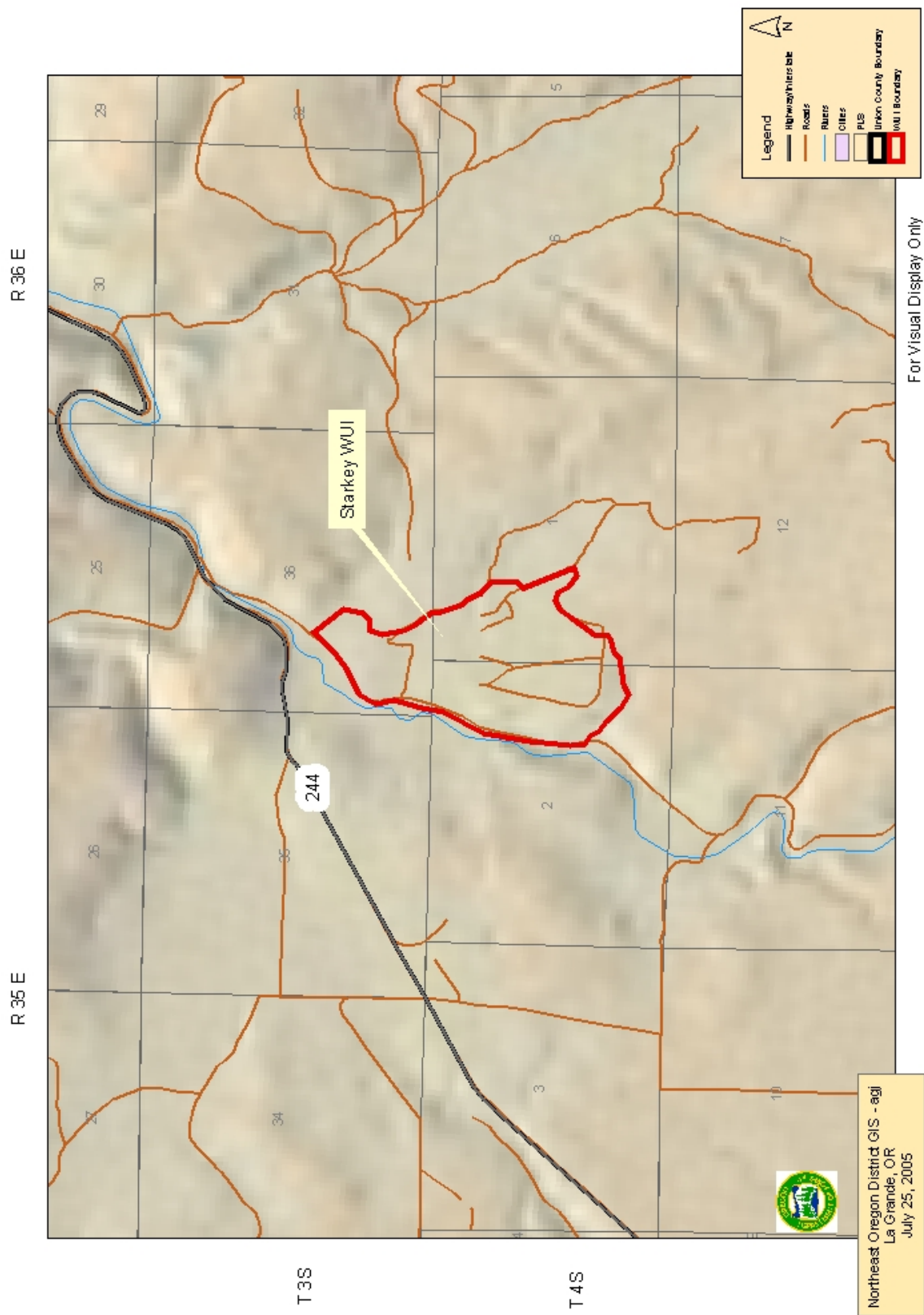
Communities at Risk: Starkey and adjacent rural residential areas.

Structural Fire Protection Agency: Wildland fire protection only.

Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

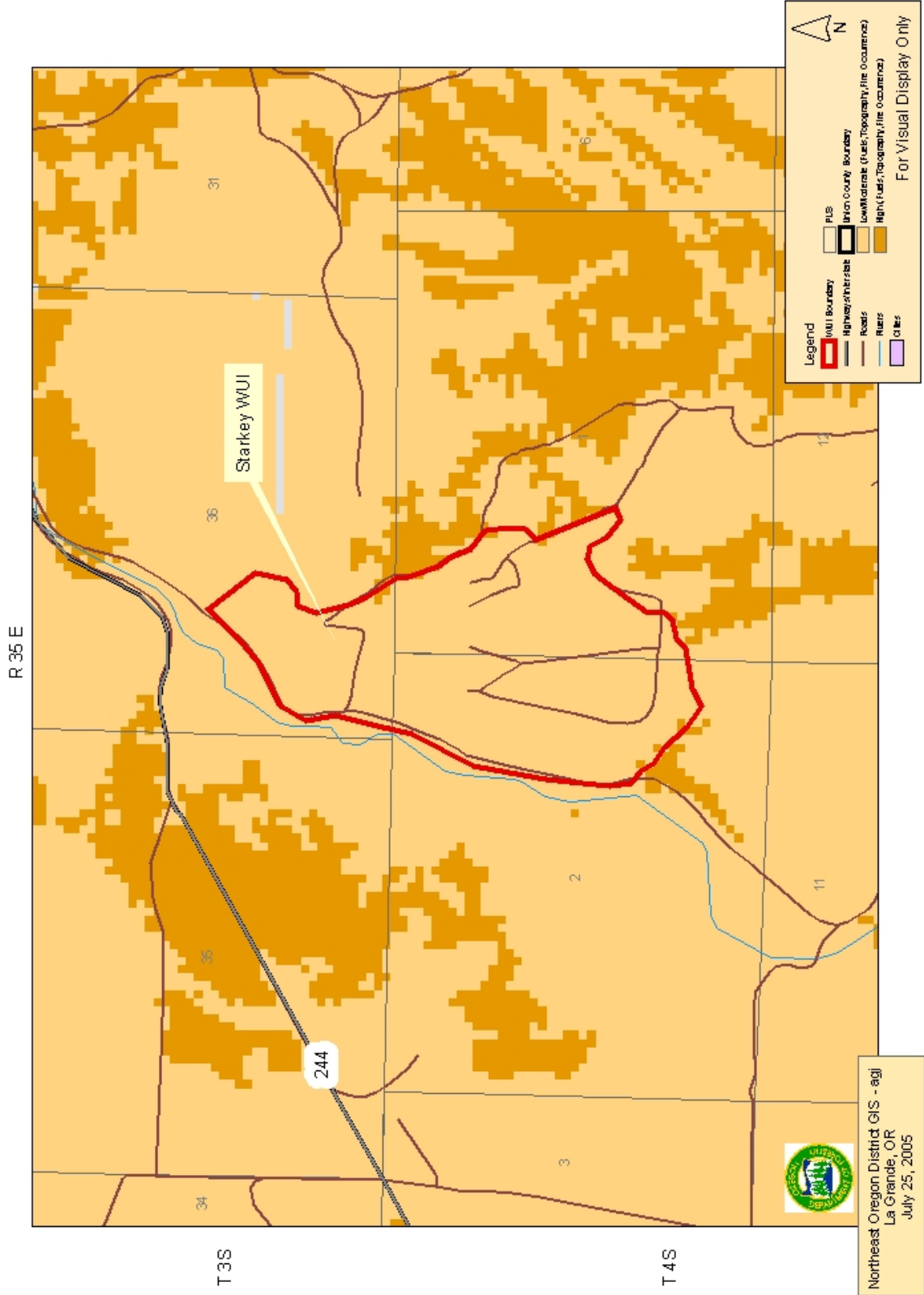
WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Grande Ronde River Corridor Private Lands	• 3 + years	• ODF; Landowners
Grande Ronde River Corridor Mapping	• 1-2 years	• ODF; Landowners; La Grande RFPD

Union County WUI Boundaries (with Shaded Relief)



Northeast Oregon District GIS - agl
La Grande, OR
July 25, 2005

Union County WUI Boundaries (with Wildfire Hazard)



VIII. Mitigation Action Plan

Action Items

See *Section X* for a discussion about project evaluation. The projects, also called action items that were identified by the steering committee, residents, landowners, agencies and other stakeholders are listed below in the priority reflected in the plan's goals and objectives. Projects that further emergency response are most important to the steering committee, followed by identifying and reducing fuel hazards, fostering support for the community wildfire protection plan, and using the plan as a resource and learning tool.

The projects are grouped into one of ten categories and include a brief description, list of project cooperators (the identified lead agency is listed first) and a general implementation timeframe.

Grant Funding

The strategies and needs to mitigate the risk of wildfire and respond to wildfire events are projects to which grant money may be directed. As such, the annual evaluation of the project list must include a consideration of other grant monies and how they are being spent towards the same goals. This ensures efficient use of the grant dollar and the potential ability to leverage grant money for greater benefit to Union County structural and wildland fire agencies. Other grant programs may include the State Homeland Security Equipment Program, Rural Firefighter Assistance / Volunteer Firefighter Assistance Equipment Program, Title III federal funding, FEMA Pre-Hazard Mitigation Funding or Oregon Transportation Investment Act funds, to name a few of the most likely sources.

Response

1. **Project Title:** Assemble and install address stakes for all county addresses.
Description: Stakes are old; will allow more efficient response.
Cooperators: UC Public Works.
Timeframe: Short Term (3 + years).
2. **Project Title:** Coordinate pre-suppression planning among all fire agencies.
Description: information is specific to topography, ingress/egress, water supply, strategic firefighting locations, staging areas, and communications.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies, the 911/Dispatch Center and the Northeast Oregon Interagency Fire Dispatch Center.
Timeframe: Short Term (1-2 years).
3. **Project Title:** Establish a rural fire protection district at Morgan Lake complete with equipment, training and personnel.
Description: Provided there were enough interested people.
Cooperators: Landowners; Union County; Structural Fire Agencies.

Timeframe: Long Term (3+ years).

4. **Project Title:** Establish a rural fire protection district at Perry and Hilgard area complete with equipment, training and personnel.
Description: Provided there were enough interested people.
Cooperators: Landowners; Union County; Structural Fire Agencies.
Timeframe: Long Term (3+ years).

Communications

1. **Project Title:** Acquire interoperable communications equipment.
Description: Continue to implement the UC Communications Strategic Plan and related projects.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies, the 911/Dispatch Center and the Northeast Oregon Interagency Fire Dispatch Center.
Timeframe: Short Term (1-2 years).
2. **Project Title:** Implement Union County Strategic Communications Plan.
Description: Plan was developed by 911 Users to strategically replace and upgrade the entire emergency communications network.
Cooperators: All local emergency responders, including state and federal wildland fire agencies, OSP, the 911/Dispatch Center and the Northeast Oregon Interagency Fire Dispatch Center.
Timeframe: Long Term (3+ years).

Road System Improvements

1. **Project Title:** Replace Yarrington Road bridge.
Description: Bridge is load-limited and constrains response and RFPD expansion.
Cooperators: UC Public Works; Oregon Department of Transportation.
Timeframe: Short Term (1-2 years).
2. **Project Title:** Prepare Evacuation Plan for Morgan Lake area.
Description: One sub-standard road must be used by both evacuating residents and emergency response agencies.
Cooperators: UC Emergency Services, Public Works and Sheriff's Office; Oregon Department of Transportation.
Timeframe: Short Term (1-2 years).
3. **Project Title:** Reconstruct Morgan Lake Road.
Description: Travelers could benefit from engineered solutions to this road.
Cooperators: UC Public Works; Oregon Department of Transportation.
Timeframe: Long Term (3+ years).

Water Source Development

1. **Project Title:** Identify and inventory water supplies including access and deficiencies.
Description: Pre-identify water sources for response; updated seasonally.
Cooperators: ODF; USFS; Structural Fire Agencies.
Timeframe: Short Term (1-2 years).

Equipment & Training

1. **Project:** NIMS training.
Description: Conduct National Incident Management System (NIMS) training for emergency responders to ensure continued federal grant funding.
Cooperators: UC Emergency Services.
Timeframe: Short Term (1-2 years).
2. **Project:** Identify methods of funding to purchase up-to-date PPE.
Description: Pool resources in obtaining current PPE.
Cooperators: La Grande RFPD; North Powder RFPD; Union RFPD; Cove RFPD; Imbler RFPD; Elgin RFPD; La Grande FD and Medical Springs RFPD.
Timeframe: Short Term (1-2 years).
3. **Project:** Plan and conduct full-scale exercises.
Description: Involving fire suppression agencies and the community in drills and exercises.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.
Timeframe: Short Term (3 + years).
1. **Project:** Identify methods of funding to purchase type III wildland fire engines.
Description: Each RFPD needs engines for wildland response to augment wildland agencies responding in their jurisdictions.
Cooperators: Structural RFPDs.
Timeframe: Short Term (1-2 years).

Fuels Reduction

1. **Project:** Pelican Creek
Description: Prescribed burn.
Cooperators: US Forest Service, La Grande Ranger District.
Timeframe: Short Term (1-2 years).
2. **Project:** Three Cabin Creek
Description: Commercial thinning.
Cooperators: US Forest Service, La Grande Ranger District.
Timeframe: Short Term (1-2 years).
3. **Project:** Mt. Emily
Description: The Mt Emily fuels reduction project area is approximately 7,295 acres in size and is part of a larger analysis area (approx, 40,360 acres) which includes Umatilla National Forest and private and State lands located within three watersheds. The project will utilize mechanical fuels reduction treatments followed by low intensity Rx fire. This project is being coordinated with fuel reduction and "FIREWISE" projects, and education efforts occurring on adjoining private and state lands and the Umatilla National Forest. Priority areas identified within the project area are based on proximity to private values at risk from wildfire, and/or presence of logical locations to base suppression operations. Management activities include, thinning, hand piling, mechanical removal, pile burning as well as low intensity under burning.

Cooperators: US Forest service, La Grande Ranger District, Umatilla National Forest, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners.

Timeframe: Long term (3+ years).

Stage of Project: Implementing (Beginning stage, thinning/hand piling).

4. **Project Title:** Cove WUI

Description: Manage Vegetation and fuels (via mechanical fuels reduction treatments, followed by low intensity Rx fire) to modify fire behavior and create survivable and defensible space on federal, state, and private lands surrounding the community. Promote "FIREWISE" communities through prevention and education measures.

Cooperators: US Forest service, La Grande Ranger District, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

5. **Project Title:** South fork Catherine Creek

Description: Manage Vegetation and fuels, (via mechanical removal, piling, followed by low intensity Rx fire) to modify fire behavior and create survivable and defensible space on federal, state, and private lands surrounding the community. Promote "FIREWISE" communities through prevention and education measures.

Cooperators: US Forest service, La Grande Ranger District, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners Private landowners.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

6. **Project Title:** Clark Creek

Description: Manage Vegetation and fuels, (via mechanical removal, piling, followed by low intensity Rx fire) to modify fire behavior and create survivable and defensible space on federal, state, and private lands surrounding the community. Promote "FIREWISE" communities through prevention and education measures.

Cooperators: US Forest service, La Grande Ranger District, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

7. **Project Title:** Medical Springs (Bald Angel)

Description: Reduce heavy fuel load conditions, (via mechanical fuel reduction treatments followed by low intensity Rx fire) to minimize wildfire impacts to natural resources and private land ownership.

Cooperators: US Forest service, La Grande Ranger District.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

8. **Project Title:** Camp Elkanah (Texas Heat)
Description: Natural Fuels Prescribed Burn (no harvest units involved). The overall objective of this project is to reintroduce and utilize fire as a disturbance factor in order to maintain ecological systems and processes. This project lies adjacent to WUI defined Elkanah area.
Cooperators: US Forest service, La Grande Ranger District.
Timeframe: Ongoing.
Stage of Project: Maintenance.
9. **Project Title:** Blue Springs
Description: Hazardous fuels reduction, via thinning small diameter understory, hand piling, followed by pile burning.
Cooperators: US Forest service, La Grande Ranger District, Private Permit Holders.
Timeframe: Ongoing.
Stage of Project: Maintenance
10. **Project Title:** Mt. Emily Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Imbler Rural Fire Department, La Grande Rural Fire Department.
Timeframe: Short Term (1-2 years).
11. **Project Title:** Cove Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Cove Rural Fire Department.
Timeframe: Short Term (1-2 years).
12. **Project Title:** Morgan Lake Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, La Grande Fire Department, La Grande Rural Fire Department.
Timeframe: Short Term (1-2 years).
13. **Project Title:** Palmer Valley Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Elgin Rural Fire Department.
Timeframe: Long Term (3-5 Years).
14. **Project Title:** Catherine Creek Corridor Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Union Rural Fire Department.
Timeframe: Long Term (3-5 years).
15. **Project Title:** Grande Ronde River Corridor Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owner.
Timeframe: Long Term (3-5 years).

Mapping & Data Development

1. **Project Title:** Create a monitoring system to gauge fuels reduction progress over time.
Description: Utilize ground plots.
Cooperators: ODF, USFS, BLM.
Timeframe: Long Term (3+ years).
2. **Project Title:** Identify data gaps.
Description: Coordinate efforts to integrate data sets and share information.
Cooperators: ODF, Union County, Structural Fire Agencies, USFS.
Timeframe: Short Term (3 + years).
3. **Project Title:** Develop a GIS layer of all fire districts/departments including areas with no structural fire protection.
Description:
Cooperators: UC Planning Department, Emergency Services.
Timeframe: Short Term (1-2 years).
4. **Project Title:** Create map books using GIS containing ownership, dwelling location, and site-specific information for each fire district/department.
Description: information is specific to ownership and dwelling location.
Cooperators: ODF, Union County, Structural Fire Agencies, USFS.
Timeframe: Short Term (1-2 years).
5. **Project Title:** Catherine Creek Corridor
Description: Map homesites and access routes to homes located in this WUI area.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Union Rural Fire Department.
Timeframe: Short Term (1-2 years)
6. **Project Title:** Grande Ronde River Corridor.
Description: Map homesites and access routes to homes located in this WUI area.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Union Rural Fire Department.
Timeframe: Short Term (1-2 years)

Prevention

1. **Project:** Resurrect and formalize the Union County Prevention Co-Op.
Description: Co-Op members pay to belong; meet monthly and discuss prevention issues.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.
Timeframe: Long Term (3+ years).
2. **Project:** Continue prevention efforts like Firewise and "I'm Concerned...".
Description: Build on progress made with these programs; spread among Union County communities.

Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.

Timeframe: Short Term (1-2 years).

3. **Project:** Participate annually in Fire Prevention Week.
Description: Pool resources to spread fire prevention message.
Cooperators: ODF, La Grande Office; UC Emergency Services.
Timeframe: Short Term (1-2 years).
4. **Project Title:** Firewise Communities
Description: Present 1-day workshop to communities interested in becoming a Firewise Community
Cooperators: ODF; Structural Fire Agencies.
Timeframe: Short-Term (1-2 years).

Partnership Development

1. **Project Title:** Continue workforce development.
Description: Programs through TEC, Oregon Youth Authority and the LHS FFA (wildland fire class) foster partnerships among those who are acquiring firefighting skills and those who need those skills.
Cooperators: La Grande High School; Training & Employment Consortium; RiverBend Facility; UC Commissioners, Emergency Services.
Timeframe: Long Term (3+ years).

Education and Outreach

1. **Project:** Identify common base information.
Description: Develop program for consistency in all public messages.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.
Timeframe: Short Term (1-2 years).
2. **Project:** Identify prescriptive parameters for fuels reduction.
Description: Develop to aid private property owners in achieving an ideal forest condition class.
Cooperators: USFS; ODF; BLM; UC Forest Restoration Board; OSU Extension Service.
Timeframe: Short Term (1-2 years).

Projects are evaluated annually as described in *Section X*.

Biomass Utilization

Federal and state agencies, local government and private forest landowners are using thinning and prescribed burning in strategic locations to reduce forest fuels and wildfire risks. Most of the material generated from fuels reduction activities is not suitable for commercial wood products manufacturing. In many cases, biomass from these activities is left on-site or piled and burned at an additional cost. One alternative outlet for utilizing biomass now is the Warm Hearts/Warm

Homes firewood program. The program distributes firewood to limited capacity citizens across Baker, Union, and Wallowa Counties. Unfortunately the program utilizes a small percentage of the biomass generated and usually utilizes smaller thinning projects. An additional alternative outlet for small diameter wood could help reduce the costs of thinning and help mitigate environmental impacts associated with prescribed burning and wildfires.

Forest biomass is generated by forest fuels reduction, commercial timber harvest; non-commercial thinning and timber stand improvement (TSI) activities. Non-commercial thinning includes pruning and tree removal designed to help shape and guide development of forest stands to meet a variety of goals. It generally does not result in removal of trees that can be used to manufacture products, but it could be used in renewable energy production (heat, steam, electricity, and fuel). Timber stand improvement can accomplish similar goals, but often results in removal of some commercially valuable trees. Wood manufacturing residues including bark, sawdust, chips, and veneer cores are additional sources of raw material for renewable energy production. A biomass plant is currently operating in Grant County, but high transportation cost makes the exportation of small diameter wood material cost prohibitive.

Union County's Forest Restoration Board is exploring co-generation opportunities that utilize biomass as fuel. Heating and cooling public buildings using small biomass generators to offset the cost of electricity and oil is being explored. This appears to be the direction communities want to move in order to address biomass utilization at a manageable scale. Once the Union County Forest Restoration Board has determined the feasibility of this project and more conclusive information is available this section of the plan will be updated.

IX. Maintenance Plan for Fuels Treatmentⁱ

Fuels reduction programs require knowledge of how fire interacts with different vegetation and defining acceptable fire behavior parameters. For example, if one determines that near WUI areas a flame of four feet or less is acceptable, one can then prioritize projects accordingly.

Concepts to Consider in Developing a Fuels Maintenance Program

Once treated timber stands undergo the process of ecological succession in which under story and over story vegetation change over time resulting in incremental changes (often increases) in herbs, grasses, shrubs, and tree regeneration. The regeneration takes place because removing trees and other vegetation creates more growing space. Over story structure changes as residual trees expand their crowns and increase in diameter. These changes continually add biomass (fuel) such as needles, branches and downed logs to the site. Subsequent disturbances caused by insects and disease can kill trees and add more biomass to the forest floor. Although some biomass decays over time in dry southwest, central and eastern Oregon forests dead biomass tends to accumulate faster than it decays resulting in more fuel.

How long before treated areas require re-treatment is dependent on several inter-related factors including:

- Past treatment level (e.g., how much biomass [fuel] was removed initially in the under story and over story);
- Plant association groups;
- Site productivity;
- Rate of fuel accumulation;
- Fuel structure (i.e., condition class)
- Historic fire regime;
- Desired fire behavior (for effective control)
- Climatic regime.

Although condition class and fire regime are primary factors in prioritizing initial treatment areas, strategic location is factored as well. This prioritization method may have less bearing on which areas should be prioritized for future *re-*

treatment. For example, it's probably unlikely that managers would allow sites that were condition class 2 or 3 before treatment and treated to condition class 1, to revert back to condition class 2 or 3 before conducting a re-treatment, particularly in the WUI. It seems more likely they would allow a site that was originally in a condition class 2 or 3 and treated to condition class 1 to re-accumulate fuels only to a point or phase that resemble a condition class 1 *transitioning* into a condition class 2. Allowing fuels to accumulate any further would entail a more expensive re-treatment and increase the risk of losing the initial investment made in fuel reduction.

Fuels Treatment and Forest Healthⁱⁱ

Fuels treatment has an added benefit beyond reducing danger. Thinning overstocked stands will increase tree diameter growth and enhance tree vigor. Healthier trees are more resistant to pests and disease. Treatment should be site and species specific. Thinning spacing should be managed to take advantage of site specific resources such as water, nutrients and sunlight.

Remember that forests are dynamic and continually growing in diameter, height, and crown width. Fuels reduction activities that include thinning are a good thing, but thinning without consideration for forest health doesn't provide the benefits of pest resistance or good individual tree growth. Also, without future maintenance, the fire risk reduction benefits decline over time.

For more information about proper tree spacing for your timber stand, please contact Paul Oester, OSU Extension Forester, at (541) 963-1010 or Oregon Department of Forestry in La Grande at (541) 963-3168.

ⁱ A Conceptual Approach for a Maintenance Strategy for Fuel Treatments in Oregon: Maintaining the Investment, Fitzgerald, Stephen and Martin, Charlie, Oregon State FFHM Committee Report. (July 5, 2004).

ⁱⁱ Oester, Paul. *Blue Mountains Renewable Resource Newsletter*. Vol. 20, No. 3, (Fall 2004).

X. Monitoring and Evaluation

Schedule

Plan maintenance will be directed by the Union County Commissioners, via the Emergency Services Office and coordinated with the plan's steering committee members, a core group of who have agreed to be a standing committee to assist with monitoring and evaluation. Proposed plan maintenance will be set annually and will consist of a plan review, priority action item re-evaluation and progress evaluation, with a total revision of the plan set for every five years.

A total plan revision every five years is recommended, as the infrastructure needs of Union County change. Specific considerations include: population fluctuations, land use changes, completion of fuels reduction projects, emergency service improvements, computer software/hardware updates, new and revised data, and extreme wildfire hazard fluctuations.

Annual strategies and recommendations will be necessary as various projects and tasks are accomplished and areas at-risk decline in hazard rating. Annual review will be necessary, as county infrastructure needs change. Annual review will be advertised to include representation from the stakeholders who participated in the development of the Community Wildfire Protection Plan.

Monitoring

Continued public collaboration on the Union County Wildfire Protection Plan is necessary to meet identified needs while accomplishing the plan's mission.

Copies of the Community Wildfire Protection Plan are available at the Union County Emergency Services Office, at the Oregon Department of Forestry Office in La Grande, Wallowa-Whitman National Forest headquarters in La Grande, in Union County public libraries. It will also be available both electronically and via the Union County and ODF websites. The websites will provide citizens an opportunity to send comments or questions regarding the plan at any time.

Evaluation

Annual assessment of the identified projects is very important to determine whether or not progress is being made. Units of evaluation were identified corresponding with each of the ten project categories:

1. **Response:** number of projects accomplished, which improve fire agency/emergency service response time.
2. **Communications:** number of identified communication issues resolved that were identified in the plan.

3. **Road System Improvements:** number of transportation problems resolved.
4. **Water Source Development:** number of water sources added.
5. **Equipment/Training:**
 - a) Equipment - number of identified/needed equipment obtained
 - b) Training - number of courses provided.
6. **Fuels Reduction:**
 - a) Number of acres treated for fuels reduction (loading reduction, increased spacing, and/or ladder fuel reduction).
7. **Mapping & Data Development:** number of projects completed or issues resolved.
8. **Prevention:**
 - a) Number of events with prevention message delivery
 - b) Number of prevention courses conducted
 - c) Number of news releases or prevention campaigns conducted
 - d) Number of prevention co-op meetings held.
9. **Partnership Development:** number of partners/agencies/groups involved.
10. **Education and Outreach:**
 - a) Number of people contacted (meetings, courses, etc)
 - b) Number of educational items distributed (brochures, etc).

On an annual basis, the standing steering committee members will assess each identified project using these units of measure to determine progress. This plan does not serve as a means of bypassing the individual processes and regulations of the participating agencies. Each project must adhere to any pertinent local, state or federal rules or guidelines in determining the point of project implementation. The plan is a coordinating document for forest projects related to education and outreach, information development, fire protection and fuels treatment.

XI. Appendix A: Glossary/Acronym List

Glossary

At-Risk Community: a group of homes or other improvements (such as utilities or transportation routes) within or adjacent to federal land in which conditions are conducive to a large-scale wildland fire and pose a significant threat to human life or property.

Community Wildfire Protection Plan: a plan for at-risk communities identifying and prioritizing areas for hazardous fuels treatments, and recommending methods of treatment.

Conflagration: a raging, destructive fire. Often used to describe a fire burning under extreme fire weather. The term is also used when a wildland fire burns into a wildland-urban interface, destroying many structures.

Crown Fire: a fire that advances from treetop to treetop or shrubs independent of a surface fire.

Defensible Space: an area, typically a width of 30 feet or more, between an improved property and a potential wildfire where the combustibles have been removed or modified.

Escape Route: route away from dangerous areas on a fire and should be pre-planned.

Evacuation: the temporary movement of people and their possessions from locations threatened by wildfire.

Extreme Fire Behavior: a level of fire behavior characteristics that ordinarily precludes methods of direct control. One or more of the following is usually involved: high rates of speed, prolific crowning and/or spotting, presence of fire whirls, a strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environments and behave erratically, sometimes dangerously.

Fire Behavior: the manner in which a fire reacts to the influences of fuel, weather and topography.

Fire Front: that part of the fire within which continuous flaming combustion is taking place. Unless otherwise specified it is assumed to be the leading edge of the fire perimeter.

Hazard: a fuel complex defined by volume, type condition, arrangement and location (topography) that determine the ease of ignition and resistance to control. Hazards may also include the built environment such as constructed improvements, access to those improvements, and water availability.

Fire Prevention: activities, including education, engineering, enforcement and administration that are directed at reducing the number of wildfires, the costs of suppression and fire-caused damage to resources and property.

Fire Protection: the actions taken to limit the adverse environmental, social, political and economical effects of fire.

Fire Regime: periodicity and pattern of naturally occurring fires in a particular area or vegetative type, described in terms of frequency, biological severity and area extent.

Fire Storm: violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

Fire Weather: weather conditions that influence fire starts, fire behavior or fire suppression.

Firebrand: any source of heat, natural or human made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels. Examples include leaves, pine cones, glowing charcoal and sparks.

Fuel Condition: relative flammability of fuel as determined by fuel type and environmental conditions.

Fuel Loading: the volume of fuel in a given area generally expressed in tons per acre.

Fuel Modification: any manipulation or removal of fuels to reduce the likelihood of ignition or the resistance to fire control.

Fuels: all combustible material within the wildland-urban interface, including vegetation and structures.

Fuel Break: an area, strategically located for fighting anticipated fires, where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. Fuel breaks divide fire-prone areas into smaller areas for easier fire control and to provide access for fire fighting.

Greenbelt: a fuel break designated for use other than fire protection.

Ground Fuels: all combustible materials such as grass, duff, loose surface litter, tree or shrub roots, rotting wood, leaves, peat or sawdust that typically support combustion.

Hazardous Areas: those wildland areas where the combination of vegetation, topography, weather and the threat of fire to life and property create difficult and dangerous problems.

Hazard Reduction (see also Mitigation): any treatment of living and dead fuels that reduces the threat of ignition and spread of fire.

Ignition Probability: chance that a firebrand will cause an ignition when it lands on receptive fuels.

Initial Attack: the actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire.

Ladder Fuels: fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.

Mitigation: action that alleviates the severity of a fire hazard or risk.

Overstory: that portion of the trees in a forest that forms the upper or uppermost layer.

Preparedness: 1) Condition or degree of being ready to cope with a potential fire situation. 2) Mental readiness to recognize changes in fire danger and act promptly when action is appropriate.

Prescribed Burning: controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, which allows the fire to be confined to a predetermined area, and to produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

Risk: the chance of a fire starting from any cause.

Structural Fire Agency: a firefighting organization, usually at the local level, trained and equipped to fight structure fires. Local structural fire agencies may also be trained and equipped to combat wildland fires.

Suppression: the most aggressive fire protection strategy, it leads to the total extinguishment of a fire.

Surface Fuel: fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.

Survivable Space: the characteristics of a home, its materials and design, in concert with the flammable materials in a home's immediate surroundings that result in high ignition resistance from flames and firebrands (burning embers). Survivable space characteristics relate to the ignitability of a home without necessarily including the higher thermal vulnerability of firefighters.

Tree Crown: the primary and secondary branches growing out from the main stem, together with twigs and foliage.

Understory: low-growing vegetation under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

Wildfire: an unplanned and uncontrolled fire spreading through vegetative fuels, at times involving structures.

Wildfire Causes: the general causes of wildland fires are 1) natural, like lightning; 2) accidental, like debris burning; and 3) intentional, like arson.

Wildland: an area in which development is essentially non-existent, except for roads, railroads, power lines and similar transportation facilities. Structures, if any, are widely scattered.

Wildland Fire: any fire occurring on the wildlands, regardless of ignition source, damages or benefits.

Wildland Fire Agency: a firefighting organization, usually at the state or federal level, trained and equipped to fight wildland fires. Typically, wildland fire agencies are not trained and equipped to combat structure fires.

Wildland-Urban Interface: an area within or adjacent to an at-risk community where wildland fuels intermix with combustible homes and structures. Wildland-Urban Interface areas in Union County are identified in the Union County Community Wildfire Protection Plan.

Acronym List

BLM – Bureau of Land Management

CAR – Community at Risk

CTUIR – Confederated Tribes of the Umatilla Indian Reservation

EOC – Emergency Operations Center

EOP – Emergency Operations Plan

FEMA – Federal Emergency Management Agency

HFRA – Healthy Forests Restoration Act

NFP – National Fire Plan

NOIDC – Northeast Oregon Interagency Dispatch Center

ODF – Oregon Department of Forestry

ODOT – Oregon Department of Transportation

OEM – Oregon Emergency Management

OSP – Oregon State Police

PLS – Public Land Survey

RFPD – Rural Fire Protection District

TSI – Timber Stand Improvement

UCES – Union County Emergency Services

UCZPSO – Union County Zoning, Partition & Subdivision Ordinance

USFS – United States Forest Service

WUI – Wildland-Urban Interface

XII. Appendix B: Collaboration Methodology

Steering Committee

The Steering Committee met approximately every six weeks to guide the plan's progress. Meetings were held:

August 20, 2003
November 5, 2003
January 21, 2004
February 18, 2004
April 14, 2004
May 24, 2004
June 30, 2004
July 28, 2004
September 2, 2004
September 23, 2004
October 21, 2004
December 1, 2005
February 9, 2005
March 9, 2005
March 16, 2005
July 13, 2005

The Steering Committee met at either the Oregon Department of Forestry Office in La Grande or at the Union County Courthouse. Agendas, sign-in sheets and meeting notes are on file at both the ODF Office and the Union County Emergency Services Office in La Grande.

Community Workshops

The first round of community meetings were held:

Tuesday, October 12, 2004, at the Elgin Community Center

Thursday, October 14, 2004, at the Imbler City Hall

Tuesday, October 19, 2004, at the Medical Springs Rural Fire Department

Wednesday, October 20, 2004, at the City of La Grande Fire Station.

The purpose of the meetings was to inform citizens of Union County about the progress of the committee tasked with developing a Community Wildfire Protection Plan for Union County. Topics included discussion of the risk assessment involved in determining high hazard areas around the county, discussion of Union County Emergency Services operations related to wildfire response, and involvement of citizens in defining wildland-urban interface boundaries using hazard, risk, and values that may be affected by threat of wildfire.

***City of Elgin
Elgin Community Center***

Values at Risk included Spout Springs Ski Resort, Looking Glass Fish Hatchery, and North End of Union County for hunting value.

Concerns that were raised were the possibility of a structure fire carrying out into the wildland and concern for the number of elderly that live outside the City of Elgin, for example Palmer Valley, that may not have the capacity to deal with creating defensible space around their homes.

Idea for outreaching to the public with the questionnaire was to go to the Senior Meals hour at the community center and ask the citizens that attend to fill out the questionnaire.

***City of Imbler
City Hall***

Values at Risk included Phillips Creek coming down into the Pumpkin Ridge area, homes, children, animals. Concerns were many:

- 1) Pumpkin Ridge is an island in itself. Difficulties responding to incidents in the area include extended response time and lack of visibility with road dust from large vehicles traveling on the gravel roads in the area.
- 2) Ruckle Road, as far as fuels and structural ignitability, seems to be "worse off" than the End Road area.
- 3) Annexation within the Imbler Rural Fire District contains "skips" in assessments. Hence, landowners that are within the fire district may not be covered if the property was never assessed during annexation. Landowner A, B, and C on the same road may be covered, but Landowner D (next parcel up from A, B, and C) may not be covered by the protection of the fire district.
- 4) There have been many "close calls" in the Pumpkin Ridge area, showing risk of ignition and potential for a large fire.
- 5) Fire resources need to make sure they tie in with local people living within a community. Those community residents, in the event of a wildfire, will likely know who to contact in an evacuation, and will know which roads are fit for

travel for emergency vehicles and evacuation routes. (It was felt this isn't done enough.)

- 6) Some of the smaller areas/neighborhoods outside of a city, rural, or volunteer fire protection district "may have to take care of themselves and take more responsibility for their protection." Communities should prepare themselves by developing phone trees and all-hazard neighborhood plans similar to the kind of preparation the citizens living in the Pumpkin Ridge area have done.

Ideas for fire prevention or hazard mitigation:

- 1) Beth Burry, citizen of Pumpkin Ridge and volunteer for the Imbler Rural Fire Department, has tried to outreach to other neighborhoods within the fire district to develop phone trees and all-hazard plans. She has succeeded with the Pumpkin Ridge residents and feels it is because she makes it more of a potluck gathering than a meeting. People seem to respond to that method.

Pumpkin Ridge does have an active phone tree and they have made an agreement with Summerville Baptist to use the church as an evacuation site.

- 2) Union County should come up with some sort of campaign on behalf of the fire districts that informs citizens of the possibility that they may not be covered by a fire district. They should encourage landowners to check with the tax assessor's office to find out what protection they do have.
- 3) Fire prevention shouldn't stop after elementary school. It was felt that 7th through 12th grade students should be targeted.
- 4) The possibility of adding a substation for Imbler Rural should be explored. With the expansion of fire protection boundaries, responding to an incident is taking longer. Other districts in the county are adding substations, e.g., North Powder.

Medical Springs

Medical Springs Rural Fire District - Pondsosa Station

Values at risk included homes and people, and the new fire station. Attendees also mentioned that there were three old cemeteries and the old post office that represented historical value for them. The discussion of values at risk and a boundary for their wildland-urban interface will continue in a meeting the citizens will hold later. They decided to draw in the boundary themselves and contact Angie when the map is complete. Some of their ideas for a boundary included using the rural fire protection district boundary or expanding a 1/2 of a mile on either side of the highway [203] and a 1/4 of a mile from houses. The rural fire district boundary is 120 square miles and the fire district protects 60 homes.

Medical Springs is an active community that takes fire protection seriously. They have worked hard to establish a fire district and build a fire station, buy fire

equipment, and train personnel purely on grant funds. They also have a phone tree that was established as a way to notify them in case of an escaped inmate from Powder River Correctional Facility.

Concerns:

- 1) During past events, the county has not activated the phone tree, possibly because not everyone knew about it. The people of Medical Springs want to be notified in the event of an emergency. Just call the first person on the list to activate the tree.
- 2) Telephone is the best way to get a hold of folks in the Medical Springs area. Some of them, depending on location of residence, only get mail three times a week and radio signal is weak. Radio stations they do get are KCMB-104.7 on FM and 1490 AM.

***La Grande
City of La Grande Fire Station***

Values at Risk include:

- 1) Roadless areas, wildlife, old growth, and water quality.
- 2) Consider fire use before suppression. Let fire run its course.
- 3) "I'd like to see money spent on protecting public lands rather than human interests."
- 4) Consider the "big-scape."
- 5) Looking at burned areas left behind by wildfires is not necessarily bad or ugly. Fire has a positive role to play.

Concerns:

- 1) There should be restrictions on building homes in the wildland-urban interface. For example, Owsley Canyon represents an area where access is poor, vegetation hazard is high and close to homes, and building materials would not withstand a large fire. "Should restrictions be put in place for current structures?"
- 2) Long-term planning should include planning for liabilities and outcomes of hazards.
- 3) "Other values of the forest" won't be considered when planning for fuels treatment projects.
- 4) "We should fight fire with fire. Prescribed burning should be aggressive, both in planning and use. However, we need to make sure we keep in mind the best use of the land, wildlife, smoke management, etc."
- 5) We are passifying ourselves when just using a mechanical approach. Prescribed fire needs used more as a tool for reducing the fine fuels.
- 6) "Should you use a soils layer to determine potential fuel hazard?"

- 7) The county planning department needs to establish stringent regulations for new building or modification of existing buildings located in the wildland-urban interface.
 - 8) There was a concern raised regarding the use of federal money used to help people that can "afford to clean up." But, some money should still be made available.
 - 9) "Offering a one-time amount of grant money for initial clean-up is ok, but maintenance should be the responsibility of the landowner" from that point forward.
 - 10) Use of National Fire Plan funds should be funneled more toward emergency services needs like improving access routes. It should be used to promote emergency service and fire response.
 - 11) There is a tendency to save forest products and resources by preventing fire from running its course.
 - 12) Too much money is spent for treating a small amount of acres.
 - 13) Priorities should be well thought out in order to gain the most protection. We aren't going to completely prevent a large fire event.
-

The second round of community meetings were held:

Monday, April 18, 2005, at the Cove Ascension School

Tuesday, April 19, 2005, at the Elgin City Hall

Thursday, April 21, 2005, at the La Grande Rural Fire Hall (Island City)

The purpose of the meetings was to view and discuss draft Wildland-Urban Interface area boundaries. Topics also included communities at risk from wildfire and potential project ideas to address fire hazard and risk.

**Cove
Ascension School**

Comments:

- 1) Increased communication about cost-share opportunities and other financial benefits should take place between the ODF and Cove RFPD / residents.
- 2) More promotion of agency projects should take place in the Cove area to increase awareness of risk reduction.
- 3) Explore the possibility of bio-mass opportunities (such as Fuels for Schools).

**Elgin
City Hall**

Comments:

- 1) Several minor comments were made specific to identified Wildland-Urban Interface areas that slightly changed the boundary.
- 2) General support of the plan was voiced.

**Island City
La Grande Rural Fire Hall**

Comments:

- 1) Support for fuels reduction projects in high-risk areas was expressed by a landowner in the Mt. Emily Wildland-Urban Interface area.

Press Releases Submitted

October 1, 2004
NEWS RELEASE
FOR IMMEDIATE RELEASE
Contact: Dara Decker (541) 963-1009

**PUBLIC WORKSHOPS SET FOR UNION COUNTY'S COMMUNITY WILDFIRE
PROTECTION PLAN**

A series of community workshops will take place during October 2004 to review fire risk, identify community priorities for wildfire protection, and discuss emergency services relevant to wildfires. The workshops will take place on (pick the workshop that fits your schedule):

October 12, 2004	Tuesday	Elgin Community Center	6:30 to 8 p.m.
October 14, 2004	Thursday	Imbler City Hall	6:30 to 8 p.m.
October 19, 2004	Tuesday	Medical Springs RFPD	6:30 to 8 p.m.
October 20, 2004	Wednesday	La Grande Fire Station	6:30 to 8 p.m.

Representatives from the County Board of Commissioners, County Emergency Services and Sheriff's Office, Oregon Department of Forestry (ODF) and United States Forest Service (USFS) will attend and lead the discussions.

This is the first of two rounds of community workshops for you to learn about the Union County Community Wildfire Protection Planning process, to understand areas of Union

County that are at risk of wildfires and to tell us the forestland attributes of Union County that you value the most. The second round of community workshops will use GIS mapping to combine the areas-at-risk information with values identified by you to produce maps for discussion and refinement. The maps will become part of the Union County Community Wildfire Protection Plan and will guide risk reduction strategies. The second round of workshops will take place in communities other than those listed above to allow greater opportunity for citizens to participate.

Union County's fire planning effort is part of a broader national initiative launched by the White House and the Western Governor's Association following the extreme fire season of 2000. A report assessing the impacts of those wildfires highlighted the need for investment to reduce fire risk, and the importance of expanding local collaboration in the planning and implementation of such projects.

The planning process includes an evaluation of wildfire risk in relation to important community values, including private and commercial property, watersheds, wildlife habitat, and recreational areas. The process will also evaluate and prioritize strategies to protect areas of high risk. Union County could potentially benefit from grant opportunities that become available for community projects where community wildfire protection plans have been developed through a collaborative process.

The guiding principle is to have states and local governments as full partners with federal agencies in making decisions that relate to the goals of wildfire risk reduction, including prioritizing fuels reduction on private land. Union County is supporting the effort with Title III funds from the U. S. Department of Agriculture. The USFS and ODF provide additional funding and support.

Any questions about this process may be directed to:

Dara Decker (541) 963-1009, UC Emergency Services Officer and Committee Co-Chair

Angie Johnson (541) 963-3168, National Fire Plan Planning Coordinator, ODF-NE Oregon District and Committee Co-Chair

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April 11, 2005
NEWS RELEASE
FOR IMMEDIATE RELEASE
Contact: Dara Decker (541) 963-1009

FINAL ROUND OF WORKSHOPS SET FOR COMPLETION OF UNION COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

Citizens of Union County participated in a series of public meetings that were held throughout Union County last October meant to introduce them to the committee members who are preparing the county's Community Wildfire Protection Plan, and familiarize them with the process involved with putting a CWPP together. The second round of community workshops is set for this month. Citizens are encouraged to pick the meeting most convenient to them; the material presented will be the same at all meetings. The workshops will consist of discussing high hazard wildland-urban interface (WUI) areas and communities-at-risk, review the list of priority WUI areas of the county, and discuss ideas for projects within the WUI areas based on outcomes of the hazard assessment conducted. Also, a rough draft of the plan is available for review and comment. Representatives from the County and Oregon Department of Forestry will provide information and lead the discussions. Other agencies and fire departments that are participating in the planning effort will also be available for questions. The schedule for meetings is as follows (all will be from 6:30 p.m. to 8:30 p.m.):

April 18, 2005	Monday	Cove Ascension School (Kimsey Commons)
April 19, 2005	Tuesday	Elgin City Hall
April 21, 2005	Thursday	La Grande Rural FPD (Island City)

Union County's fire planning effort is part of a broader national initiative launched by the White House and the Western Governor's Association. Assessing the consequence of wildfire in Union County highlighted the need for investment to reduce fire risk. The importance of expanding local collaboration in the planning and implementation of projects geared at influencing the work plans of both the USFS and BLM improves fire prevention and suppression, reduces hazardous fuels, restores fire-adapted ecosystems, and promotes community assistance. Grant opportunities exist for community projects where community wildfire protection plans have been developed through a collaborative process.

Any questions about this process may be directed to:

Angie Johnson, NFP Planning Coordinator, ODF	(541) 963-3168
Dara Decker, Union County Emergency Services Officer	(541) 963-1009

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Website

The Union County website (www.union-county.org) and the Oregon Department of Forestry website (www.odf.state.or.us/areas/eastern/northeast/default.asp) were utilized to post copies of the draft plan, share risk assessment information, advertise community workshops and display the Values-At-Risk Questionnaire for download and completion. A final copy of the plan will be posted to both websites after adoption and the websites will be available for the duration as a communication tool for communities to express comment or concern about protection from wildfire.

Values-At-Risk Questionnaire / Blue Mountain Survey

Values-At-Risk Questionnaire

The Values-At-Risk Questionnaire was a grassroots effort by the Steering Committee to invite comments on the forest attributes valued most by residents. The questionnaire was posted on the Emergency Services website and was published in The Observer October 14-16, 2004 and October 19-21, 2004. It was also made available at community workshops and placed in community libraries and city halls throughout Union County (specifically: North Powder City Hall, La Grande Library, La Grande City Hall, La Grande Senior Center, Island City City Hall, Summerville City Hall, Union City Hall, Union Library, Cove City Hall, Cove Library, Imbler City Hall, Elgin City Hall and Elgin Library). The questionnaire was also distributed on the Eastern Oregon University campus and with the Union County Search and Rescue Unit. Questionnaire outcomes are included on the next page.

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Responses to Question #5 from questionnaire

Union County Community Wildfire Protection Plan Questionnaire Values List

Q5 – List 3 attributes you value most about your community:

Elgin

1. Small community atmosphere
2. Quiet and peaceful (3)
3. Beauty/scenic value (1)
4. Clean air/water
5. Timber resource/productivity
6. Wildlife/habitat
7. Natural trees and vegetation
8. Water resource
9. Friends

Q5 – List 3 attributes you value most about your community:

Imbler

1. No tavern
2. No cemetery
3. No taxi

Q5 – List 3 attributes you value most about your community:

Island City

1. Clean air/water (1)
2. Small community atmosphere (1)
3. Neat and attractive community
4. Natural trees and vegetation
5. Good government
6. Good retail mix

Q5 – List 3 attributes you value most about your community:

Pumpkin Ridge/Summerville

1. Forest/land (3)
2. Wildlife/habitat (4)
3. Friends/neighbors (8)
4. Family (1)
5. Animals
6. Home/property (1)
7. Open space (1)
8. Love the location (2)
9. Beauty/scenic value (4)
10. Community safety
11. Rural character (2)
12. Willingness to work together (1)
13. Small community atmosphere (1)
14. Forgiving
15. Quiet and peaceful

16. Mixed uses
17. Transition between forest and agricultural land
18. Hiking trails
19. Private land adjacent to federal land

Q5 – List 3 attributes you value most about your community:

Cove

1. The town
2. Love the location
3. Friends/neighbors (3)
4. Beauty/scenic value (2)
5. Schools
6. Helpful
7. Quiet and peaceful
8. Freshness
9. Mountains
10. Small community atmosphere
11. Timber
12. Home/property
13. Recreation
14. Wine
15. Knowing how to help in case of fire

Q5 – List 3 attributes you value most about your community:

Union

1. Small community atmosphere (3)
2. Historical nature of community (3)
3. Rural character
4. Fishing
5. Hiking
6. Horseback riding
7. Sense of community/community pride (5)
8. Volunteerism (1)
9. Quiet and peaceful (2)
10. Clean air/water
11. Beauty/scenic value (2)
12. Friends/neighbors (2)
13. Community safety
14. Catherine Creek (1)
15. Open space
16. Wildlife/habitat

Q5 – List 3 attributes you value most about your community:

North Powder

1. Beauty/scenic value
2. Climate
3. Rural character
4. Agriculture
5. Quiet and peaceful
6. Small community atmosphere

Q5 – List 3 attributes you value most about your community:

Rural County

1. Beauty/scenic value
2. Quiet and peaceful
3. Rural character
4. Forested habitat
5. Hunting
6. Fishing
7. Skiing
8. Horseback riding

Q5 – List 3 attributes you value most about your community:

Outside Union County

1. People (2)
2. Green lawns
3. Small community atmosphere (3)
4. Clean air/water (2)
5. Open space
6. Home/property
7. No traffic
8. Clean community
9. Community safety (1)
10. Convenient to larger cities

Q5 – List 3 attributes you value most about your community:

Did not specify

1. Wildlife/habitat (1)
2. Forest
3. Recreation
4. Home/property
5. Clean air/water
6. Electrical power
7. The town
8. People
9. Environment (1)
10. Greenery
11. Conservation

Q5 – List 3 attributes you value most about your community:

La Grande

1. Communication
2. Social support
3. Rural character (2)
4. Friends/neighbors (22)
5. Small community atmosphere (13)
6. Sense of community/community pride (10)
7. Community appearance (6)
8. Recreation (5)
9. Wildlife/habitat (16)
10. Timber resource/productivity (4)
11. Beauty/scenic value (11)
12. Economy (1)

13. Quiet and peaceful
14. Livability (3)
15. Fishing (3)
16. Hunting (2)
17. Clean air/water (6)
18. Forest/land (11)
19. Mountains (4)
20. University (12)
21. Community safety (5)
22. Diversity
23. Climate (2)
24. Rural character (5)
25. Many churches
26. Downtown
27. Few hazards
28. Love the location (1)
29. Possessions (1)
30. 30' from fire hydrant
31. Inexpensive cost of living (2)
32. Agriculture (2)
33. Wilderness
34. Fun
35. Bowling alley
36. Home/property (4)
37. Public services
38. Search and Rescue
39. Open Space (1)
40. Medical facilities

Responses to Question #7 from Questionnaire

Union County Community Wildfire Protection Plan Questionnaire Values List

Q7 – If you answered yes to #6, please list how:

Elgin

10. Fire threatens my home and the beauty of the area.
11. A wildfire would devastate the scenic value, timber resources and clean air and water.
12. Our 30 acres would be devastated and our timber lost.

Q7 – If you answered yes to #6, please list how:

Island City

1. Fire would threaten local business.
2. Dense smoke would be difficult to endure.

Q7 – If you answered yes to #6, please list how:

Pumpkin Ridge/Summerville

1. Fire would destroy wildlife and their habitat. (2)
2. Fire would destroy houses. (2)
3. Fire would destroy trees and land. (1)
4. Fire would destroy the scenic beauty of our area. (2)
5. I live by a non-treatable wilderness.
6. Wildfire could lead to death.
7. Fire could destroy the view of trees on Mt. Emily like it did Mt. Harris.

Q7 – If you answered yes to #6, please list how:

Cove

1. Fire could burn down the town.
2. Burned stuff isn't pretty and my house might burn down.
3. Fire is both good and bad; it helps the mountains but if out of control will take the freshness of the landscape away.
4. The backdrop may burn and homes may be destroyed.
5. I want to be helpful to other people in case of fire.

Q7 – If you answered yes to #6, please list how:

Union

1. If mountains are charred, why hike them?
2. We don't have the urban interface area like Cove, Starkey, Mt. Emily, etc.
3. Loss of life, natural resources and community.
4. Burning causes poor air quality and degrades scenery.
5. Wildfire would ruin the trees and streams.

Q7 – If you answered yes to #6, please list how:

North Powder

1. A fire would destroy the view of the forest, harm wildlife habitat and encourage the growth of noxious weeds.
2. Fire would burn crops and ranching.
3. People would move away.

Q7 – If you answered yes to #6, please list how:

Rural County

1. A wildfire would affect the beauty of the area by destroying the trees.
2. Threaten wildlife, erode soils, pollute waterways and desecrate the landscape.

Q7 – If you answered yes to #6, please list how:

Outside Union County

1. Values are burned up.
2. Fire would ruin the landscape and the air would stink.
3. Smog...
4. The air would get smoky.

Q7 – If you answered yes to #6, please list how:

Did not specify

1. Fire would affect the landscape in many ways; the trees would be gone.
2. Management is needed to prevent fires.

Q7 – If you answered yes to #6, please list how:

La Grande

1. Fire would destroy appearance and habitat.
2. All could be destroyed in a major event.
3. Loss of scenery for decades and a loss in real estate values.
4. Destruction of habitat, view sheds and trees.
5. The safety of the community would be compromised by an unchecked threat of wildfire.

6. I wouldn't be able to enjoy the livability, recreation and wildlife of the area.
7. I live at the base of the mountains and I enjoy the wildlife.
8. It would destroy habitat for the wildlife, which would affect sportsman's activities.
9. Physical beauty would be impacted.
10. Fire would destroy property, lives and wildlife.
11. Wildfire would burn timber, kill animals and possibly ruin habitat.
12. Fire would ruin some of the buildings and homes that have been here for years.
13. Fire would burn the trees on the mountains.
14. There would be dust but no trees, shrubs, beauty, wildlife or erosion control.
15. The scenic beauty, nice neighborhood and wonderful downtown would be destroyed.
16. Lost landscape, life and timber.
17. The views, air quality and recreational opportunities would be impacted.
18. There would be no hunting, camping or nature.
19. I recreate in the woods and fire would be a threat; thin and hand pile.
20. The landscape wouldn't be so great anymore.
21. Fire would burn the trees to nothing.
22. Possible destruction of the land.
23. The scenery and wildlife would no longer exist.
24. Loss of habitat for animals.
25. Fire would affect the wildlife population.
26. Fire could burn down the fun.
27. Wildlife!
28. There could be structural damage and love ones lost.
29. Fire damages the looks.
30. My home or school could burn!
31. Fire could burn over the highway when I want to go home.
32. Wildfire would burn down my house, be expensive to local government and cause loss of my neighborhood.
33. Wildfire could be detrimental to safety.
34. A wildfire would burn the grazing land and the trees.
35. There would be total destruction, loss of homes and life.
36. The surrounding area could burn down.
37. If a wildfire went through, the mountains would be burned and not as pretty.
38. Fire would burn private property (homes), cause smoke and smog and trees would burn.
39. The town, land and wildlife could be destroyed.
40. There would be no trees, no deer/elk and no Tree City USA for the 14th year.
41. The town, natural resources and jobs would be reduced by a large wildfire.
42. Fire would destroy the clean and beautiful scenery; it would take years to replenish.
43. People and trees could be burned to death.

Blue Mountain Survey

The Blue Mountain Wildland-Urban Interface Wildfire Study was a scientifically engineered study meant to gauge residents' understanding of wildfire issues in high-risk areas. The survey was mailed out using statistical sampling techniques in Union, Baker and Wallowa Counties. Survey outcomes are included here:

Blue Mountain Wildland-Urban Interface Wildfire Study SUMMARY OF RESULTS

September 2003

Surveys Mailed: 847
Surveys Returned: 225 (26.6%)

Question 1. Are you a forest landowner?

Yes: 86%
No: 14%
Total Responses: 218

Question 2. Do you live on your forested property?

Yes: 72%
No: 28%
Total Responses: 184

Question 3. How many forested acres do you own?

Total Acres: 14,814
(345,814 with Boise Solutions)
Average Acres per Respondent: 84
Total Responses: 176

Question 4. Please indicate the geographic area in which your forested property is located. (If you own property in more than one area, please mark all that apply).

Mt Emily: 42
Cove: 9
Morgan Lake: 10
Pumpkin Ridge: 23
Ruckle Rd: 23
Upper Lostine Subdivision: 0
Wallowa Lake Basin: 0
West of Wallowa Lk: 0

Alder Slope: 0
Imnaha River Woods: 0
Ferguson Ridge/Prairie Ck: 0
Sumpter Valley: 25
Stices Gulch: 5
Base of Elkhorn Mtns: 55
Sparta: 0
Halfway/Pine Valley: 1
Ukiah: 0
Meacham: 2
Weston Mtn/Tollgate: 1

Total Responses: 196

Question 5. How high do you feel the risk of a wildfire is in your neighborhood?

High: 31%
Med: 57%
Low: 12%
Total Responses: 183

Question 6. If a wildfire occurred in your area, what factors would place you and/or your home at risk?

A. Neighboring properties with high fuel load.

High: 70%
Low: 30%

B. Response time/capability/equipment of local fire agencies.

High: 54%
Low: 46%

C. Fuel loads on your properties.

High: 41%

Low: 59%

Low: 8%

Total Responses: 179

D. Flammability of your structures.

High: 43%

Low: 57%

Question 10. Have you worked around your home to create a defensible space?

Yes: 83%

No: 17%

Total Responses: 172

E. Access to your property.

High: 25%

Low: 75%

Question 11. If you did do this work, did you use National Fire Plan cost share assistance?

Yes: 18%

No: 82%

Total Responses: 166

F. Construction material used on home.

High: 43%

Low: 57%

G. Position of home on slope.

High: 24%

Low: 76%

Question 12. How interested are you in learning more about creating defensible space?

High: 36%

Med: 38%

Low: 26%

Total Responses: 176

H. Loss of services and utilities.

High: 45%

Low: 55%

Total Responses: 147

Question 7. Do you have a plan for what you would do if there were a fire in your neighborhood?

Yes: 54%

No: 46%

Total Responses: 184

Question 13. Where is the greatest need for fuels reduction work?

Private lands: 41%

U.S. Forest Service: 53%

Industrial Forest Land: 6%

Total Responses: 203

Question 8. Have you participated in National Fire Plan activities?

Yes: 28%

No: 72%

Total Responses: 185

Question 14. How concerned are you about your scenic view being impacted by National Fire Plan Fuels Reduction work?

Very Concerned: 16%

Somewhat Concerned: 29%

No Concern: 55%

Total Responses: 185

Question 9. Defensible space refers to the area between a house and an oncoming wildfire where the vegetation has been modified to reduce the wildfire threat and to provide an opportunity for firefighters to effectively defend the house. Sometimes a defensible space is simply a homeowner's properly maintained back yard. How knowledgeable do you feel you are regarding creating defensible space?

High: 54%

Med: 38%

Question 15. If you were interested in learning more, what kind of informational format would you prefer?

A. Direct mailed brochures: 22%

B. Centralized workshops or classes: 9%

C. Video: 9%

D. Hands-on demonstrations: 8%

E. Self-guided tour of demonstration areas: 8%

F. Local television: 2%

- G. Radio: 2%
- H. Internet website: 9%
- I. Neighborhood workshop: 10%
- J. Individual consultation: 14%
- K. Newspaper insert: 7%

Question 16. Please rate your level of concern regarding building a defensible space around your home (1=very little concern; 4=extreme concern).

Amount of physical work required.

- 1: 44%
- 2: 31%
- 3: 17%
- 4: 8%

Amount of time required.

- 1: 39%
- 2: 32%
- 3: 18%
- 4: 11%

Financial cost required.

- 1: 31%
- 2: 18%
- 3: 28%
- 4: 23%

Doing the work yourself.

- 1: 51%
- 2: 25%
- 3: 11%
- 4: 13%

Hiring a contractor/forestry professional.

- 1: 39%
- 2: 14%
- 3: 19%
- 4: 28%

The aesthetic value of your property.

- 1: 28%
- 2: 20%
- 3: 26%
- 4: 26%

Neighborhood covenants/restrictions.

- 1: 72%
- 2: 12%
- 3: 8%
- 4: 8%

Amount of maintenance required.

- 1: 48%
- 2: 34%
- 3: 10%
- 4: 8%

Question 17. How much would you be willing to pay to reduce the wildfire risk that your home faces?

- Very little: 40%
- Some: 55%
- A lot: 5%

Total Responses: 166

Question 18. Are you aware of the financial assistance available for treating fuels on homeowners'/ landowners' properties?

- Yes: 55%
- No: 45%

Total Responses: 183

Question 19. If so, are you interested in applying for some of these funds?

- Yes: 58%
- No: 42%

Total Responses: 160

Question 20. If not, why would you be reluctant?

- A. Not interested in assistance: 19%
- B. Don't need it: 45%
- C. Don't want to do any work: 0
- D. Government requirement/ regulation issues: 36%

Total Responses: 91

Question 21. Would you be willing to put on an educational program for your neighborhood?

- Yes: 25%
- No: 75%

Total Responses: 173

Local Radio / Newspaper

The Observer and two local radio groups, KCMB and KUBQ, were utilized to advertise the planning effort and promote participation opportunities. The Observer also provided copies of photos from the 1973 Rooster Peak Fire. Copies of articles and ads are included in the next five pages (not numbered - photocopies and faxed material).

(If you are viewing this document on-line, then you will need to contact Angie Johnson, (541) 963-3168, or Dara Decker, (541) 963-1009, to see copies of the articles and ad.)

XIII. Appendix C: Union County Emergency Operations Plan - Wildland Fire Annex

Wildland Fire

I. PURPOSE

The purpose of this hazard specific annex is to provide an outline of the roles and responsibilities of the different agencies that may be involved in an urban / wildland interface fire.

The goal of this wildland fire annex is to ensure the safety of life and property during a wildfire event.

Many agencies and jurisdictions within the county could be involved if a wildfire threatens people and property. It will take coordination and cooperation of all agencies to adequately protect the lives and property of Union County citizens.

II. SITUATIONS AND ASSUMPTIONS

Situation

Union County is predominately rural, with many outlying farms and ranches. Some areas in Union County have no available structural fire protection.

Union County covers approximately 2,038 square miles of land committed to various uses. Resource land uses like agriculture, timber, grazing and aggregate mining, along with other uses such as residential, commercial and industrial development are present in Union County, and may be protected by several different agencies, each with specific boundaries and jurisdictions.

All areas of the county are subject to thunder and lightning storms throughout the spring, summer, and fall months, which can cause many fires per year. As 49% of Union County is publicly owned, many hunters, hikers and other outdoor enthusiasts take advantage of outdoor recreation in Union County, which can be a cause for concern related to human-caused wildfire ignitions.

Assumptions

The protection of life and property is paramount in decisions relating to firefighting procedures.

With numerous agencies and jurisdictions potentially becoming involved, coordination and cooperation among agencies is vital in achieving maximum fire suppression.

Assistance through mutual aid agreements may be necessary, and mutual aid agreements are in place among rural fire protection districts (RFPDs) and wildland fire suppression agencies.

Resource procurement assistance may be necessary through the county and private contractors.

The first responding RFPD or agency will assume Incident Command (regardless of jurisdiction) until relieved by the responsible agency. If the wildland fire remains within one jurisdiction, that RFPD/agency assumes Incident Command and uses the Incident Command structure. If the wildland fire incident involves more than one state/federal agency or any municipality and a state/federal agency, then the Unified Command structure will be used.

All affected agencies or municipalities will be notified through the 911 Center, Northeast Oregon Interagency Dispatch Center (NOIDC), or the Emergency Services Officer.

III. CONCEPT OF OPERATIONS

General

Primary responsibility for incident command and control rests with agency representatives. The on-scene commander has the authority to deploy departmental resources. The incident command/unified command system will be used in all county emergency situations. Each agency will maintain contact as best as they can to ensure proper coordination.

Preparedness

1. Update mapping of area jurisdictions, and provide to all mutual aid agencies.
2. Preplan and coordinate communications and frequency use.
3. Identify vulnerable areas and plan for their defense or evacuation.
4. Pre-plan and be familiar with evacuation plans and routes.
5. Be familiar with requirements for requesting State and Federal disaster assistance in a timely manner.
6. Agencies will ensure all equipment is in operational working order.
7. Make available public information handouts on how citizens can prevent and defend their property, and lives.
8. Train and exercise regularly; then review and update. Overall response among affected agencies will be strengthened and streamlined by practicing together in drills and scenarios on a regular basis.

Response

All affected departments/agencies within the county with response obligations are as follows:

1. *911/DISPATCH RESPONSE:*
 - Maintain standard 911 service.
 - Maintain standard dispatch protocol.
 - Maintain incident communications unless the lead dispatcher determines that the EOC must be opened to assume incident communications.
 - Relay emergency warning as directed by the Incident Commander.
 - Notify NOIDC of wildland fires burning within one mile of the protection boundary.

2. *FIRE SERVICE RESPONSE:*
 - Containment and control of fires.
 - Related rescue events (if trained).
 - Hazardous materials expertise (up to their individual qualifications) and containment (if trained).
 - Request additional resources from existing mutual aid agreements.
 - Request activation of the State Conflagration Act (County Fire Chief) according to state guidelines.

3. *LAW ENFORCEMENT RESPONSE:*
 - Preservation of law and order.
 - Implementation of warning system.
 - Provide security, traffic and crowd control.
 - Assist in evacuation and egress procedures.

4. *PUBLIC WORKS RESPONSE:*
 - Logistical support associated with the incident.
 - Debris removal.
 - Road maintenance on a priority basis.

IV. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

General

Organizational response procedures practiced on a day-to-day basis will be familiar during disaster situations and augmented as necessary. Support will be provided by other agencies or through contractors as the events dictate.

Task Assignments

Union County Fire Agencies:

1. Coordinate all fire control and rescue activities between all affected

- agencies within fiscal policies.
2. Provide on-scene hazardous materials expertise up to qualifications, then request hazardous materials regional team.
 3. Request and coordinate mutual aid response from other agencies.
 4. Provide on-scene prevention and code enforcement to minimize the incident.
 5. Provide support and assistance for warning, sheltering, evacuation, and other public safety operations as needed.

Those duties (as outlined above) pertain to all activities within district boundaries. Mutual aid assistance to Union County cities or RFPDs is outlined in current agreements.

Oregon Department of Forestry will take the lead role in fire suppression and manpower relating to private forested lands.

U.S. Forest Service will take the lead role in fire suppression and manpower relating to federal forest lands.

The *Bureau of Land Management* has contracted with the US Forest Service for initial attack responsibilities on BLM land in Union County. An agreement is in place between the BLM and the USFS specifying that the nearest resources to the incident, regardless of ownership or suppression responsibility, are deployed for initial attack.

Union County Law Enforcement Agencies:

1. Responsible for uninterrupted law enforcement activities, to the extent possible, within the unincorporated areas of Union County during emergency conditions.
2. Request the evacuation of residents affected by incident.
3. Coordinate outside law enforcement assistance in unincorporated areas.
4. Initiate Warning and Communications functions.
5. Provide direction and support for other response departments and public safety agencies (fire, public works).
6. Direct traffic control.
7. Assist with affected area security.
8. Coordinate, assist with evacuation procedures.
9. Assist the Sheriff and coordinate outside resources when necessary.

Oregon State Police will assist county law enforcement with site security, evacuation, and technical expertise as requested.

Law enforcement is responsible for those duties, as outlined above, within their jurisdiction.

Union County Public Works Agencies:

1. Provide equipment, manpower, and materials necessary for logistical support to assist in fire suppression.
2. Maintain communications link with EOC.
3. Be available to support cities inquiries and requests.
4. Repair and restore vital facilities and essential services.
5. Utilize and coordinate outside private resources at the county's disposal.
6. Assist utilities in essential emergency repairs.
7. Assist other public safety agencies in search and rescue, evacuation, site security, and other pertinent response functions as time and manpower permit.

ODOT will participate in wildland fire emergencies as outlined in the *ODOT Emergency Operations Plan, Annex E – Incident Management, Appendix 4 – Wildland Fire*. ODOT may also provide assistance and coordination for road maintenance and debris removal activities on the city/county road system in concert with public works officials.

Union County Emergency Services:

1. Notify and update Union County Commissioners on the situation.
2. Activate the EOC if required.
3. Notify Oregon Emergency Management of situation.
4. Advise adjacent counties of potential mutual aid requests.
5. Alert sheltering organizations of crisis potential.
6. Prepare emergency declaration if required.
7. Prepare a county public information release.

State of Oregon Departments:

Involvement of state agencies other than what is normally provided for on a day-to-day basis will require a local emergency declaration requested by the county and approved by the Governor.

Union County Unprotected Areas:

Union County has approximately 50,890 acres of unprotected land. When a wildfire event is imminent and meets the criteria for activating the State Conflagration Act, the Union County Fire Chief will request assistance and support for wildland fire suppression.

V. DIRECTION AND CONTROL

Routine operations will be handled by individual departments/agencies' standard operating procedures. During heightened emergency conditions requiring activation of the EOC, the department head/agency representatives will coordinate activities from the EOC. Each department/agency will name an alternate to cover any shift change or the absence of the primary responder.

It may also be necessary to staff individual command posts (incident command) with supervisory personnel. The major activity at the site will dictate overall incident command. Each department ranking officer at the command post will establish and maintain communications, direct emergency operations, and coordinate all requests for assistance through agency representatives at the EOC. When on-scene capabilities are exceeded, outside assistance will be requested and coordinated from the EOC.

VI. CONTINUITY OF GOVERNMENT

Lines of succession within each department and division are outlined in established standard operating procedures. The Incident Commander (IC) and Command Post (CP) location will be quickly identified and relayed to all responding agencies.

The Union County line of authority succession is listed in the Basic Plan, Section XI.

During a "declared" emergency event, consideration may be given to utilizing State Emergency Management personnel to fill vacant key positions.

Procedures must be followed to ensure protection of all vital county and individual departmental records, whether disaster related or from everyday operations. Safe storage facilities, not prone to disaster events (i.e. flood damage) should be utilized where possible.

VII. ADMINISTRATION AND SUPPORT

Communications

Communications play a vital role during department/agency response, which are primarily handled through the Union County 911/Dispatch Center and supported by EOC participation. Any resources responding to a county wildfire incident will be assigned a radio frequency from either 911 or NOIDC.

To the extent possible, state/federal agency radio frequencies should be programmed into local fire agency radios and local fire agency radio frequencies should be programmed into state/federal agency radios. Additionally, any new frequencies used in Union County should be programmed into all agencies' handheld and mobile radios.

911 Center / NE Oregon Interagency Dispatch Center Interface

Due to the fact that numerous agencies and departments will respond to a wildland fire of any size, communications can become hectic, especially for dispatching agencies. To minimize confusion and streamline communications as much as possible, 911 and NOIDC have come to the following agreement:

At this time, NOIDC and 911 do not share radio frequencies. If a fire occurs on or near a mutual boundary, federal, state and rural fire agencies shall be dispatched. 911 will dispatch rural fire districts via radio and call NOIDC to advise them of the incident. Since the dispatch centers do not share radio frequencies, 911 will maintain radio communications with the rural fire districts and NOIDC will maintain radio communications with federal and state responders. Incident Command may maintain radio contact with NOIDC and may choose federal or state frequencies to handle all communications. NOIDC and 911 will communicate via phone when necessary.

Administration

The timely and efficient response of public safety agencies during emergency events requires extraordinary coordination between field units and the EOC. Priorities assigned by department heads will facilitate an orderly and efficient use of response personnel. Records generated during emergency events will be collected and filed chronologically. Good record keeping procedures are essential for review, future planning, and event reconstruction. Resource lists are available in the Emergency Services Office.

VIII. ANNEX DEVELOPMENT AND MAINTENANCE

It is the responsibility of the county and each city's public safety agencies to ensure its own operational capability.

The Emergency Services Officer will coordinate with all agencies for the maintenance of this Annex and coordinate input from each response agency.

APPENDICES (*inquire at Emergency Services Office*)

- Appendix 1 – Emergency Response Log
- Appendix 2 – Disaster Area Permit
- Appendix 3 – Conflagration Act
- Appendix 4 – Resource Lists

XIV. Appendix D: Sources

Website Sources

<http://www.fireplan.gov/reports/351-358-en.pdf>

<http://www.nwfireplan.gov>

<http://www.fireplan.gov/content/home>

<http://www.fireplan.gov/reports/7-19-en.pdf>

<http://www.whitehouse.gov/infocus/healthyforests/toc.html>

<http://www.fema.gov/fima/planning10.shtm>

http://www.odf.state.or.us/DIVISIONS/protection/fire_protection/prev/sb360/docs/overview.pdf

CWPP References

Section I - Introduction

<http://www.communitiescommittee.org/pdfs/cwpphandbook.pdf>

ii Oregon Emergency Management; *Emergency Management Plan, Natural Hazards Mitigation Plan, Fire Chapter*, (December 2003).

iii Oregon Department of Forestry; *Forest, Farms and People: Land Use Change on Non-Federal Land in Eastern Oregon, 1975-2001* (August 2004).

http://www.odf.state.or.us/DIVISIONS/resource_policy/resource_planning/Annual_Reports/EORDZ.pdf

Section II - Union County Profile

i *The Climate of Oregon: From Rain Forest to Desert*, Taylor, George H. and Hannan, Chris, Corvallis, OR: OSU Press (1999) pp. 80.

ii Ibid, pp. 8-9.

iii Taylor, *Climate of Oregon*.

iv *Union County Population Analysis and 2020 Forecast; Final Draft*, The Benkendorf Associates Corporation, (January 25, 2001) pp. 1.

v *Union County 2002 Strategic Plan*, Elesco Limited and Auyer Consulting, (June 2002) pp.15.

vi Union County Assessment and Tax Collection Department, (March 2005).

Section V - Community Outreach and Education

i Union County Zoning, Partition and Subdivision Ordinance, Siting Standards for Dwellings and Structures and Development and Fire Siting Standards (Adopted November 2, 1983).

Section VI - Wildfire Risk Assessment

¹ This document was authored by Angie Johnson, Oregon Department of Forestry-Northeast Oregon District, and edited by Trish Wallace, US Forest Service-Wallowa-Whitman office. The hazard assessment was conducted by both Trish and Angie.

² *Expanded Fire Condition Class Definition Table*. Available at <http://www.frcc.gov>.

Section IX - Maintenance Plan for Fuels Treatment

ⁱ A Conceptual Approach for a Maintenance Strategy for Fuel Treatments in Oregon: Maintaining the Investment, Fitzgerald, Stephen and Martin, Charlie, Oregon State FFHM Committee Report. (July 5, 2004).

ⁱⁱ Oester, Paul. *Blue Mountains Renewable Resource Newsletter*. Vol. 20, No. 3, (Fall 2004).

Union County Community Wildfire Protection Plan

A working document that will serve as a resource for providing information to enhance community safety through hazard and risk reduction in the wildland-urban interface areas of Union County

08-10-05



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Acknowledgements

This project was funded using *Title III – County Project* dollars from the *Secure Rural Schools and Community Self-Determination Act of 2000*.

A special thank you to the Community Wildfire Protection Plan Steering Committee and Resource Committee who dedicated their time and effort to this project while continuing to carry out the duties of their everyday jobs.

Recognition also goes to the many citizens of Union County and to local, state and federal government organizations who assisted in this planning effort by providing historical and technical information for the project.

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Individual Wildland Urban Interface Area maps are provided in Section VII.

Signature Page

Transmitted herewith is the *Wildfire Protection Plan for Union County*. The Wildfire Protection Plan provides a framework in which Union County can assess the risks and hazards associated with Wildland-Urban Interface areas and identify methods of reducing the risk of ignition or eliminating hazards.

The Union County Board of Commissioners has approved this plan and both wildland firefighting agencies and the County's structural fire protection services have agreed upon the contents. The plan contents will be revisited annually and projects will be revised and updated as necessary. All recipients are requested to advise the Union County Emergency Services Office of any changes that might result in its improvement or increase its usefulness.

Colleen MacLeod, Union County Commissioner

Steve McClure, Union County Commissioner

John Lamoreau, Union County Commissioner


Ray Hamann, Union County Fire Chief


John Buckman, District Forester, NE Oregon District, Oregon Dept. of Forestry

BE IT REMEMBERED, that at a regular term of the Board of Commissioners of the State of Oregon, for the County of Union, sitting for the transaction of County business, begun and held at the Joseph Building Annex in the City of La Grande, in said County and State, on Wednesday of said month and the time fixed by law for holding a regular term of said Commission, when were present:

The Honorable Colleen MacLeod, Chair
Steve McClure, Commissioner
John Lamoreau, Commissioner

WHEN, on Wednesday the 10th day of August 2005, among others the following proceedings were had to wit:

IN THE MATTER OF A RESOLUTION)	RESOLUTION
ADOPTING THE UNION COUNTY)	2005-25
COMMUNITY WILDFIRE)	
PROTECTION PLAN AND ESTABLISHING)	
AN ANNUAL REVIEW BOARD)	

WHEREAS, the Union County Board of Commissioners allocated *Title III County Project* money from the *Secure Rural Schools and Community Self-Determination Act of 2000* to complete a Community Wildfire Protection Plan for Union County communities;

WHEREAS, the Union County Community Wildfire Protection Plan is a non-regulatory plan that identifies 16 Wildland-Urban Interface areas of high wildfire risk and hazard;

WHEREAS, the Union County Community Wildfire Protection Plan identifies potential projects that may reduce the hazards present in Wildland-Urban Interface areas and reduce the risk of wildfire ignition;

WHEREAS, the Union County Board of Commissioners establishes the project steering committee as the annual review board for the plan to be coordinated through the Union County Emergency Services office every spring;

BE IT RESOLVED that the Union County Board of Commissioners hereby adopts the Union County Community Wildfire Protection Plan and establishes the project steering committee as the annual review board.


DATED this 10th day of August 2005.



COLLEEN MACLEOD, CHAIR



STEVE MCCLURE, COMMISSIONER



JOHN LAMOREAU, COMMISSIONER

I. Introduction

Plan Overview and Development

The Community Wildfire Protection Plan for Union County is the result of analyses, professional cooperation, collaboration and wildfire risk assessments considered with the intent to reduce the potential for wildfires that threaten people, structures, infrastructure, and values in Union County.

The project steering committee began meeting in October 2003 to first revise the Wildfire Annex for the Union County Emergency Operations Plan. Subsequent meetings were held to establish a project mission and goals and objectives for the Wildfire Protection Plan; develop the risk assessment; identify and prioritize WUIs; organize community workshops; provide guidance on plan content and organization; and prioritize risk reduction projects.

Data from numerous sources and time periods was used to prepare the plan. Because of the different sources and data periods the transition between data sets is not always fluid and there are many gaps in data collection. Where relevant, these gaps are identified and all sources are cited.

The planning committee, made up of collaborating partners, is responsible for implementing this project and includes:

Dara Decker	Union County Emergency Services	Co-Chair
Angie Johnson	Oregon Department of Forestry	Co-Chair
Paul Anderes	Union County Forest Restoration Board	Member
Larry Aragon	Wallowa-Whitman National Forest	Member
Jim Beekman	Umatilla National Forest	Member
Rob Burnside	Confederated Tribes of the Umatilla Indian Reservation Fire Dept.	Member
Jon Christensen	Private Forest Owner	Member
Ray Hamann	La Grande Rural Fire Protection District/Union County Fire Chief	Member
Gary Hansen	Cove Rural Fire Protection District	Member
Steve Henderson	Imbler Rural Fire Protection District	Member
Mark Jacques	Oregon Department of Forestry	Member
John Lamoreau	Union County Board of Commissioners	Member
John Manwell	Forest Capital	Member
Pat McDonald	Elgin City & Rural Fire Protection District	Member
David Quinn	Northeast Oregon Interagency Dispatch Center	Member
Jay Rasmussen	Wallowa-Whitman National Forest	Member
Ron Rochna	Citizen	Member
Trish Wallace	Wallowa-Whitman National Forest	Member
Mitch Williams	Oregon Department of Forestry	Member

Resource members serve in an advisory capacity to the planning committee and include:

Heidi Bigler-Cole	USFS Pacific Northwest Lab	Resource Member
John Buckman	Oregon Department of Forestry	Resource Member
Jim Carter	Medical Springs Rural Fire Protection District	Resource Member
Renae Crippen	Northeast Oregon Interagency Dispatch Center	Resource Member
Brett Brownscombe	Hells Canyon Preservation Council	Resource Member
Dale Eckman	Bureau of Land Management	Resource Member
Mike Hartwell	Bureau of Land Management	Resource Member
Chris Heffernan	Private Forest Owner	Resource Member
Bill Hooker	Union City & Rural Fire Protection District	Resource Member
Sonny Johnson	Cove Rural Fire Protection District	Resource Member
Lola Lathrop	911/Dispatch Manager	Resource Member
Colleen MacLeod	Union County Board of Commissioners	Resource Member
Michael McAllister	Citizen	Resource Member
Steve McClure	Union County Board of Commissioners	Resource Member
Paul Oester	OSU Extension Service	Resource Member
Boyd Rasmussen	Union County Sheriff's Office	Resource Member
Matt Reidy	Wallowa-Whitman National Forest	Resource Member
Ken Rockwell	Wallowa-Whitman National Forest	Resource Member
George Russell	North Powder City & Rural Fire Protection District	Resource Member
Ron Warnock	Cove Rural Fire Protection District	Resource Member
Bruce Weimer	La Grande Fire Department	Resource Member
Kurt Wiedenmann	Wallowa-Whitman National Forest	Resource Member
Judy Wing	Wallowa-Whitman National Forest	Resource Member

Plan Compliance

This community wildfire protection plan has been prepared in compliance with the National Fire Plan, the 10-year Comprehensive Strategy, the FEMA Tri-County Hazard Natural Hazard Mitigation Plan (Baker, Union, and Wallowa Counties), Union County Emergency Operations Plan, Oregon Senate Bill 360 (The Act of 1997), and Healthy Forests Restoration Act.

The Union County Commissioners with cooperation and input from the Community Wildfire Protection Plan Steering Committee endorse this plan. These representatives mutually agree to the final contents of the plan. The plan is not regulatory and does not create or place mandates or requirements on individual jurisdictions. This plan does not bypass the individual rules and procedures that govern the participating agencies, organizations and individuals. The role of the plan is to serve as a working document to coordinate fire and land managers and their efforts in Union County.

Preparing a Community Wildfire Protection Planⁱ

Both the *National Fire Plan*, and the *Ten-Year Comprehensive Strategy for Reducing Wildland Fire Risks to Communities and the Environment* place a priority on working collaboratively within communities in the WUI to reduce their risk from large-scale wildfire. The incentive for communities to engage in comprehensive forest planning and prioritization was given new momentum with the enactment of the *Healthy Forests Restoration Act* (HFRA) in 2003. The

language in HFRA provides maximum flexibility for communities to determine the substance and detail of their plans and the procedures they use to develop them. HFRA emphasizes the need for federal agencies to work collaboratively with communities in developing hazardous fuels reduction projects, the act also places priority on treatment areas identified by communities themselves in a community fire plan. Combine this with the direction by NFP and the Ten-Year Strategy, one can see the importance of preparing a plan.

Other local government planning considerations, such as FEMA's direction to prepare county hazard mitigation plans and the implementation of Oregon Senate Bill 360, has made it very important for local government to participate in the development and implementation of a community wildfire protection plan. A community wildfire protection plan inventories local conditions including fire risk, and coordinates fire protection and outreach projects across Union County communities.

Wildland-Urban Interface Loss in Oregonⁱⁱ

Oregon's *Natural Hazards Mitigation Plan* says wildland fires are a common and widespread natural hazard in Oregon; the state has an extensive history of wildfire. Significant portions of Oregon's wild lands and rural communities are dominated by ecosystems dependent upon fire for health and survival.

Oregon has over 41 million acres (over 64,000 square miles) of forest and rangeland susceptible to wildfire. In addition, significant agricultural areas of the Willamette Valley, north central and northeastern Oregon support grain crops that are prone to wildfire damage. Fire danger is not exclusive to land, communities are also at risk. A federal document titled *Urban Wildland Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire* (listed in the 2001 *Federal Register*, 367) issued by the Department of Agriculture - Forest Service Department of the Interior - Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service and National Park Service states "Oregon has communities that are at risk of damage from wildfire".

The majority of wildfires occur between June and October. However, wildfires can occur at other times of the year when weather and fuel conditions combine to allow ignition and spread. Seventy percent of Oregon's wildland fires result from human activity. The remaining thirty percent result from lightning, occurring most frequently in eastern and southern Oregon.

The financial and social costs of wildfires demonstrate the need to reduce their impact on lives and property, as well as the short and long-term economic and environmental consequences of large-scale fires. Cost savings can be realized through preparedness and risk reduction including a coordinated effort of planning for fire protection and implementing activities among local, state, and federal agencies, the private sector, and community organizations. Individual

property owners have a major role to play in this coordinated effort, especially in wildland interface areas.

The wildland-urban interface (WUI) is the area or zone where structures and other human development meet or intermingle with wildland or vegetative fuels. As more people have moved into wildland urban interface areas, whether for lifestyle or economic reasons, the number of large wildfires affecting homes has increased dramatically. Many in the population migrating to rural Oregon from urban areas maintain the expectation of structural fire protection similar to the high-density areas they were leaving. Rural fire departments combined with local mutual aid agreements and finally the Conflagration Act attempt to fulfill these expectations. However, many homes are still located within areas with little or no structural fire protection.

Recent fire seasons bring the wildland interface problem and the problem of overabundant dense forest fuels to the forefront. The forest fuels issue is a major and continuing problem that has received presidential level attention. Work is underway to reduce fuels in WUI areas by way of community involvement and funding from the *National Fire Plan*. National Fire Plan goals are to:

- Ensure sufficient firefighting resources for the future;
- Rehabilitate and restore fire-damaged and fire-adaptive ecosystems;
- Reduce fuels (combustible forest materials) in forests and rangelands at risk, especially near communities; and
- Work with local residents to reduce fire risk and improve fire protection.

Community Assistance grants and other grant opportunities are available through *National Fire Plan* (NFP) to aid in achieving these goals. The goals aim high. They represent a substantial amount of work, and their ultimate success will depend on concerned individuals, agencies, and organizations working in concert. No agency or group working alone can achieve NFP's goals.

Conversion of Resource Lands in Eastern Oregon

The Oregon Department of Forestry completed a study titled, *Forest, Farms and People: Land Use Change on Non-Federal Land in Eastern Oregon, 1975-2001*ⁱⁱⁱ that studies the conversion of resource lands (farm, forest and range) to residential development in Eastern Oregon. The study used aerial photographs from 1975, 1986 and 2001 to examine land development before and after the implementation of land use laws to determine whether land use laws have been successful in slowing growth on Eastern Oregon resource lands. Ultimately, the report concludes that land use laws have slowed the conversion of resource land in Eastern Oregon, but while the rates of urban and rural residential development have declined statewide, they have increased in Eastern Oregon's non-federal

forests, leading to potential impacts like compromised forest management and fire protection capability.

Results from the study include the following facts:

1. In parts of Central Oregon, 60% of forest industry land has shifted from forest industry to non-industrial ownership.
2. There are now three times as many dwellings on non-federal wildland forest in Eastern Oregon as in 1975. This may lead to increased fire hazard, impacts to wildlife and their habitat, and a decreased timber supply.
3. Dwelling density is increasing at a faster rate in Eastern Oregon's fire-prone private wildland forests than in Western Oregon's private wildland forests.
4. As the number of structures in Eastern Oregon's forests increase, the propensity to manage for timber production decreases.
5. Along with decreasing inventory volumes on timber industry lands, timber harvests in Central Oregon have decreased dramatically, and may remain depressed.
6. The remainder of Eastern Oregon's private forests may experience the rapid development and other permanent changes currently occurring in Central Oregon.

The study results have implications for private forestland in Union County. Local land division ordinances currently contain fire-siting standards (see *Section V*) that stipulate the safest way for residential development to occur in forestland yet development is still occurring, which leads to structural protection challenges for local protection agencies. Additionally, timber production and wildlife habitat may decline as forestland is converted to residential development.

ⁱ <http://www.communitiescommittee.org/pdfs/cwpphandbook.pdf>

ⁱⁱ Oregon Emergency Management; *Emergency Management Plan, Natural Hazards Mitigation Plan, Fire Chapter*, (December 2003).

ⁱⁱⁱ Oregon Department of Forestry; *Forest, Farms and People: Land Use Change on Non-Federal Land in Eastern Oregon, 1975-2001* (August 2004).
http://www.odf.state.or.us/DIVISIONS/resource_policy/resource_planning/Annual_Reports/EORDZ.pdf

II. Union County Profile

Located along the Interstate 84 corridor in northeast Oregon, Union County is approximately 250 miles east of Portland, Oregon and 160 miles northwest of Boise, Idaho. Union County lies in the Grande Ronde River and Powder River Valleys just east of the Blue Mountains. Union County is bordered by Wallowa County to the north and east, Baker and Grant Counties to the south and Umatilla County to the west.

Union County is characterized by the ridges and valleys typical of the Blue Mountains, and is part of the Grande Ronde River Basin. Total area is 2,038 square miles, or 1,304,320 square acres. The Grande Ronde River runs south to north across Union County, and supports recreational, irrigation and livestock uses.

There are eight incorporated communities in Union County including La Grande, Island City, Elgin, Imbler, Cove, Union, North Powder and Summerville. Union County also contains eight fire districts/departments providing structural fire protection and three wildland fire agencies providing wildland fire protection. Fire Protection is discussed in greater detail under *Section IV – Emergency Management*. The area draws many visitors every year to enjoy outdoor activities such as skiing, hunting, fishing, hiking and biking. Aside from the natural beauty of the area, amenities like a university and hospital also draw visitors and new residents.



Figure 1 - Union County Vicinity Map

Climate

Union County enjoys four distinct seasons. Annual precipitation is approximately 18 inches in the valleys while high mountain areas rarely exceed 10 inches. Seasonal distribution is quite different from western Oregon. "Relatively low winter totals are nearly matched by rain from summer thunderstorms, which are much more common than western areas. Thus, much

of eastern Oregon receives almost uniform precipitation throughout the year."ⁱ Summer highs average in the 80s while winter highs linger in the 30s."ⁱⁱ Summer days are usually dry and clear with cool nights. The prevalence of thunderstorms in the mountainous and timbered regions of eastern Oregon suggests the potential for lightning-caused fires.

Land Use

Most of the county's development and population is located on the valley floor. Industrial, state and national forests occupy the higher elevations. National Forest land comprises almost all of the 49% publicly owned land.

Today's land uses in the Grande Ronde Valley reflect land uses of the valley's early settlers. The valley floor supports extensive agricultural activities, while

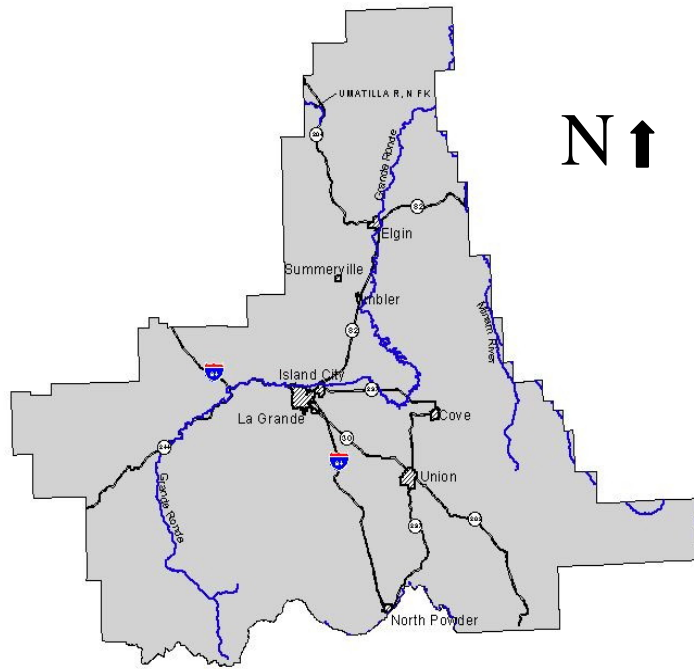


Figure 2 - Union County Map

livestock grazing on rangelands and timber resources flourish on the steeper slopes surrounding the valley. Historically, development in conjunction with farm and ranch uses occurred on the valley floor, but

today, most development occurs within cities' urban growth boundaries and rural residential zones identified in the Union County Land Use Plan. Most rural residential zones are located in wildfire risk areas due to density of development, vegetation, past fire occurrences, weather and topography.

Union County depends on the landscape to sustain its livelihood. Land is primarily suited for agriculture, but there are also forest/agriculture possibilities and mineral/aggregate locations throughout the county.

Table 1. Northeast Oregon Land Use

County	Percent Acreage in farms
Union	40.8%
State of Oregon	28.4%

Source: Reid, Rebecca L., *Oregon: A Statistical Overview: 2002*, Southern Oregon Regional Services Institute, Southern Oregon Regional Services Institute, Southern Oregon University. Ashland, Oregon, May 2002.

Forestland Ownership and Stewardship

Forestland in Union County is divided among federal, state and private ownership or stewardship. Table 2 displays federally administered land in Union County as compared with the state as a whole. Federal land managers include the United States Forest Service and the Bureau of Land Management. The Oregon Department of Forestry provides stewardship and fire protection patrol for state and private forestland throughout Union County.

Table 2. Federally Administered Land

County	Private % Total	BLM % Total	USFS % Total	Federal Land Total ⁱⁱⁱ
Union	52%	1%	47%	47.5%
State of Oregon	44%	25%	25%	50%

Source: Reid, Rebecca L., *Oregon: A Statistical Overview: 2002*, Southern Oregon Regional Services Institute, Southern Oregon Regional Services Institute, Southern Oregon University. Ashland, Oregon, May 2002.

Population and Demographics

The Grande Ronde Valley includes six of the county's eight incorporated communities, and most of the county's population. According to the Union County Population Analysis and 2020 Forecast, the county had a year 2000 population of 24,550 people^{iv}. See Table 3 for individual community populations.

Table 3. Union County Community Populations

Community	2000 PSU Revised	1990 U.S. Census	Population Change 1990-2000	Percent Change 1990-2000
Cove	595	507	88	17%
Elgin	1,655	1,586	69	4%
Imbler	285	299	-14	-5%
Island City	925	696	229	33%
La Grande	12,340	11,766	574	5%
North Powder	490	448	42	9%
Summerville	115	111	4	4%
Union	1,930	1,847	83	4%
Union County	24,550	23,598	952	4%
Incorporated	18,335	17,260	1,075	6%
Unincorporated	6,215	6,338	-123	-2%

Source: Union County Population Analysis and 2020 Forecast

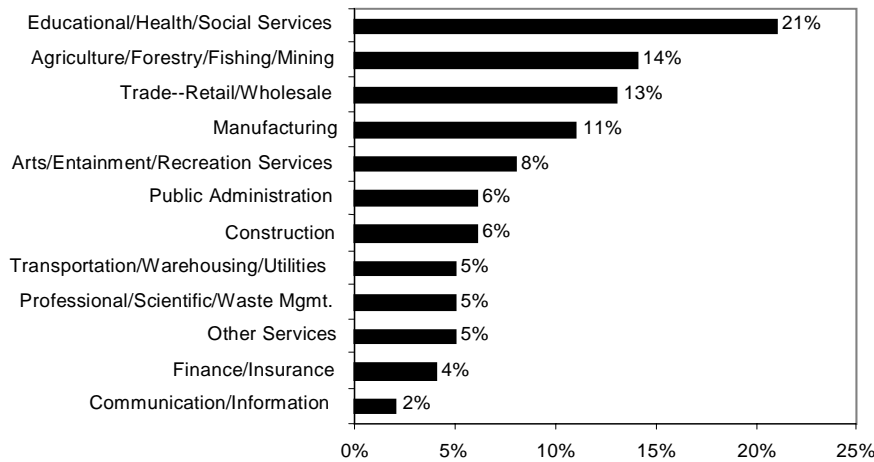
Increased growth (both urban and rural) impacts agency preparation for emergencies because increased population and development (especially within WUI's) greatly increases wildfire frequency and severity.

Employment and Industry

The region has historically been dependent upon agriculture and timber as the primary employment in the area. Currently prominent industries include public employment (government and education), agriculture and timber. Manufacturing, trade and services are the largest employment sectors in Union County.^v Timber played a key role in Union County's early economic development but has steadily declined in economic value since the late 1970s. Wood products, however, still remain as the most prominent manufacturing sector in Union County, and northeast Oregon as a whole.

Looking towards the future, agricultural, manufacturing, educational, healthcare, governmental, tourism, and retail trade sectors will continue to grow and provide goods, services and employment opportunities for area residents. Figure 4 provides a breakdown of the region's employment by industry for the year 2000:

Figure 3. Employment by Industry



Source: Oregon Labor Market Information System, Oregon Employment Department.

Fire History

Union County and the surrounding area have a significant history of both human and lightning caused fires. A combination of climate, fuels and terrain make Union County prone to wildfire. Figure 4 shows lightning vs. human caused fires for a ten-year period.

Figure 4 shows over 600 fire starts (human and natural) were reported during the years 1994 – 2003. During that time period human causes were responsible for approximately 200 starts and lightning strikes were responsible for approximately 400 starts. Figure 5 shows the interface areas and fires over ten acres in size.

Figure 5 illustrates Union County fires greater than 10 acres over the last 20+ years. Figures 4 and 5 illustrate a stark contrast. Though Union County annually endures many fire starts from both lightning and human sources the number of fires reaching the ten-acre threshold remains relatively low. This dichotomy is due to effective initial attack and coordinated local suppression efforts. It is worth noting that the recent absence of major fires does not indicate that major fires are not possible in the future. As illustrated in this document many areas are at high risk for a potentially catastrophic event.

Major Union County Fires

Over the past twenty-five years Union County has had five fires of major significance. The fires are: Rooster Peak – 1973, Mt. Harris – 1981, Frizzell – 1986, Boulevard – 2001 and Craig



Figure 4. Rooster Peak Fire photo courtesy of The Observer, August 18, 1973.

Loop – 2003. The fires were of significance for different reasons.

The lightning caused Rooster Peak fire was the largest and most destructive in recent history. The fire burned approximately 6,400 acres including six structures. Much of the fire was located near La Grande's southwest City Limits. Because structures were lost and the fire threatened the City of La Grande, this is the most significant fire in recent history.

The Mt. Harris fire was an 850-acre human caused fire resulting in significant timber loss. In addition to the timber loss the fire was highly visible from La Grande, Summerville, Imbler and Cove. Much of the Mt Harris burn has never recovered to support the timber once present. One ongoing effect of the two fires is a psychological one. The Rooster Peak fire's close proximity to La Grande and the Mt Harris fire's high visibility left a memorable impact on long time Grande Ronde Valley residents. These fires made the wildfire threat a much more tangible danger.

The Frizzel fire (250 acres, lightning caused) and the Craig Loop fire (43 acres, human caused) were not significant fires due to their size, but were significant due to their location and potential. Both fires took place in the Mt. Emily WUI. This interface is now recognized as one of Union County's most populated and most at risk interface areas. Though these fires were relatively small and quickly contained the potential for property damage and loss of life was substantial.

The Boulevard fire (150 acres, lighting caused) was another near miss for Union County. The fire threatened the La Grande watershed, a rugged and roadless area of high environmental value. Much like the previous fires the potential for a catastrophic fire was high, but for different reasons. The watershed contains substantial fuel and has very limited access. Had conditions been less favorable, a major event could have occurred.

Forest ecosystems depend on fires for certain functions. Under certain circumstances fire is a healthy and natural occurrence. Fast moving, low intensity burns clear understory and allow for new growth while not harming the larger fire resistant trees. The issue of reintroducing fire into an ecosystem where fire has been long absent is difficult. Resource managers must choose which fires to allow to burn and which to suppress. This decision is made taking into account a variety of factors and conditions. As increased mitigation steps are taken and plans such as this are put in place, that decision may become easier.

Economic Impact of Major Fires

Timber is a valuable resource in Union County representing an economic commodity in the form of raw materials and finished products, as well as an amenity resource appreciated for its scenic beauty and outdoor opportunities. Timber resources also play key roles in water quality and wildlife habitat.

A wildfire of any magnitude in Union County would severely impact the economy by reducing the amount of wood available for market. This in turn would limit the business relationships and opportunities of those who are dependent on forest resources as the amount of available timber is in decline. A catastrophic fire would also impact tourism and recreational opportunities over the long term. As forestland is consumed by wildfire wildlife habitat diminishes and the aesthetic value declines.

Suppression costs include all costs associated with controlling wildfire. The cost of suppression for land management agencies like the Oregon Department of Forestry and United States Forest Service can mount quickly depending on fire season severity.

When wildfire consumes physical property like structures, the associated costs rise dramatically, displacing people and businesses and contributing to higher overall economic losses. The assessed value of property in Union County totals \$1,140,900,882 and should be protected to the extent possible against loss from wildfire.^{vi}

ⁱ *The Climate of Oregon: From Rain Forest to Desert*, Taylor, George H. and Hannan, Chris, Corvallis, OR: OSU Press (1999) pp. 80.

ⁱⁱ *Ibid*, pp. 8-9.

ⁱⁱⁱ Taylor, *Climate of Oregon*.

^{iv} *Union County Population Analysis and 2020 Forecast; Final Draft*, The Benkendorf Associates Corporation, (January 25, 2001) pp. 1.

^v *Union County 2002 Strategic Plan*, Elesco Limited and Auyer Consulting, (June 2002) pp.15.

^{vi} Union County Assessment and Tax Collection Department, (March 2005).

III. Mission, Goals and Objectives

Mission Statement

Union County and partnering agencies are committed to creating a meaningful Community Fire Plan that serves to coordinate wild land fire agencies resources and educate landowners while enhancing community safety and values through hazard reduction, risk reduction, and fire prevention.

Goals and Objectives

Goals and objectives were formulated by the plan committee and were later refined using input from community workshops. The plan committee then prioritized the plan goals based on identified needs in Union County. Goals are listed in priority order.

1. Improve emergency response through the protection of life, property and natural resources:
 - a. Identify local equipment and training needs.
 - b. Promote cooperation and foster relationships among agencies, organizations, jurisdictions, and communities.
 - c. Improve interagency communications before and during emergency situations.
 - d. Improve pre-suppression planning strategies among all agencies with protection responsibilities.
2. Identify and reduce hazardous fuels in Wildland Urban Interface areas and coordinate risk reduction strategies across the landscape:
 - a. Share data and use a common set of base information for risk assessment.
 - b. Use local knowledge.
 - c. Prioritize hazardous fuel reduction areas.
 - d. Utilize fuel reduction material where suitable and cost-effective.
3. Foster widespread and consistent support of the Community Wildfire Protection Plan:
 - a. Form partnerships among agencies and citizens.
 - b. Collaborate with the community to develop a range of ideas/alternatives for protection from wildfire.
4. Use the community wildfire protection plan as a coordinated resource, tool and educational piece:
 - a. Fire prevention.
 - b. Landowner assistance.
 - c. Coordinated and consistent messages.

IV. Emergency Operations

Fire Protection

In October 2003, wildland and structural fire protection agencies in Union County began updating the Wildfire Annex to the *Union County Emergency Operations Plan*. The annex is a hazard-specific chapter that outlines the roles and responsibilities of the different agencies that may be involved in an urban/wildland interface fire, with the main goal of protecting life and property during a wildfire event. To read the annex in its entirety, see Appendix C.

Union County contains eight fire protection districts/departments providing structural fire protection. Additionally, the US Forest Service (USFS) and the Oregon Department of Forestry (ODF) provide wildland fire protection for timber resources. Though some rural fire protection districts have received wildland firefighting training, wildland firefighters have not been trained in structural protection, nor do they provide structural fire protection. The Bureau of Land Management (BLM) also manages land in Union County, but coordinate with the USFS for initial attack responsibilities on BLM land. An agreement is in place between the BLM and the USFS specifying that the nearest resources to the incident regardless of ownership or suppression responsibility are deployed for initial attack.

In Union County, fire protection can be found in three tiers: unprotected (without any protection for the land or structure); single protection from rural districts, city departments, or wildland agencies (structures are protected, but not the land; or visa versa); and dually protected (both structural and wildland protection). Union County contains approximately 50,890 acres of land not protected by a structural or wildland fire agency. To the extent possible, new development abutting fire districts is annexed into the district via landowner petition. When a wildfire reaches the threshold for declaring a conflagration (per the Oregon Conflagration Act), the Union County fire chief will request assistance and support for wildland fire suppression.

In order to meet the criteria set forth in 2005 by the Office of the State Fire Marshall for conflagration declaration, Union County is currently compiling this plan in accordance with the following:

1. FEMA National Fire Plan
2. The 10-year Comprehensive Strategy
3. FEMA Tri-County Hazard Natural Hazard Mitigation Plan (Baker, Union, and Wallowa Counties)
4. Union County Emergency Operations Plan

5. Oregon Senate Bill 360 (The Act of 1997), and
6. Healthy Forests Restoration Act.

Additionally, the Union County Planning Department has had in place since 1983 adopted minimum fire defense standards for new construction. These have been modified over time using Oregon Department of Forestry fire siting standards as development has increased. The County's IT Department is working on changing the designation that appears on property tax statements from "fire patrol" to "ODF non-structural protection". Other criteria required by the Office of the State Fire Marshall for 2006 include the active implementation of this community wildfire protection plan.

Infrastructure and Structural Protection Capabilities

The various fire agencies in Union County provide structural and wildland fire protection that also includes infrastructure like utilities, transportation corridors and water systems. Generally, the greatest issues for local fire districts are specific roads or bridges that have been identified as load limited or are too narrow for adequate ingress / egress.

Currently the fire districts throughout Union County are working on assembling an inventory of equipment and personnel qualifications. From this inventory, fire districts will be able to determine what their training and equipment needs are in order to improve fire services for Union County. When this project is complete, the inventory will be shared among all local fire agencies and become a part of this plan.

Defensible Space

Defensible space is the area around a structure where the vegetation has been reduced or modified to reduce the ability for flame conduction from the ground level to the tree crowns. The defensible space is designed to be a buffer between the fire and a structure. Creating and maintaining a defensible space takes many forms, from planting and maintaining a lawn to thinning and clearing underbrush. The space will often be layered in a vertical primary, secondary and tertiary format with different treatment and maintenance in each portion of the space. The size of a defensible space is dependent on many factors such as slope, fuels, climate and fire history. There is no standard size or type of defensible space. Dependant on conditions, each property's size and types of defensible space will vary greatly. From a tactical standpoint, the defensible space designed into a property's landscaping and management may be what allows a fire agency to save a structure. The number of resources needed to protect a structure with a properly maintained defensible space is lower. Given a major fire in a WUI, conserving resources will be a priority in an effort to defend as much improved property as possible.

V. Community Outreach and Education

Outreach

Education and community outreach were two areas of primary focus when creating this community fire protection plan. The local area can be the best source of information and encouraging community involvement is an important part of this plan. It is also important that this plan be viewed as valuable to public safety, and as a resource to mitigate wildfire hazards.

During the development of this plan, two rounds of community workshops were held throughout Union County. The workshops allowed the steering committee an opportunity to discuss the plan completion timeline, the high hazard area risk assessment, values threatened by wildfire risk, and any additional concerns related to emergency services and fire agency response. The first round of community workshops were held in Elgin, Imbler, Medical Springs and La Grande. Discussion topics included the importance of the planning effort, the local risk assessment and emergency operations related to wildfire events. The second round of community workshops were held in Cove, Elgin and Island City. Discussion topics included the risk assessment, formulation of WUI boundaries and potential projects (see Appendix B for Community Workshop Summaries).

In addition to community workshops, radio interviews and newspaper articles, the steering committee decided a website would also be an effective method for communicating with citizens throughout the evolution of the plan. In reality, both Union County's and the La Grande ODF Office's websites were used to support this project.

The steering committee also formulated a grassroots questionnaire identifying potential educational opportunities and gauging what citizens value most and how those values may be threatened by wildfire. The questionnaires were passed out at community workshops, available at all local libraries, city halls and community centers throughout Union County. The questionnaire was also printed in the newspaper on three occasions and posted on the website for download and completion (see Appendix B for questionnaire results).

Blue Mountain Wildland-Urban Interface Study

In September of 2003 the Oregon Department of Forestry completed the *Blue Mountain Wildland-Urban Interface Wildfire Study* (Appendix B). Grant funding from the National Fire Plan were used to conduct this study in cooperation with Union County and Baker County OSU Extension Services. Contact Paul Oester at 963-1010 for more detailed information. This study was conducted using statistical methods for scientific validity so potential respondents were targeted to receive the survey.

Surveys were mailed to 847 landowners within various WUI's in Baker, Grant, Umatilla, Union and Wallowa Counties. Approximately 225 individuals responded to the survey indicating wildfire priorities and values. The study shows substantial concern for fuel loads on adjacent properties and response time/equipment/capabilities of local fire agencies. The study also indicates a majority of respondents do not have a plan for what they would do in case of a nearby wildland fire. The great majority is not concerned about the issues relating to creating defensible space such as cost, physical work, time and aesthetics and is interested in potential grant funding opportunities.

Union County Values-At-Risk Questionnaire

As a part of the public involvement associated with this plan the steering committee and staff crafted a *Values-At-Risk Questionnaire* to evaluate the concerns and values of Union County's WUI residents (Appendix B). Individuals listed resources valued most, such as aesthetics, outdoor recreation, clean air and water, vegetation and wildlife habitat and indicated all could be detrimentally affected by wildfire. Most have had limited, if any contact, with Fire Wise or other fire planning efforts and have only moderate concern for wildfire in their area. In addition a substantial number of residents are only somewhat or not at all aware of defensible space principles. This questionnaire was a grassroots effort and was not conducted using statistical methods; the questionnaire was made available to anyone who had an interest in filling it out.

Both the study and the questionnaire show concern for wildfire and the resulting consequences. Both highlight a need for additional education and outreach to those landowners in WUI's in order to promote the use of defensible space as well as other grant and educational programs.

Fire Programs and Policies

In order to address wildfire in Union County's wildland-urban interface (WUI), homeowners and landowners must understand the hazards around their homes and property that contribute to increased wildfire risk. As more people move into WUI areas the number of large wildfires potentially impacting homes have increased.

Across Union County, fire protection can be found in three tiers: unprotected (without any protection for the land or structure); single protection from rural districts, city departments, or wildland agencies (structures are protected, but not the land; or visa versa); and dually protected (both structural and wildland protection).

Finding areas with dual protection is limited to rural residential areas. Also, the large land area of the county causes increased response time and limits the capabilities of fire services.

Structural Vulnerability - a term that relates factors contributing to how and why a home is vulnerable to wildfire. Examples of factors that would make homes vulnerable in a wildfire event are access to the home, ladder fuels and vegetation within the landscape of a home, and whether or not fire protection

Union County citizens have available various prevention programs about self-preparation and property protection from the risk of wildfire. These programs are mentioned below. The best protection is prevention.

Living with Fire

This educational newspaper is available on-line. The newspaper displays step-by-step instructions on how to create a survivable space around your home taking into account topography and surrounding vegetation. Please visit www.or.blm.gov/nwfire/docs/Livingwithfire.pdf for more information.



Figure 5. Photo courtesy of California Department of Forestry and Fire Protection.

The pre-fire activities implemented by this homeowner included a green and well-maintained landscape, reduction of wildland vegetation around the perimeter of the property, a fire resistant roof, and a good access road with a turnaround area. The charred surroundings of the home show that these pre-fire activities effectively protected it when wildfire hit.

I'm Concerned....

ODF is currently using the "I'm Concerned..." campaign for its fire prevention program. "I'm Concerned..." offers quick tips for burning debris safely, seasonal property clean up, safely building and extinguishing a campfire, burn barrel safety, and home fire safety. ODF publishes "I'm Concerned..." ads in the local newspapers and on their website as the time of year dictates. You can visit www.odf.state.or.us/eastern/northeast/default.asp anytime to get a copy of the fire safety tips.

Firewise

Firewise promotes fire-wise practices by, 1) educating citizens about the dangers of a wildfire in the area; 2) encouraging residents to take responsibility in reducing the risk of a wildfire and creating survivable space around their residence; and, 3) increasing awareness of the natural role of low-intensity fires and the benefits of prescribed burning or occasionally managing natural wildland fires to achieve ecological benefits while maintaining firefighter and public safety (visit www.firewise.org for more information).

Structural Ignitability - a term that relates to the cause of a home igniting during a wildfire. Cause could be attributed to the building materials used for the home or the amount of combustible materials around the home.

A term that is emphasized in this prevention program is structural ignitability. Structural ignitability is the ability of the building materials used for a home, deck or attached outbuilding to combust.

Fire-Resistant Plants for Oregon Home Landscapes

When landscaping around a home, most homeowners are concerned primarily with aesthetics. When homeowners are advised to remove flammable vegetation, they are often worried that the aesthetics of their landscape will be compromised.

Flammable plant material on the landscape can dramatically increase the fire risk around homes. Homeowners can find information about fire-resistant plant materials that aid in improving the chances of a home surviving wildfire while providing aesthetically pleasing color, texture, flowers, and foliage for the landscape. For details please visit

www.extension.oregonstate.edu/emergency/FireResPlants.pdf.

Cost-Share Grant Programs through National Fire Plan

ODF provides homeowners within the WUI areas of Union County a free home site inspection. After the inspection, technical advice is shared with the homeowner as to what can be done to lessen the structural ignitability rating of the home. The amount and type of vegetation to be removed varies depending on the amount of survivable space needed to protect the home. This could entail a substantial cost to the homeowner; however there may be grant funds available to share in the cost of the project.

In addition to the above-mentioned program, there is a separate program for larger landowners that have land within a Union County WUI. The larger large block landowners become an even higher priority if located in a WUI and adjacent to federal land. This program offers cost-share incentives for pre-commercial thinning, slash removal, brush removal, and/or ladder fuel removal. Contact ODF in La Grande at (541) 963-3168 to find out more about these programs.

Land Use Planning

Land use planning is an important part of ongoing efforts to mitigate the impact of development in WUI areas. Development in concert with the physical landscape and its inherent risks is the first line of defense against a major fire resulting in extensive private property damage and loss of life. Oregon has instituted the statewide land use planning program, which is administered by county and city planning departments. Union County administers the program through the Comprehensive Plan instituted by Union County Zoning, Partition and Subdivision Ordinance (UCZPSO). UCZPSO requires all new development located within one quarter mile of forestland to meet Fire Siting Standards. Among other things the standards regulate access and building materials as well

as require on-site water for fire suppression. In addition they require a primary and secondary fuel break be maintained on the property.ⁱ

ⁱ Union County Zoning, Partition and Subdivision Ordinance, Siting Standards for Dwellings and Structures and Development and Fire Siting Standards (Adopted November 2, 1983).

VI. Wildfire Risk Assessment

Methodology for Hazard Assessment¹

To identify and prioritize wildland-urban interface areas-at-risk in Union County, an assessment of factors contributing to large wildfire events was conducted. This section will outline the process used and highlight any unfamiliar definitions. Two key documents were referenced for this process, as instructed by Oregon Department of Forestry:

- 1) *Field Guidance: Identifying and Prioritizing Communities at Risk*. National Association of State Foresters. June 27, 2003. (Available at: <http://www.stateforesters.org/reports>)
- 2) *Concept for Identifying and Assessment of Communities at Risk in Oregon*. Draft prepared by Jim Wolf, Fire Behavior Analyst, Oregon Department of Forestry. July 19, 2004. (Available by contacting Jim Wolf at jwolf@odf.state.or.us)

These documents were used to expand the assessment of communities-at-risk to also include the assessment of wildland-urban interface areas-at-risk.

In Union County, a ***community-at-risk (CAR)*** is defined as a group of homes or other structures with basic infrastructure (such as shared transportation routes) and services within or near federal land. A ***wildland-urban interface area (WUI)*** surrounds a community at risk, including a community's infrastructure or water source, and may extend beyond 1 ½ miles of a community, depending on topography, geographic features used as an effective firebreak, or Condition Class 3 land.

It is important that one understands the meaning of risk and hazard in relation to wildfire. Risk is the chance or probability of fire occurrence. Hazard is the exposure to risk, and in a wildfire those hazards can be related to the natural environment and the man-made environment. Natural hazards include fuel type and amount, topography, and weather. Man-made hazards include access to structures and wildland, availability of water, limited greenspace around structures, and ignitability of structures. Capability of firefighting resources will be compromised by the severity of both natural and man-made hazards.

Fire Occurrence

The rate of fire occurrence is an important component of the assessment. Fire history records for the last ten years (1994-2003) were used. Fire history data was compiled from the La Grande Ranger District and the Walla Walla Ranger District of the U, Oregon Department of Forestry-La Grande Unit, and the BLM. The fire occurrence rate (FOR) per 1,000 acres was used to yield a value of 1, 2, or 3 to be used to calculate overall hazard in the county.

The following are point assignments for fire occurrence per 1,000 acres for the 10-year period:

<i>Number of fires per 1,000 Acres (1994 – 2003)</i>	<u>Value</u>
1 – 2 fires for the 10 years	1
3 – 4 fires for the 10 years	2
5 + fires for the 10 years	3

Fuels

Data used to create a fuels inventory in a Geographical Information System (GIS) was derived from LandSat imagery provided by Oregon Department of Forestry for private lands and the

Wallowa-Whitman National Forest GIS and Oracle tables derived from stand exams and photo interpretation. For Union County, the increased risk of a large wildfire event is caused by the buildup of forest fuel and changes in vegetation composition over time. Unnaturally dense stands competing for limited water and nutrients are at increased risk of wildfire and insect and disease epidemics. Condition class for the county is minimal at level 1, while condition class 2 and 3 dominate. This also means that fire regimes are altered from their historic range, which in turn sets Union County up for wildfires that will be larger in size, more intense and severe, causing landscape patterns to change significantly. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects and disease, or other pest management activities.²

Both surface and crown fuels were considered for the vegetation hazard. Surface fuel hazard was determined by using fire behavior fuel models and/or potential flame length. The table below displays the grouping of fuel models to determine hazard. Values were assigned for each fuel group:

<u>Fuel Group</u>	<u>Value</u>
Group 1 (see Table 4)	1
Group 2 (see Table 4)	3
Group 3 (see Table 4)	5

Table 4. Fuel Group Descriptions

Fuel Hazard Factor	Fuel Model Group	Fire Characteristics
1	Grass, Low/less flammable brush, and short-needle timber litter (FM 1, 5, 8)	Typically produces a flame length of up to 5 feet; a wildfire that exhibits very little spotting, torching, or crowning, and which results in a burned area that can normally be entered within 15 minutes. Low severity.
2	Grass/Timber, Moderate brush, conifer reproduction, open sage and juniper (FM 2, 6, 9)	Typically produces a flame length of 5 to 8 feet; a wildfire that exhibits sporadic spotting, torching, or crowning, and which results in a burned area that can normally be entered within one hour. Mixed severity.
3	Tall, flammable grasses, Heavy/flammable brush, timber/slash (FM 3, 4, 10-13)	Typically produces a flame length of over 8 feet; a wildfire that exhibits frequent spotting, torching, or crowning, and which results in a burned area that normally cannot be entered for over one hour. Stand replacement severity.

Crown fuel hazard was derived from the vegetation conditions of the landscape and took into consideration the canopy closure and structure.

Total Vegetation Hazard was determined by combining the points assigned to the crown fuel hazard and points assigned to the surface fuel hazard. The total possible value for vegetation hazard is ten.

<u>Crown Fuel Group</u>	<u>Value</u>
Low	1
Moderate	3
High	5

Historical notes have been kept for the GIS processes used and are archived at the Union County Emergency Services Office or the Oregon Department of Forestry Office in La Grande.

Topographic Hazard

Slope and aspect affect both the intensity and rate of wildfire spread. The topography hazard factor was derived from the Digital Elevation Model for Union County; values were assigned to the combination of slope and aspect working together on the landscape.

<u>Slope</u>	<u>Value</u>
0 – 25%	1
25 – 50%	2
> 50%	3
<u>Aspect</u>	<u>Value</u>
N, NE	1
NW, E	2
W, SE	3
S, SW, Flat	4

Total Topographic Hazard was determined by combining the points assigned to the slope hazard and points assigned to the aspect hazard. The total possible value for topographic hazard is seven.

Overall Hazard

Fire occurrence, the total topographic hazard rating, and the total fuel hazard rating were combined using *Spatial Analyst* (an ESRI product) to determine an overall hazard display of Union County. The maximum points assigned for fire occurrence was 3, the maximum points assigned for total topographic hazard was 7, and the maximum points assigned for total vegetation hazard was 10. The breakpoint used to determine high hazard was 10.5. Hence, anything with 10.5 or higher was considered high hazard, and anything lower was considered moderate / low hazard.

Weather Hazard

In Union County, weather patterns produce summer lightning storms that start many fires. These multiple starts put a strain on the wildland firefighting resources. Add the drying of fuels over time and low relative humidity, and the probability for large fires has increased. The number of days per season that forest fuels are capable of producing a significant fire event is important to consider. Oregon Department of Forestry has already determined that Eastern Oregon is at the highest hazard rating for weather. This value was assigned by an analysis of daily wildfire danger rating indices in each regulated use area of the state. This value is constant across Union County; however weather patterns vary due to the mountainous landscape within the county. The high hazard value was offset with annual rainfall during the scoring of wildland-urban interface areas in order to effectively prioritize each WUI, as well as reflect a true assessment of the local weather hazard.

Overall Fire Protection Capability Hazards

In Union County, local fire departments determined their overall capability for responding to a fire in their district. Each district submitted information to the Oregon Department of Forestry that included an inventory of roads that prohibit access to structures, water shortages, unprotected locations, structure density, building materials and defensible space around structures, and any other issues that pose a hazard to the fire district.

The WUI boundaries were drawn to capture the overall limitations of each fire protection district, fuel hazard, communities at risk and values-at-risk. Logical anchor points on the landscape were used to designate WUI boundaries, including natural fuel breaks, ridge lines, roads, and 6th field hydrological unit code (HUC) boundaries (identified using the GIS layer available in the Oregon Department of Forestry GIS library).

Values at Risk

The economic viability of Union County would suffer if a large wildfire eliminated valuable timber and destroyed recreational areas that draw tourists to the county. Citizens of Union County consistently identified the beauty and scenery as being of value. From anywhere within the Grande Ronde Valley of Union County, the forested landscape is within the viewshed of a community. A large wildfire could significantly affect that scenic value. Values-at-risk are subjective based on community input; however, it was possible to use the input in the scoring and prioritization of each WUI area. For more detailed information regarding values-at-risk derived from community input, please review the Values-At-Risk Questionnaire results found in Appendix B of this plan.

Using the Hazard Assessment to Score and Prioritize WUI Areas

The hazard assessment information discussed previously was used to develop a scoring matrix that would provide results to be used for prioritizing the WUI areas within Union County. The weighting of each element of the matrix was based on input received from the community, steering committee, and statewide assessment information. The matrix is not statistically valid as the plan was designed to be community-driven. Community and steering committee input was captured in its raw form. The list of priorities helped the steering committee build a comprehensive inventory of projects and action items that could be implemented to protect the WUI areas from large wildfire. The categories for the scoring matrix are:

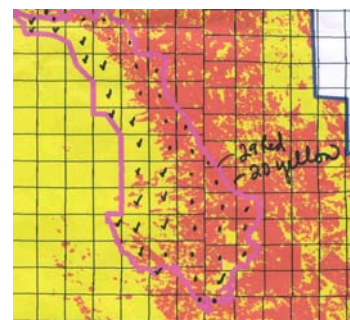
- ✓ Wildfire Hazard
- ✓ Overall Fire Protection Capability/Structural Vulnerability
- ✓ Values Protected
- ✓ Weather
- ✓ Opportunity for Fuels Reduction

A total of 150 points were established for the overall high score. Each of the categories was a percentage of that score. In Section VII of this document, the scoring matrix lists the scores received for each WUI, with a total of fifteen WUI's existing in Union County.

Category 1: Wildfire Hazard

Sixty points were possible for the category of wildfire hazard, yielding 40% of the overall total score. The wildfire hazard was based on the original layout done when total hazard was derived from ignition risk, topography, and fuels (see *Overall Hazard* in the *Methodology* section above.)

Cove Hazard Scoring



A simple GIS technique, known as majority rules, was used to determine whether a WUI area had a low/moderate wildfire hazard rating or a high hazard rating. Sections from the public land survey (PLS) layer were counted within a WUI. Each section was analyzed based on the amount of color it had that represented high (red) or low/moderate (yellow). The dominating color of that section determined whether a section should be counted as "red" or "yellow." Then the number of "reds" and the number of "yellows" were tallied. If an area had more "yellow" sections than "red" sections, it received a score of 30. If an area had more "red" sections than "yellow" sections, it received a score of 60.

Category 2: Overall Fire Protection Capability/Structural Vulnerability

This category of the scoring matrix consists of six areas to consider, with this category yielding 30% of the overall score. Different ranges represented low, moderate, and high risk. A score of 0-15 gave the WUI a low hazard rating; a score of 16-30 gave the WUI a moderate hazard rating; and a score of 31-45 gave the WUI a high hazard rating.

The six areas for consideration when assigning a score to Overall Fire Protection Capability/Structural Vulnerability are:

- ✓ Homesite Density
- ✓ Ignition Risk Factors
- ✓ Type Of Organized Fire Response
- ✓ Structural Fire Agency Response Time
- ✓ Level Of Community Preparedness
- ✓ Structural Vulnerability Factors

Category 3: Values Protected

When scoring a WUI for values protected, a list was comprised of the values that the public noted in the questionnaire and from information gleaned from the public meetings. Also, municipal watershed and major transmission lines and corridors were added as those values are part of the legislation that was put forth under the Healthy Forest Restoration Act (HFRA). This category was 15% of the total score, with the possibility of receiving a high score of 22.5 points. If a WUI had 0-3 of those values present, then a score of 7.5 was received; 3-5 present, then a score of 15 was received; and, 5 or more present, then a score of 22.5 was received. The scoring matrix in the appendix lists the values considered.

Category 4: Weather Factor

It was already mentioned in the *Methodology* section above that northeastern Oregon is considered to have a high hazard rating for weather. However, it was decided that the

high hazard rating should be offset with annual rainfall in order to reflect the unique weather patterns across Union County. This category is 10% of the overall total score, with 15 points being the most a WUI could receive for this category. If an area receives 25" or more annually, then a score of 5 was assigned. If an area receives 13-24" annually, then a score of 10 was assigned; and, if an area receives 12" or less annually, then a score of 15 was assigned. (Note: The layer used to determine annual rainfall came from the Oregon Department of Forestry GIS library).

Cove Annual Rainfall

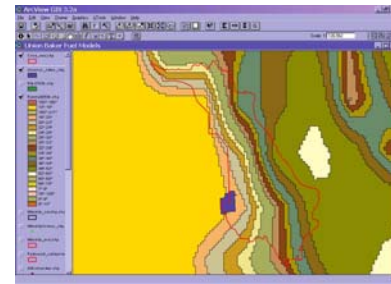


Table 5. Individual WUI Score Sheet

Score Sheet for Wildland Urban Interface Area at Risk	
1) Wildfire Hazard Rating (Ignition Risk, Topography, Fuels) = 40% of score Low/Moderate = Score of 30 High = Score of 60	Score: _____
2) Overall Fire Protection Capability / Structural Vulnerability Rating = 30% of score Low Risk: Score 0 - 15 Moderate Risk: Score 16 - 30 High Risk: 31 - 45	Score: _____
3) Values At Risk = 15% of score Low = Score of 7.5 Moderate = Score of 15 High = Score of 22.5	Score: _____
4) Weather Factor (High Hazard and Low Precipitation) = 10% of score Low = Score of 5 (25+\" annually) Moderate = Score of 10 (13-24\" annually) High = Score of 15 (0-12\" annually)	Score: _____
5) Opportunity for Fuels Reduction Projects = 5% of score Yes for Private; Yes for Federal/Other = 7.5 Yes for one; No for one = 5.0 No for both = 2.5	Score: _____
Total: _____	

**Category 5:
 Opportunity for Fuels
 Reduction Projects**

To fully protect WUI areas from the risk of large wildfire, some level of fuels treatment will need to be conducted. Hence, this category was 5% of the overall total score (a high score of 7.5 is possible). If there was active fuels treatment taking place in a WUI or private landowners had expressed an interest in conducting a fuels treatment project and there was an adjacent planned or completed project on federal land, then the WUI received a score of 7.5. If there was a "yes" for one and a "no" for the other (with the same criteria as mentioned above), then the

WUI received a 5. If there wasn't any treatment being done or planned for the future and no interest on behalf of private landowners, then the WUI received a score of 2.5.

Prioritization

A list of priorities was established from the scores assigned to each WUI. The WUI with the highest score is at the top of the list and the WUI with the lowest score is at the bottom of the list. Projects and Action Items for each WUI were developed based on the reasons a WUI received a particular score in a particular category of the overall scoring matrix.

¹ This document was authored by Angie Johnson, Oregon Department of Forestry-Northeast Oregon District, and edited by Trish Wallace, US Forest Service-Wallowa-Whitman office. The hazard assessment was conducted by both Trish and Angie.

² *Expanded Fire Condition Class Definition Table*. Available at <http://www.frcc.gov>.

VII. Wildland-Urban Interface Areas

Wildland-Urban Interface Areas

Sixteen WUI's were identified which roughly correspond with rural residential areas in Union County. The Stubblefield Mountain and Beaver Creek Watershed areas tied for the sixth riskiest area. Table 6 identifies them in order of potential risk, with the highest risk listed first.

Each of the column headings corresponds with each category of the risk assessment. The key for Table 6 is:

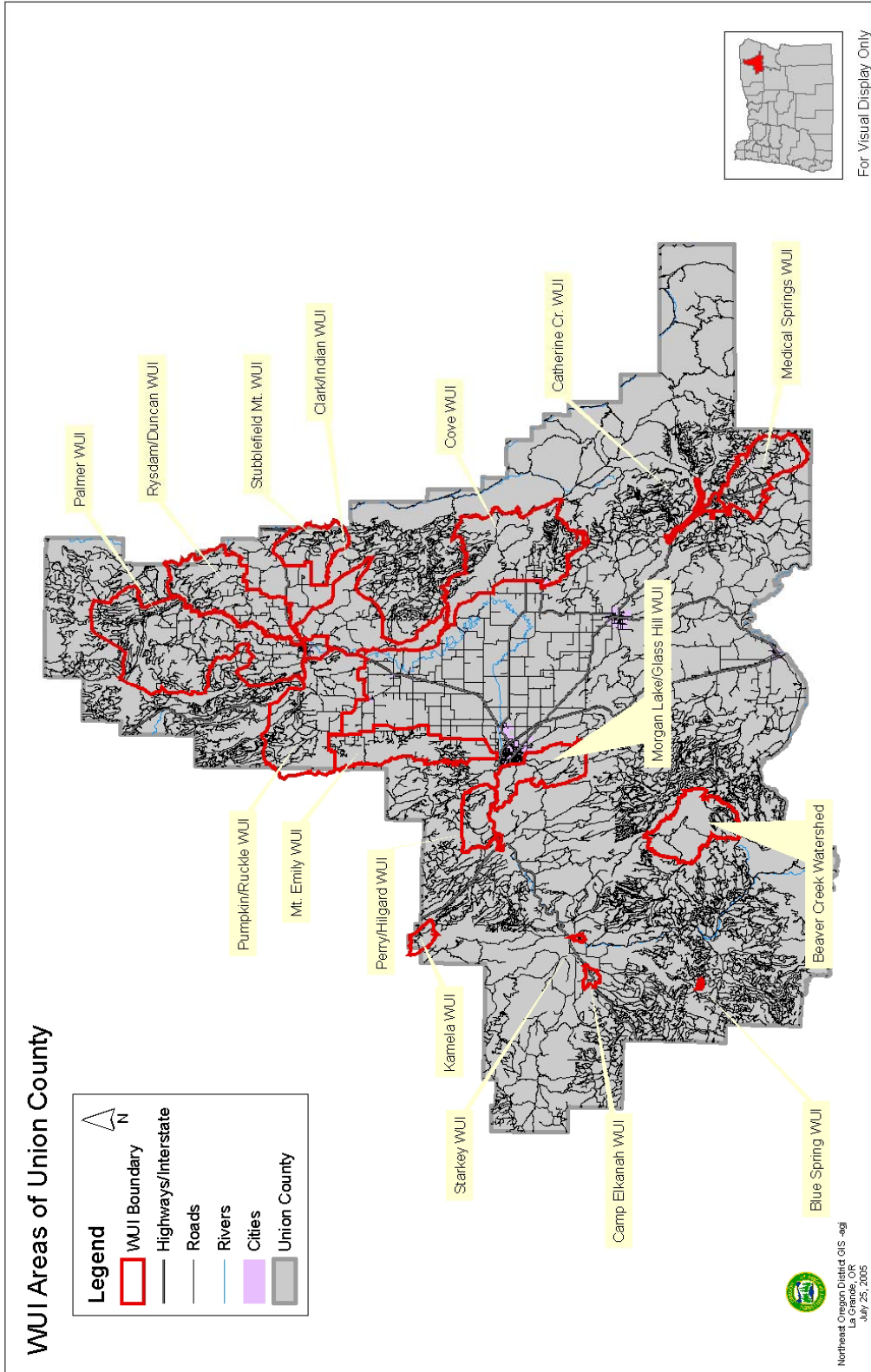
1. Wildfire Hazard = Fire occurrence, combined with vegetation and topography.
2. OFP/SV = Overall fire protection combined with structural vulnerability.
3. Values at Risk = Values at risk from wildfire as determined by VAR questionnaire.
4. Wx Haz. = Weather hazard.
5. Opp. FR = Opportunity for fuels reduction partnerships or projects.

Individual Interface Information

Each of the sixteen WUIs has a layout showing the boundaries and overall hazard of the region. Pertinent information about the interface areas is listed alongside the map. Risk assessment and project information is also listed here.

Table 6. Wildland-Urban Interface Ranking Summary

WUI Area	Wildfire Hazard	OPF / SVR	Values at Risk	Weather Hazard	Opp. FR	Total Score	Rank
	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>	<i>Raw Score/Rating</i>		
<i>Morgan</i>	60/H	37/H	22.5/H	10/M	5/M	134.5/150	#1
<i>Cove</i>	60/H	33/H	22.5/H	10/M	7.5/H	133/150	#2
<i>Mt. Emily</i>	60/H	35/H	22.5/H	5/L	7.5/H	130/150	#3
<i>Palmer</i>	60/H	29/M	22.5/H	10/M	7.5/M	129/150	#4
<i>Perry/Hilgard</i>	60/H	33/H	22.5/H	5/L	7.5/H	128/150	#5
<i>Stubblefield</i>	60/H	37/H	15/M	5/L	5/M	122/150	#6
<i>Beaver Creek Watershed</i>	60/H	32/H	22.5/H	5/L	2.5/L	122/150	#6
<i>Catherine Creek</i>	60/H	26/M	22.5/H	5/L	7.5/H	121/150	#7
<i>Blue Springs</i>	60/H	35/H	15/M	5/L	5/M	120/150	#8
<i>Medical Springs</i>	60/H	24/M	22.5/H	5/L	7.5/H	119/150	#9
<i>Kamela</i>	60/H	22/M	15/M	5/L	7.5/H	109.5/150	#10
<i>Pumpkin Ridge /Ruckle</i>	30/L-M	34/H	22.5/H	10/M	7.5/H	104/150	#11
<i>Elkanah</i>	30/L-M	39/H	15/M	10/M	7.5/H	101.5/150	#12
<i>Clark</i>	30/L-M	30/M	22.5/H	10/M	5/M	97.5/150	#13
<i>Rysdam</i>	30/L-M	29/M	22.5/H	10/M	5/M	96.5/150	#14
<i>Starkey</i>	30/L-M	33/H	15/M	10/M	7.5/H	95.5/150	#15
L = Low M = Medium H = High							



WUI Name: Morgan Lake / Looking Glass Hill

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	37	22.5	10	5	134.5	1

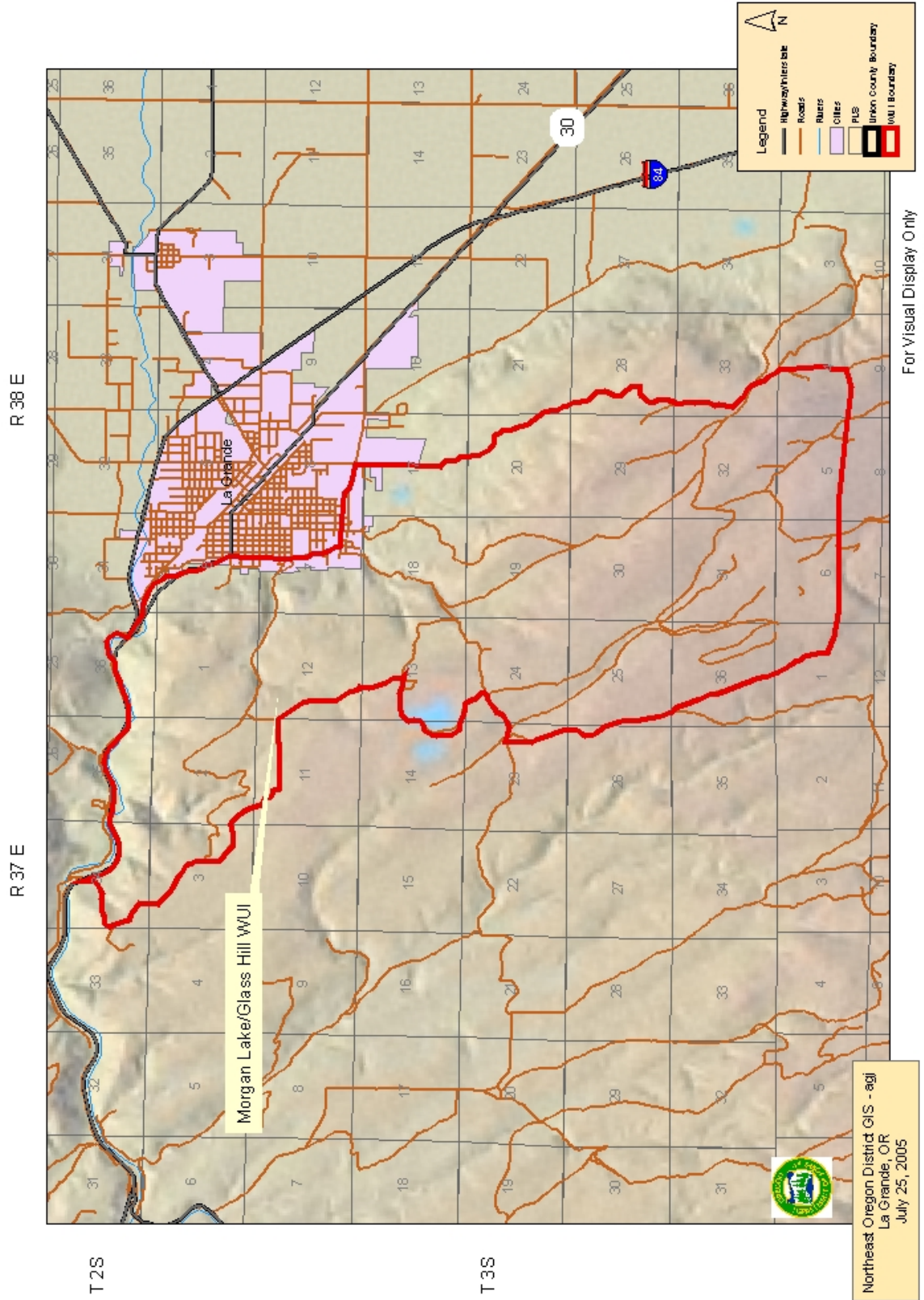
Communities at Risk: Morgan Lake, City of La Grande

Structural Fire Protection Agency: La Grande Fire Department protects to the City Limit; otherwise it is wildland fire protection only.

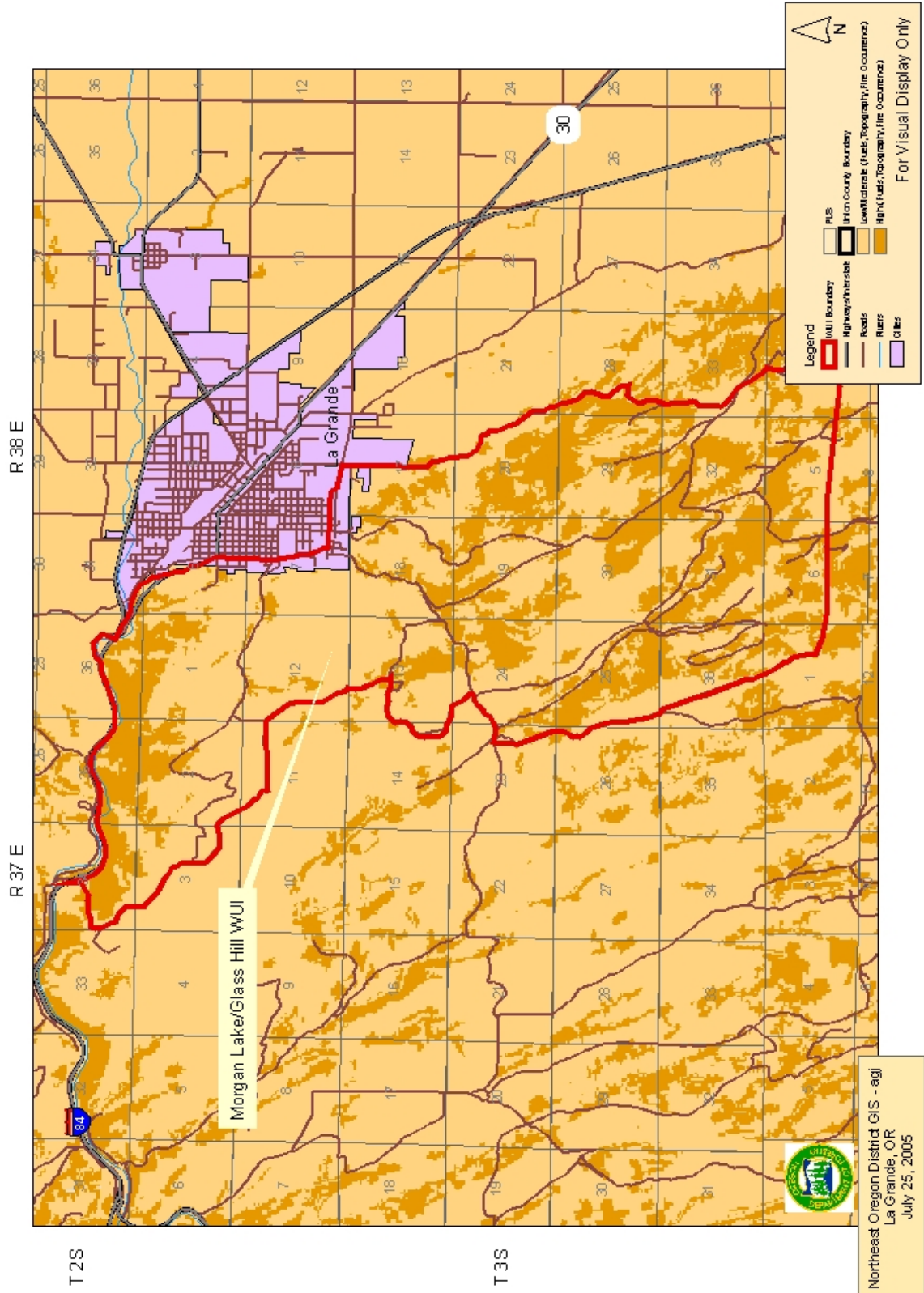
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Morgan Lake Private Lands	• 1-2 years	• ODF; Landowners, LGFD; LGRFPD
Prepare Morgan Lake Evacuation Plan	• 1-2 years	• UCES; UCPW; UCSO
Reconstruct Morgan Lake Road	• 3 + years	• UCPW; ODOT
Establish RFPD for Morgan Lake	• 3 + years	• Landowners; UC; Structural Agencies

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Cove

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	33	22.5	10	7.5	133	2

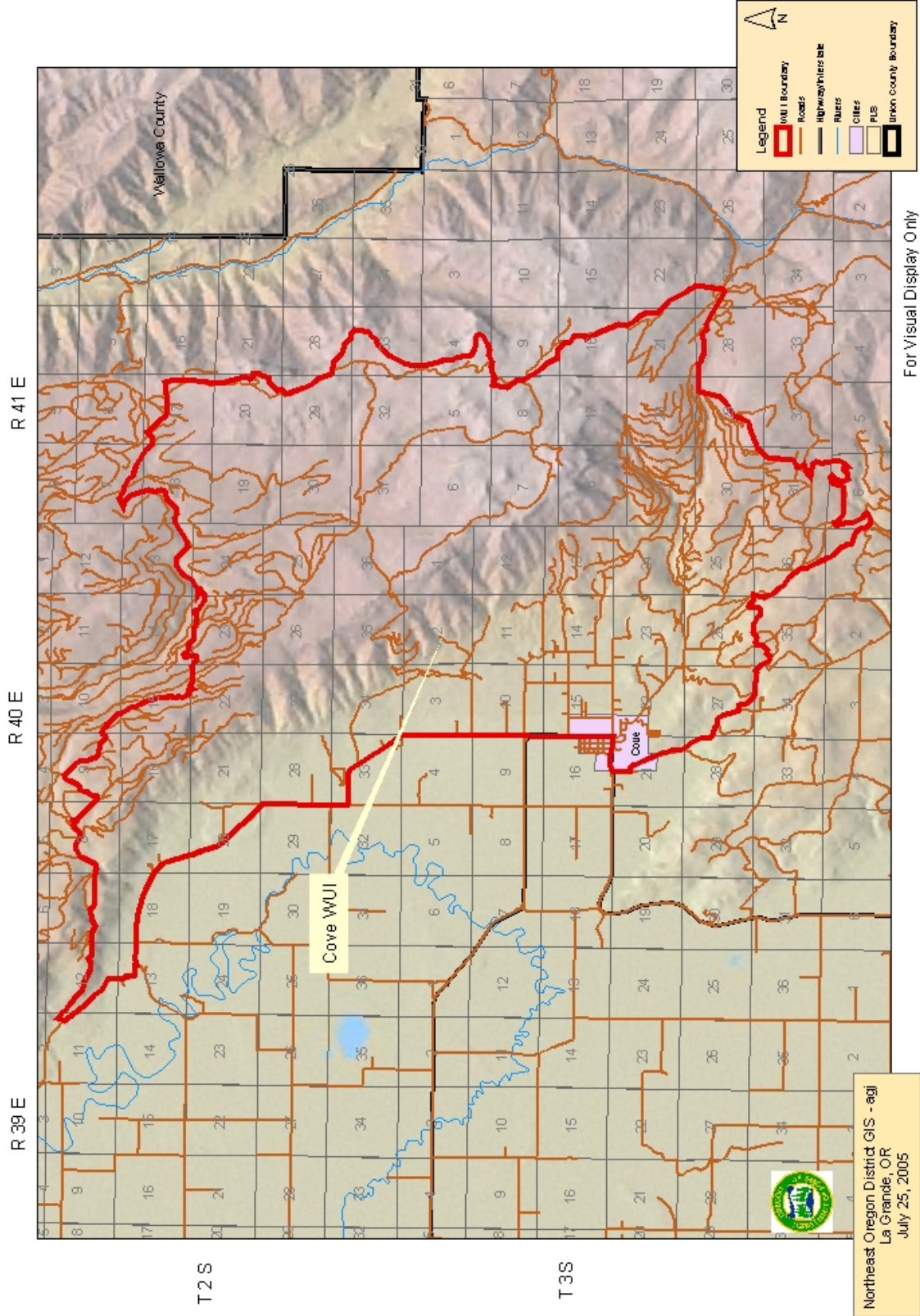
Communities at Risk: City of Cove, Lower Cove, High Valley and adjacent rural residential areas.

Structural Fire Protection Agency: Cove Rural Fire Protection District.

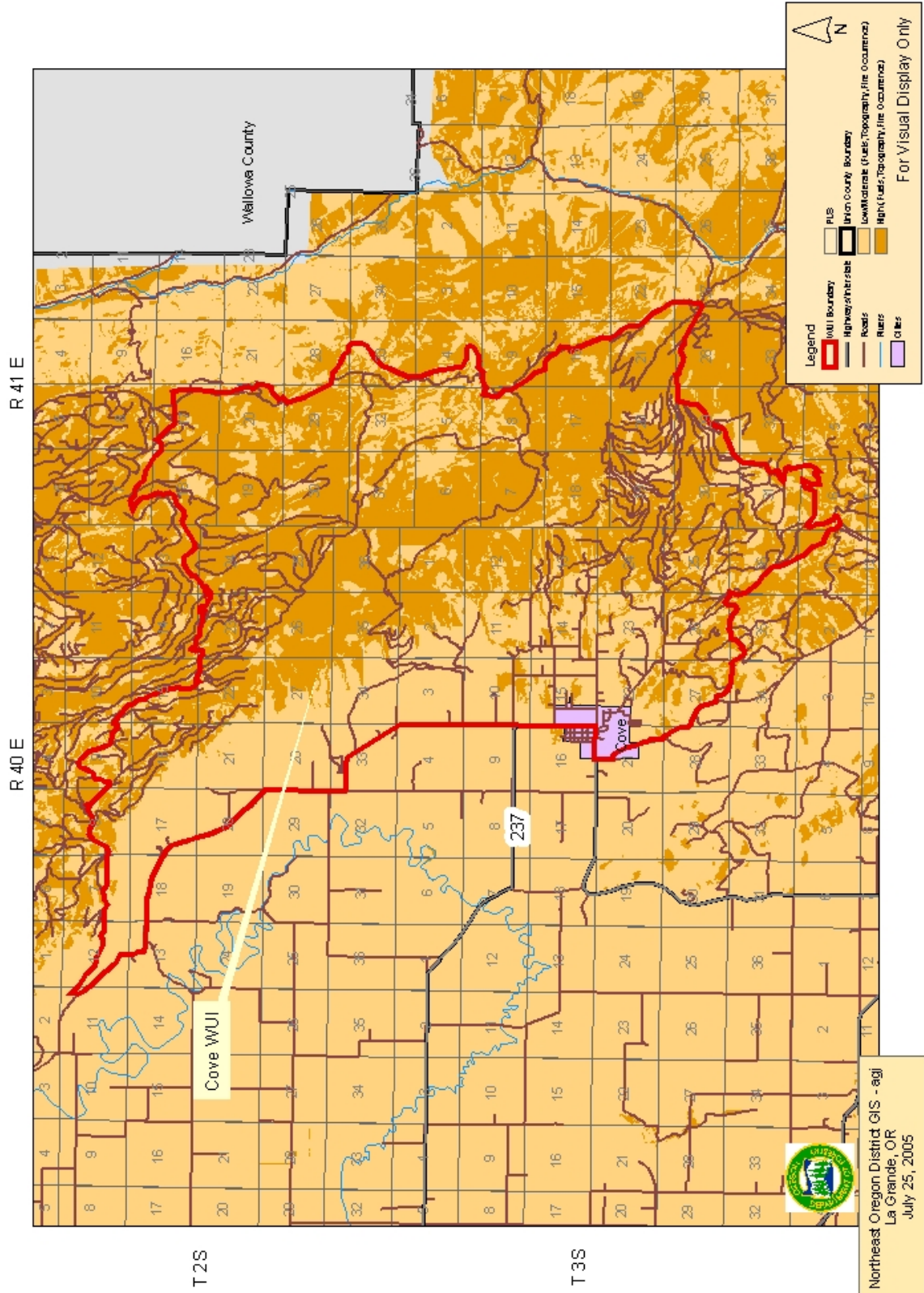
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Cove Treatment	• 3 + years	• USFS; ODF; Landowners, Cove RFPD; UC Forest Restoration Board; Industrial Forestland Owners
Cove Private Lands	• 1-2 years	• ODF; Landowners; Cove RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Mt. Emily

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	35	22.5	5	7.5	130	3

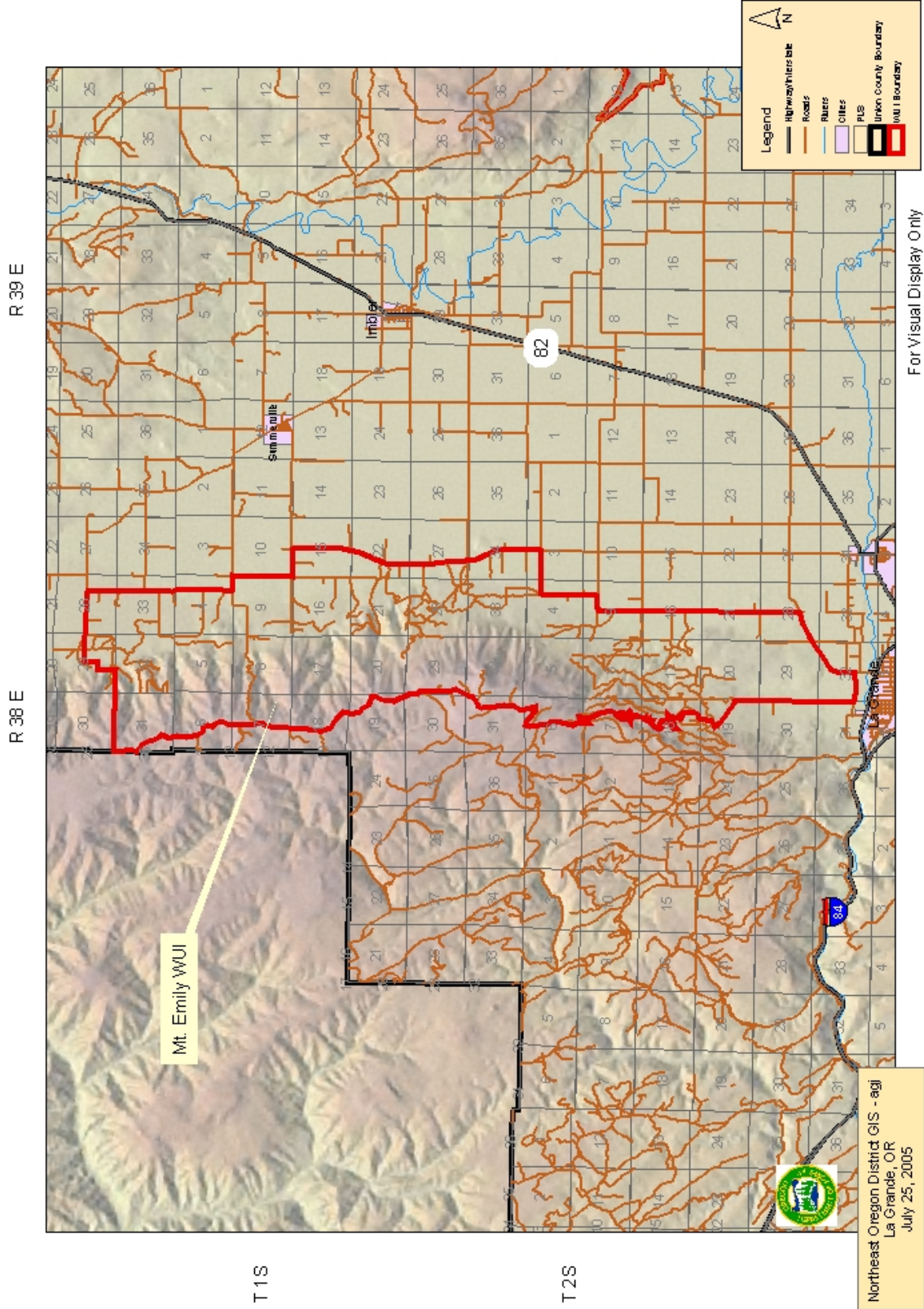
Communities at Risk: Mt. Emily, Owsley Canyon and adjacent rural residential areas.

Structural Fire Protection Agency: La Grande and Imbler Rural Fire Protection Districts.

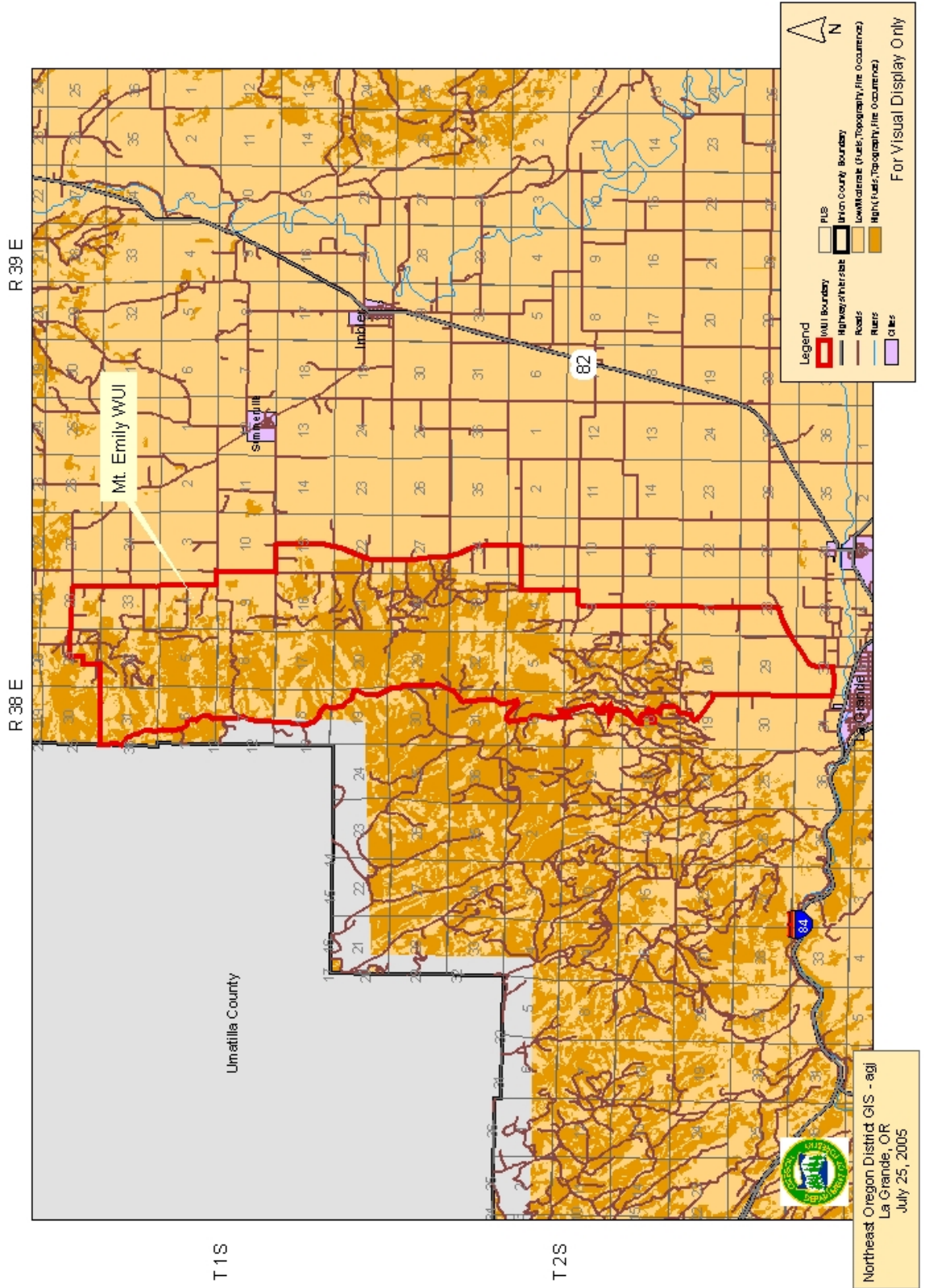
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Mt. Emily Treatment	<ul style="list-style-type: none"> • 3 + years 	<ul style="list-style-type: none"> • USFS; ODF; Private & Industrial Landowners; LG & Imbler RFPDs; UC Forest Restoration Board
Mt. Emily Private Lands	<ul style="list-style-type: none"> • 1-2 years 	<ul style="list-style-type: none"> • ODF; Private & Industrial Landowners; LG & Imbler RFPDs

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Palmer Valley / Valley View

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	29	22.5	10	7.5	129	4

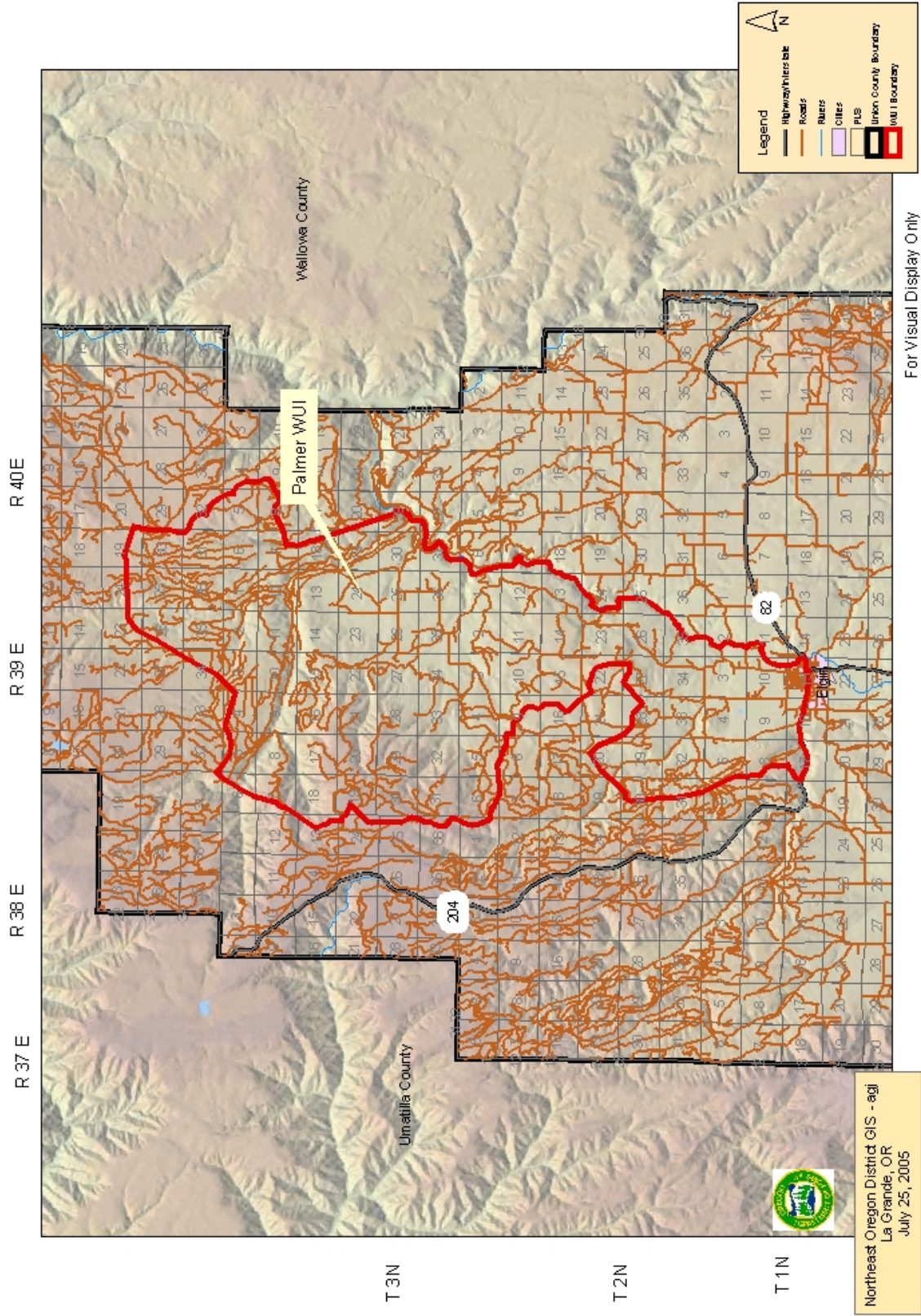
Communities at Risk: Palmer Valley, Valle View Road area, City of Elgin and adjacent rural residential areas.

Structural Fire Protection Agency: Elgin Rural Fire Protection District.

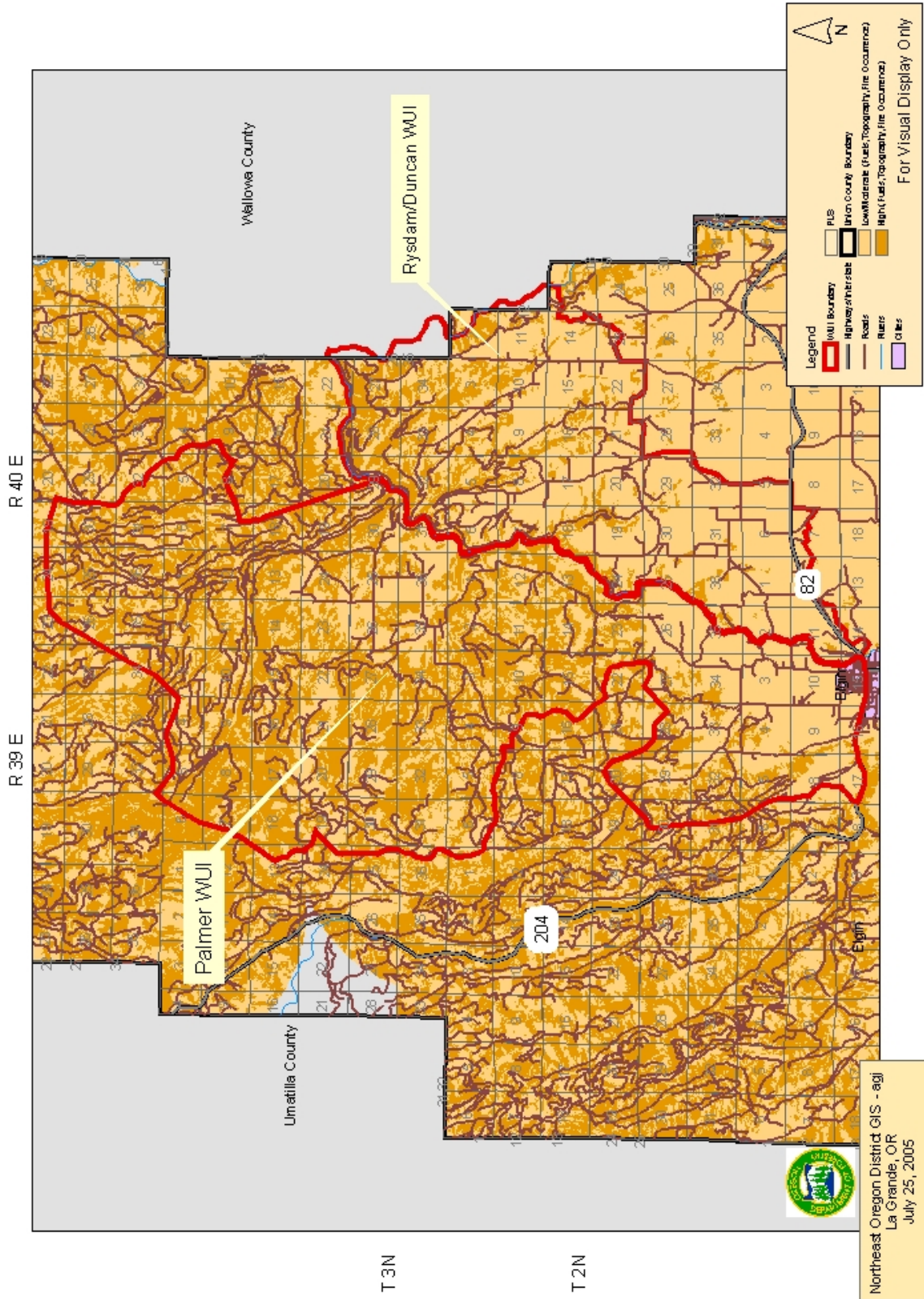
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Palmer Valley Private Lands	• 1-2 years	• ODF; Landowners; Elgin RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Perry / Hilgard

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	33	22.5	5	7.5	128	5

Communities at Risk: Upper and Lower Perry, Hilgard.

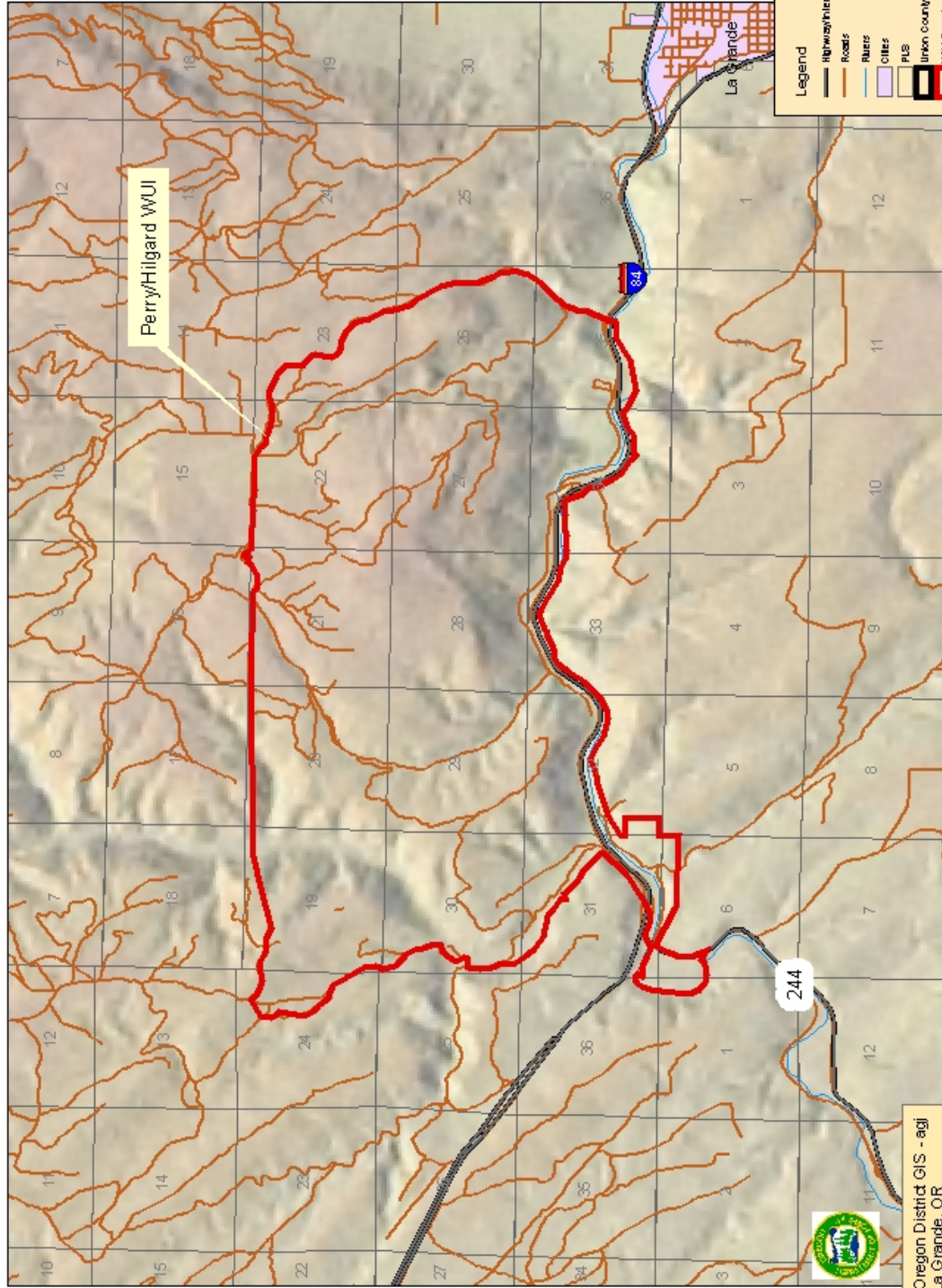
Structural Fire Protection Agency: Wildland fire protection only.

Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Establish a Perry / Hilgard RFPD	• 3 + years	• Landowners; UC; Structural Agencies
Pelican Creek Treatment	• 1-2 years	• USFS
Three Cabin Creek Treatment	• 1-2 years	• USFS

Union County WUI Boundaries (with Shaded Relief)

R 37 E

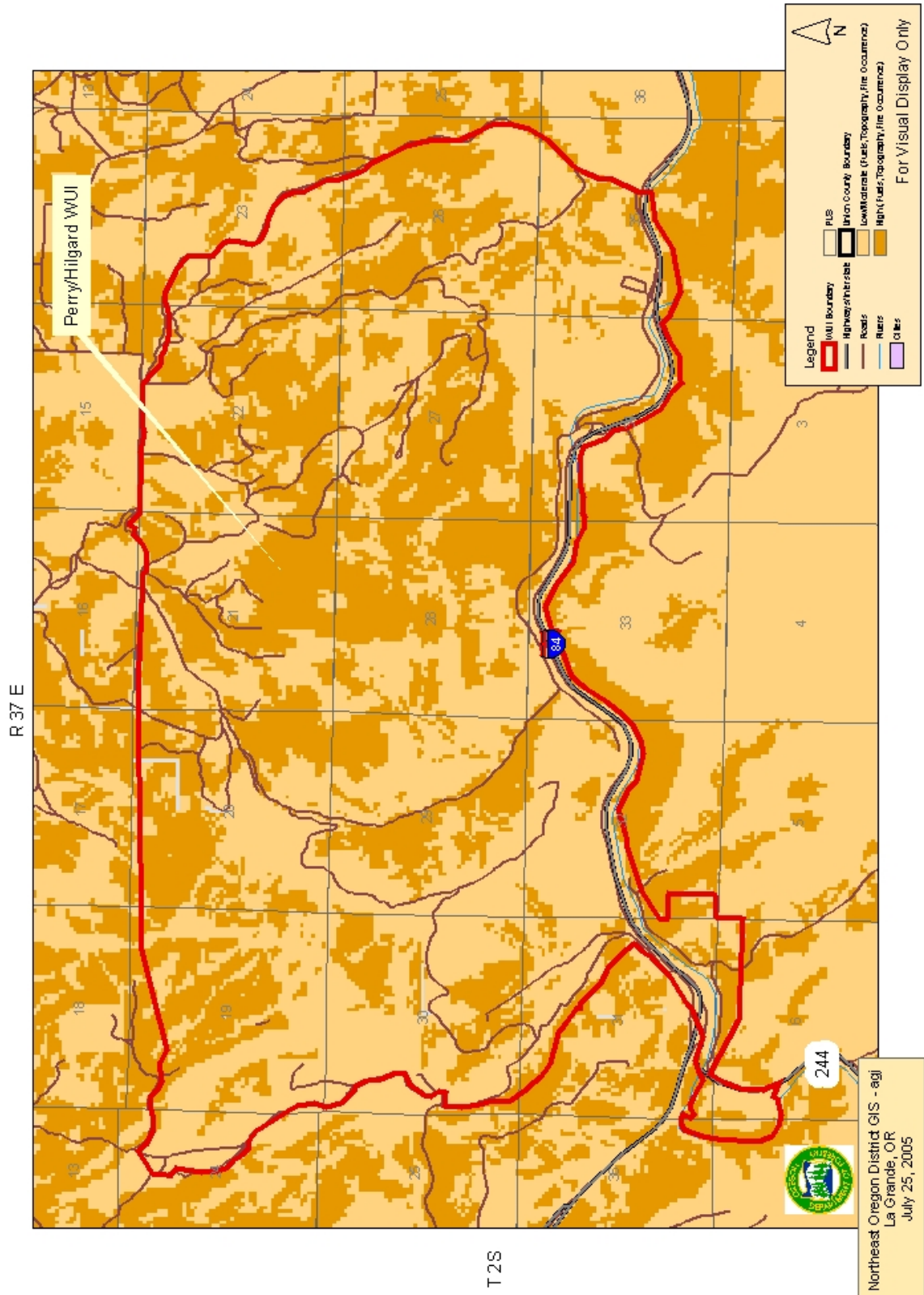


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Northeast Oregon District GIS - agl
La Grande, OR
July 25, 2005

Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Stubblefield

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	37	15	5	5	122	6

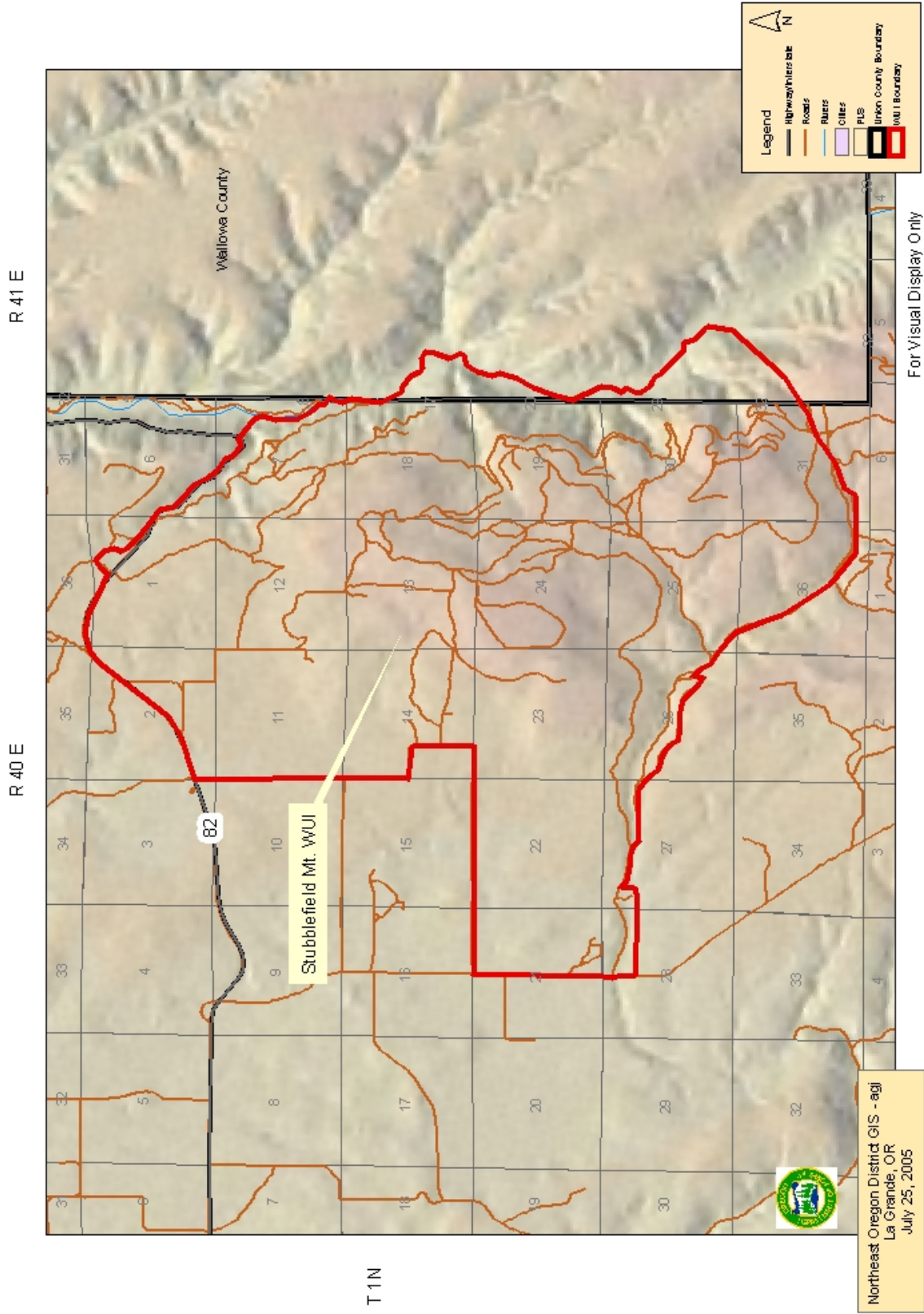
Communities at Risk: Stubblefield Mountain area.

Structural Fire Protection Agency: Wildland fire protection only.

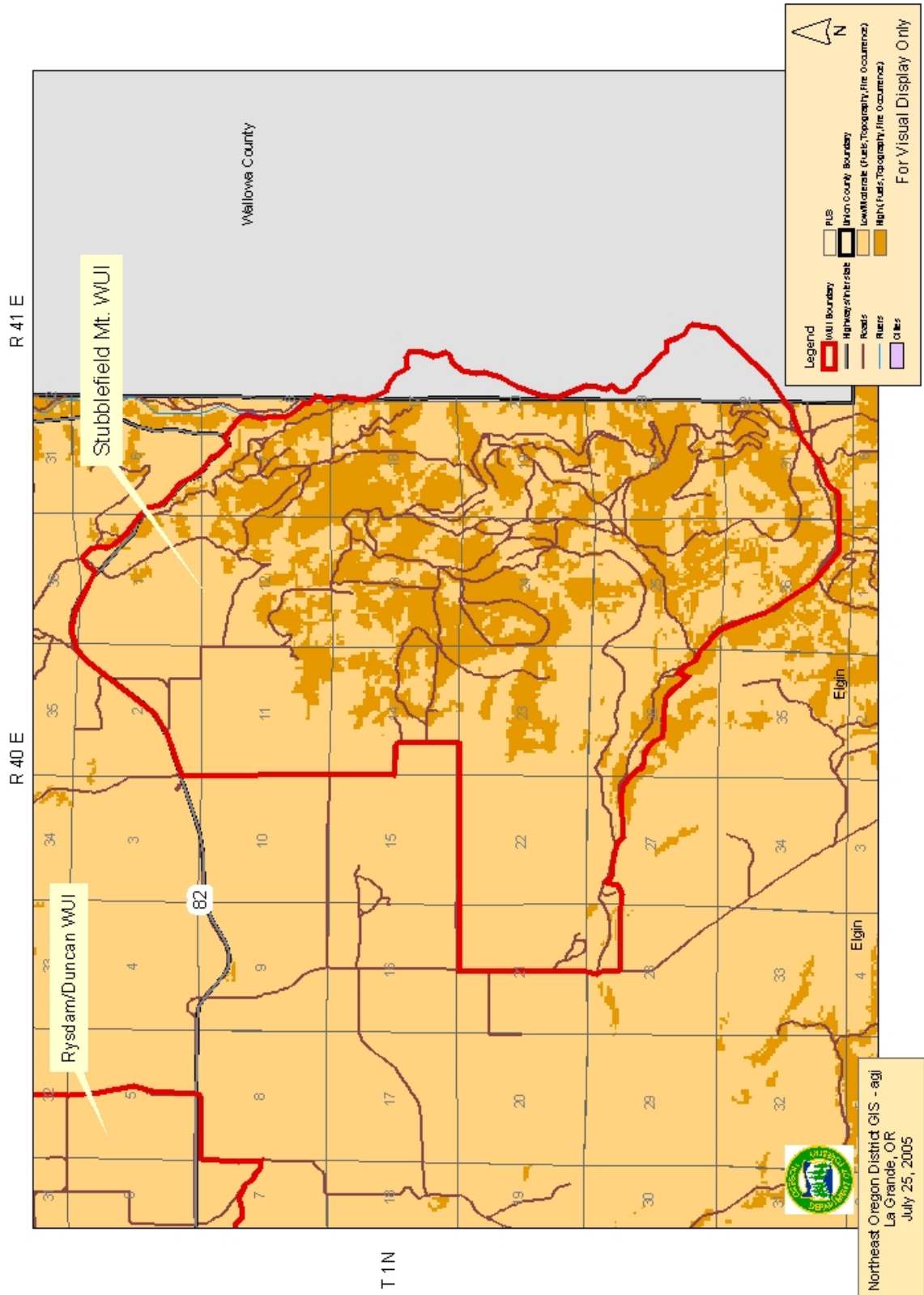
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Beaver Creek Watershed

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	32	22.5	5	2.5	122	6

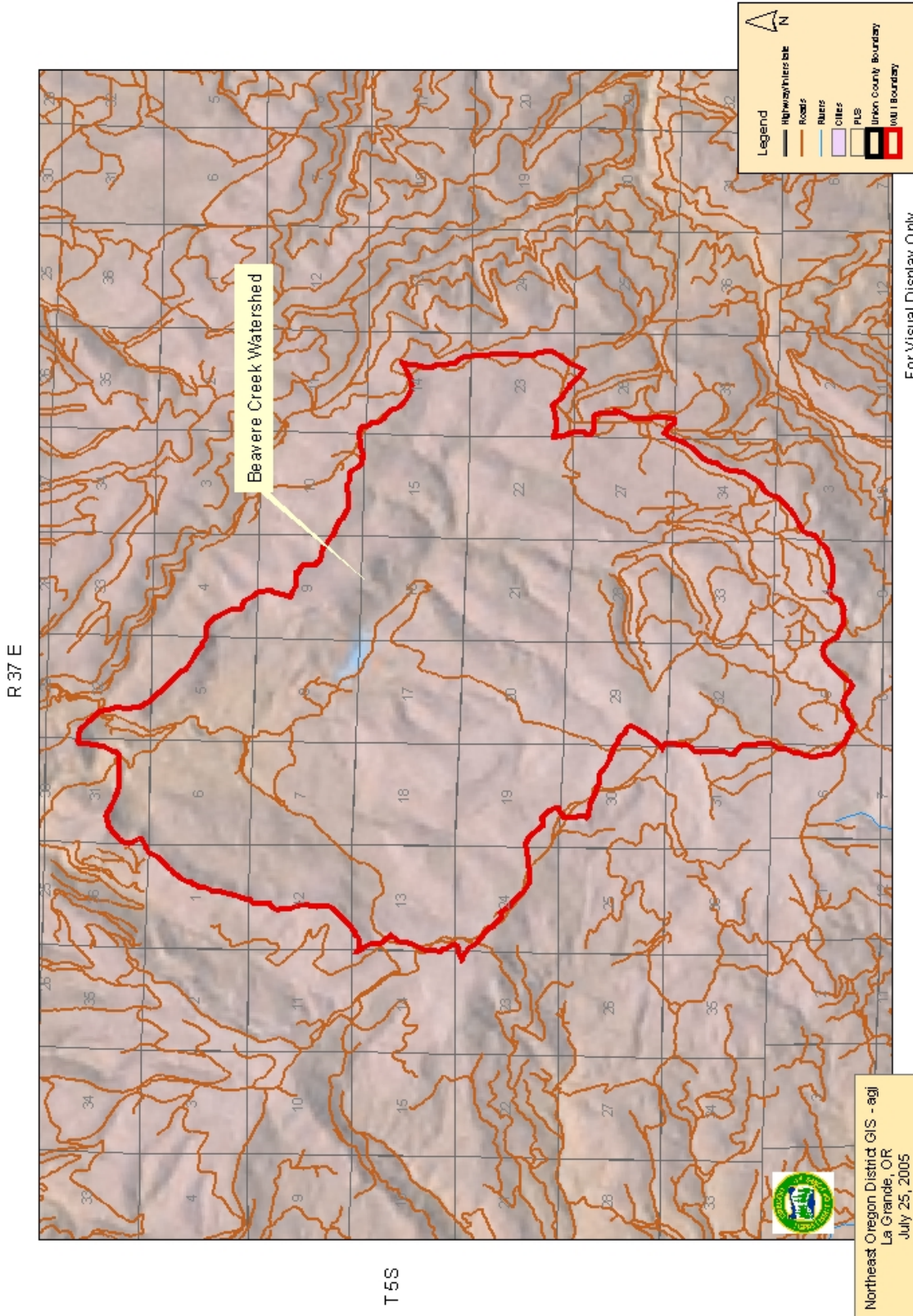
Communities at Risk: City of La Grande.

Structural Fire Protection Agency: Wildland fire protection only.

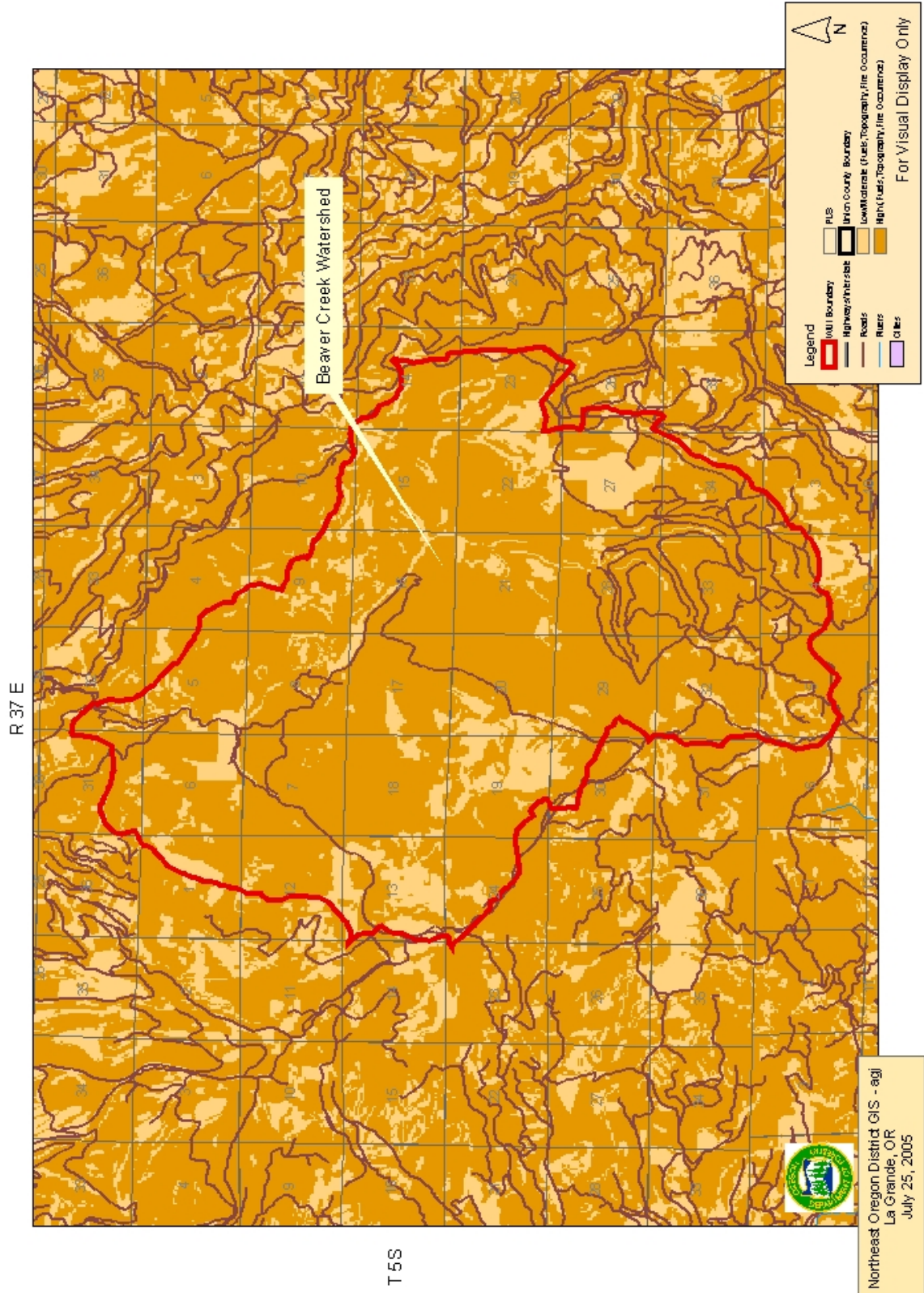
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Catherine Creek

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	26	22.5	5	7.5	121	7

Communities at Risk: Catherine Creek area.

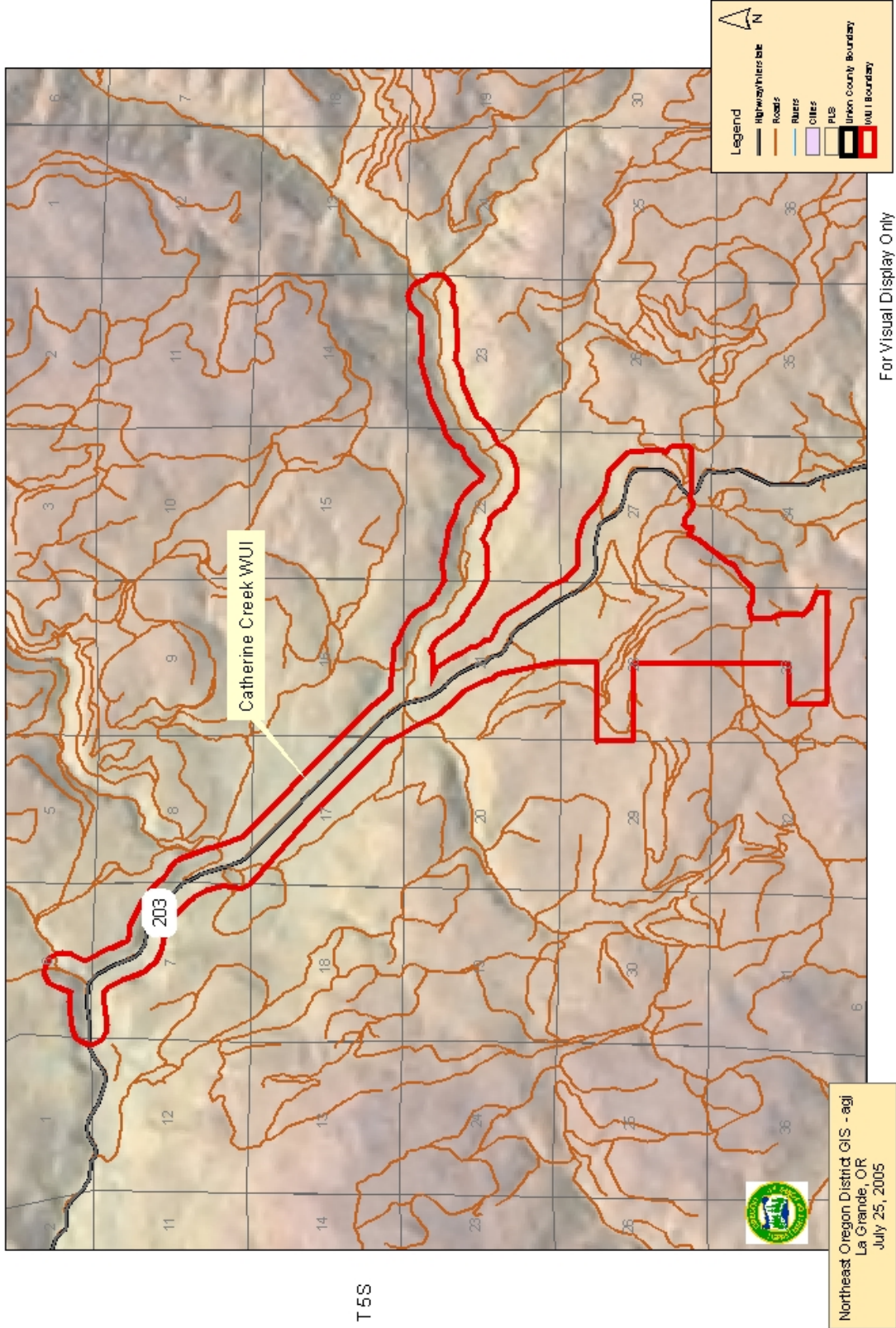
Structural Fire Protection Agency: Wildland fire protection only.

Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
South Fork Catherine Creek	• 3 + years	• USFS; ODF; Private & Industrial Landowners; Union RFPD; UC Forest Restoration Board
Catherine Creek Corridor Private Lands	• 3 + years	• ODF; Landowners; Union RFPD
Catherine Creek Corridor Mapping	• 1-2 years	• ODF; Landowners; Union RFPD

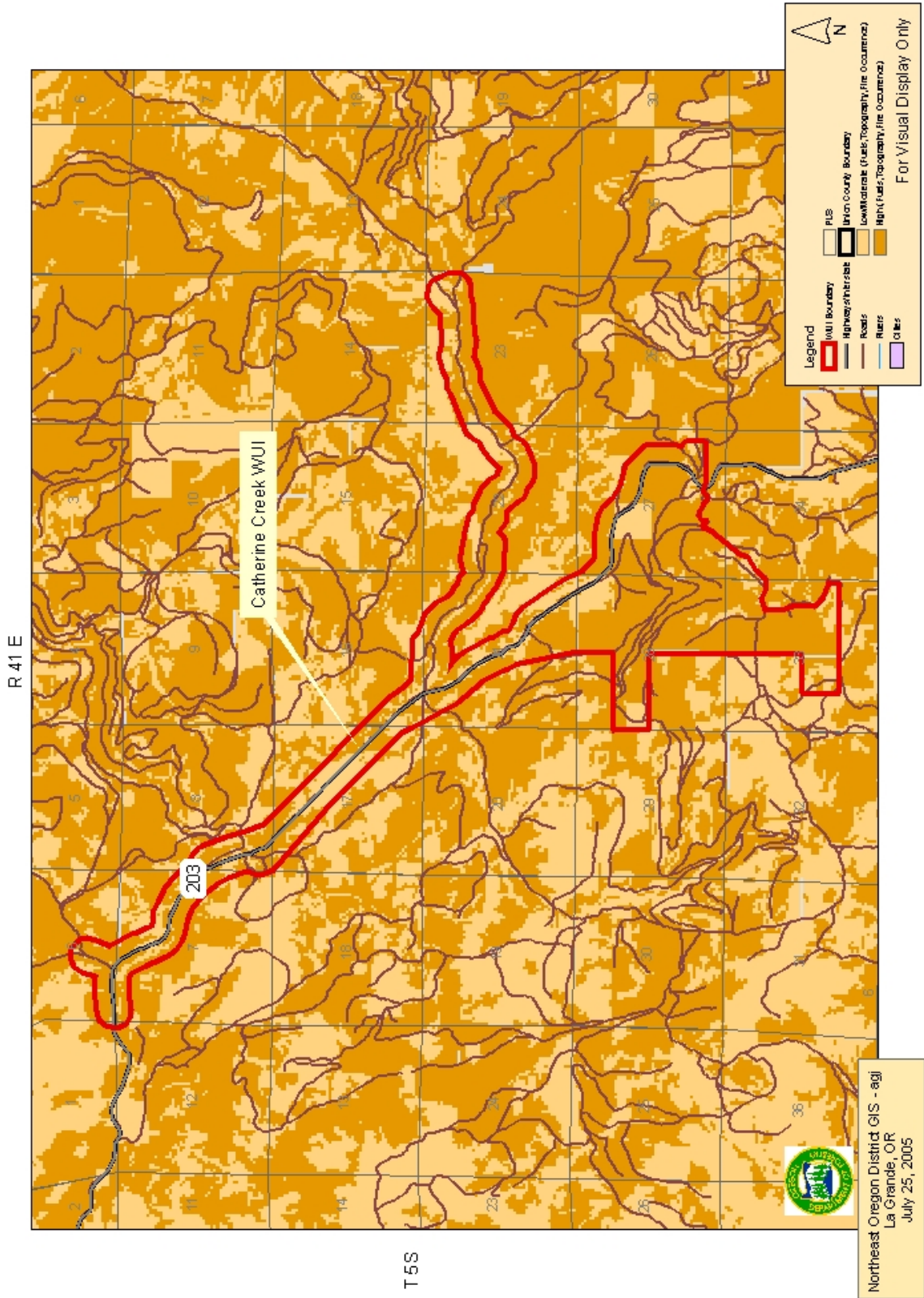
Union County WUI Boundaries (with Shaded Relief)

R 41 E



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Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Blue Springs

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	35	15	5	5	120	8

Communities at Risk: Blue Springs area.

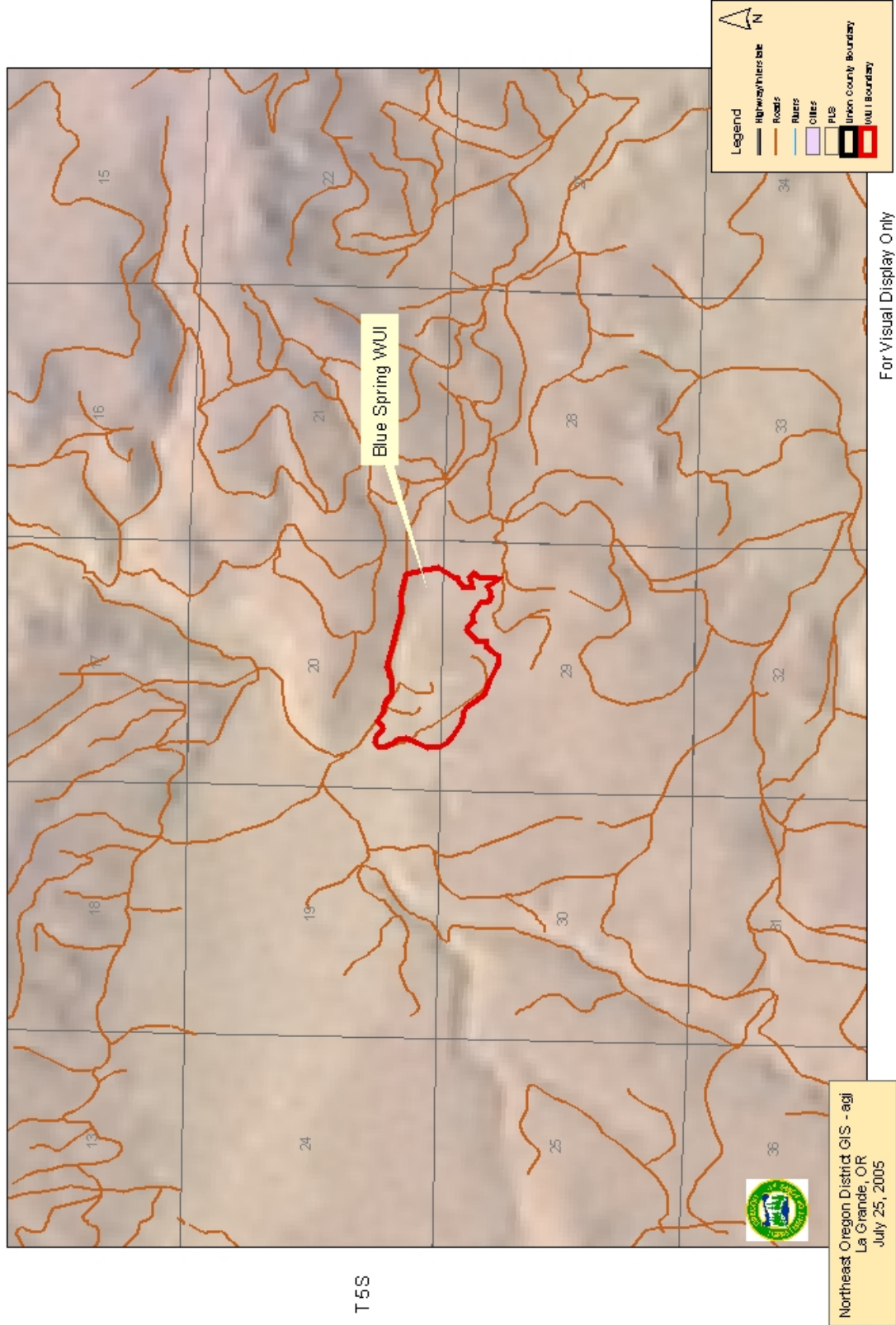
Structural Fire Protection Agency: Wildland fire protection only.

Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

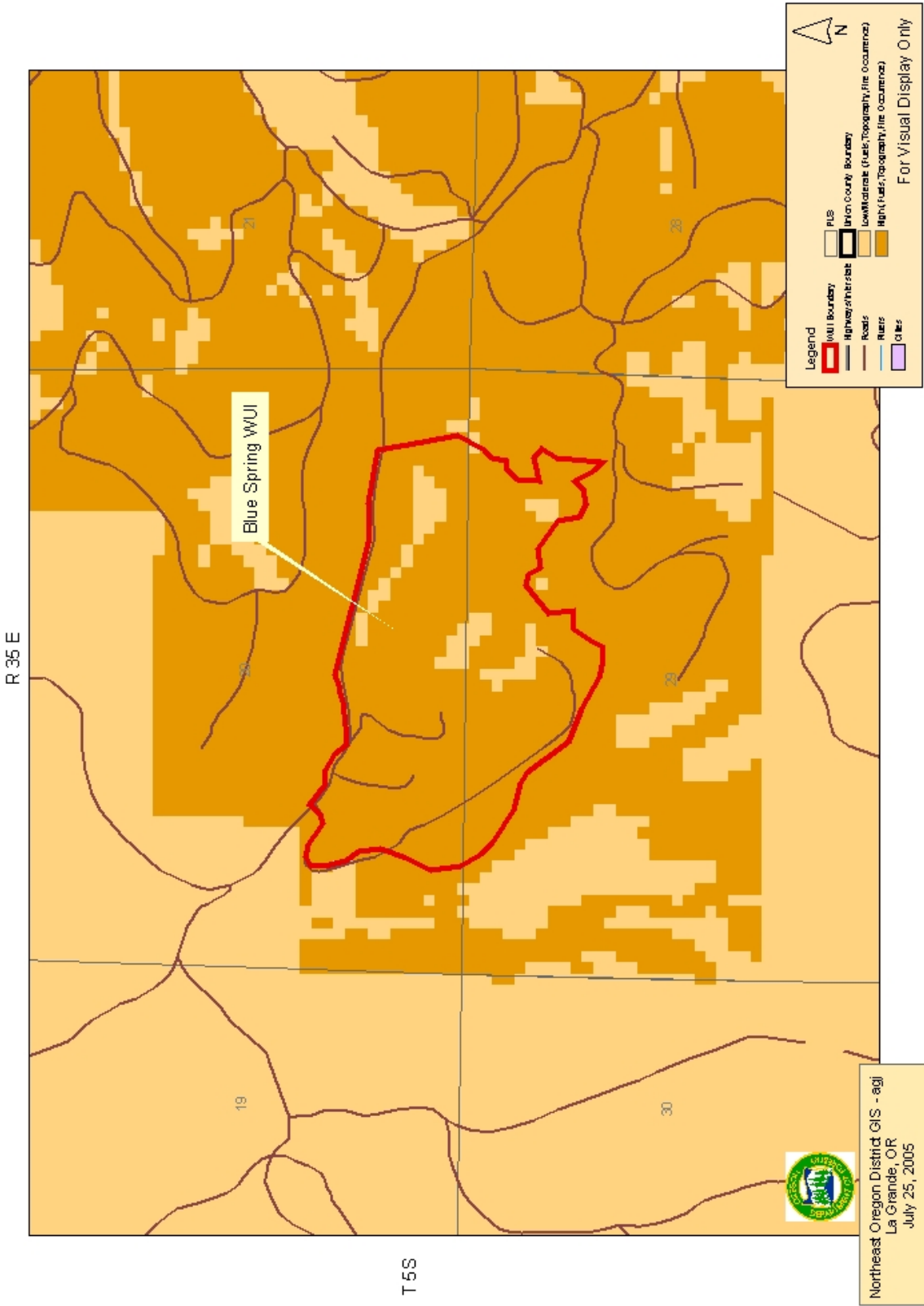
WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Blue Springs Maintenance	• Ongoing	• USFS

Union County WUI Boundaries (with Shaded Relief)

R 36 E



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Medical Springs

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	24	22.5	5	7.5	119	9

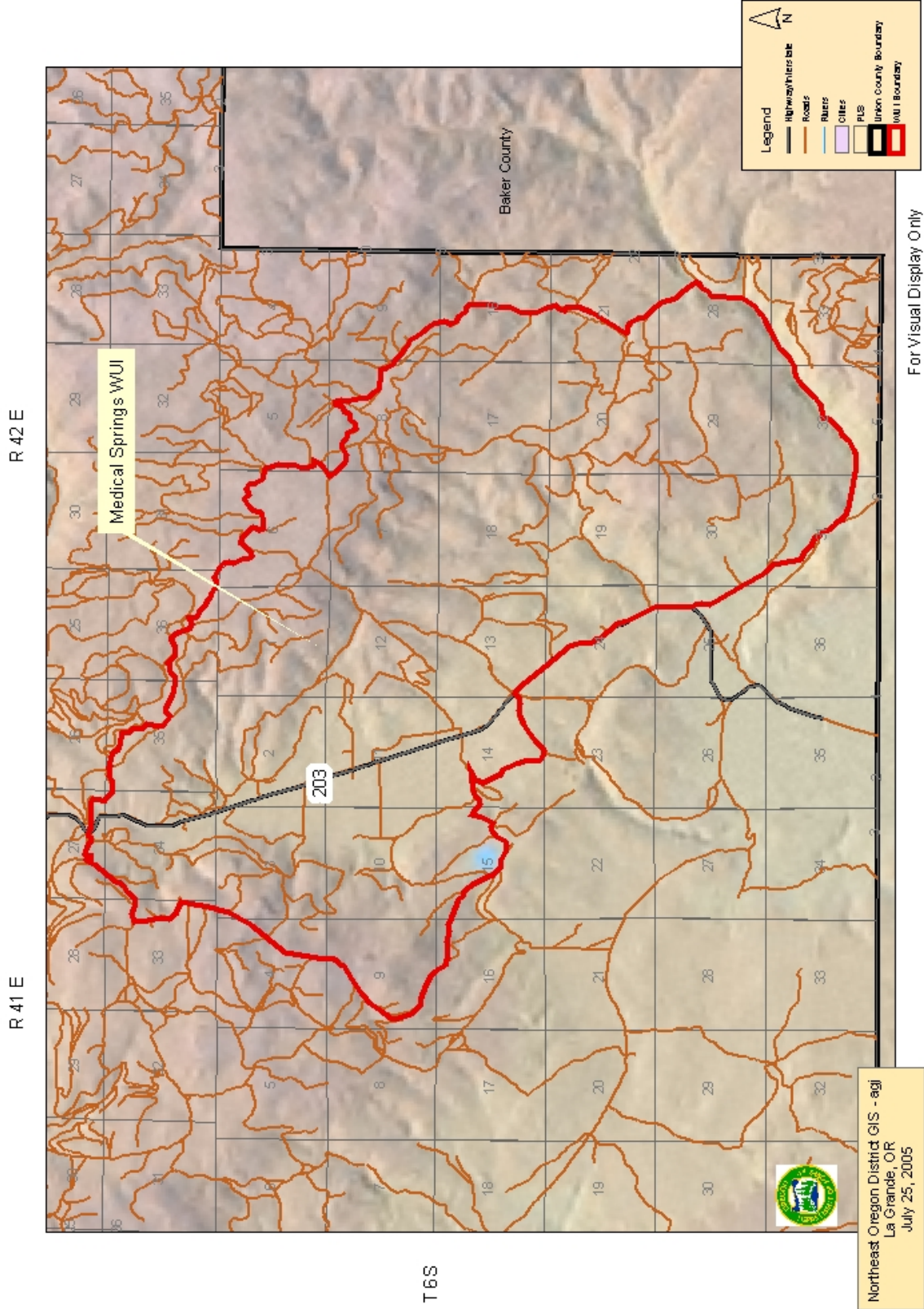
Communities at Risk: Medical Springs, Pondosa and adjacent rural residential areas.

Structural Fire Protection Agency: Medical Springs Rural Fire Protection District.

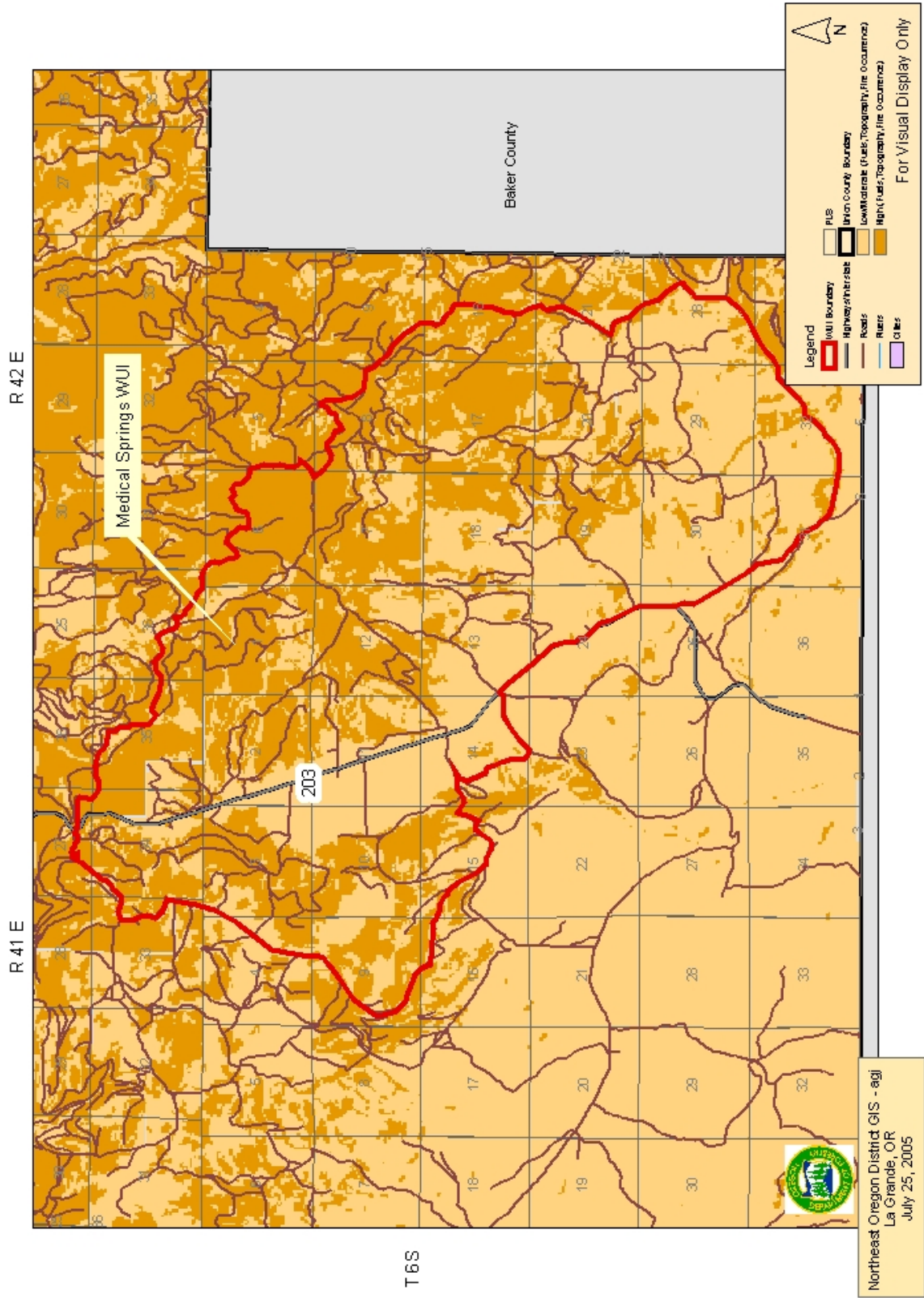
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Medical Springs (Bald Angel) - Planning	• 3 + years	• USFS

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Kamela

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
60	22	15	5	7.5	109.5	10

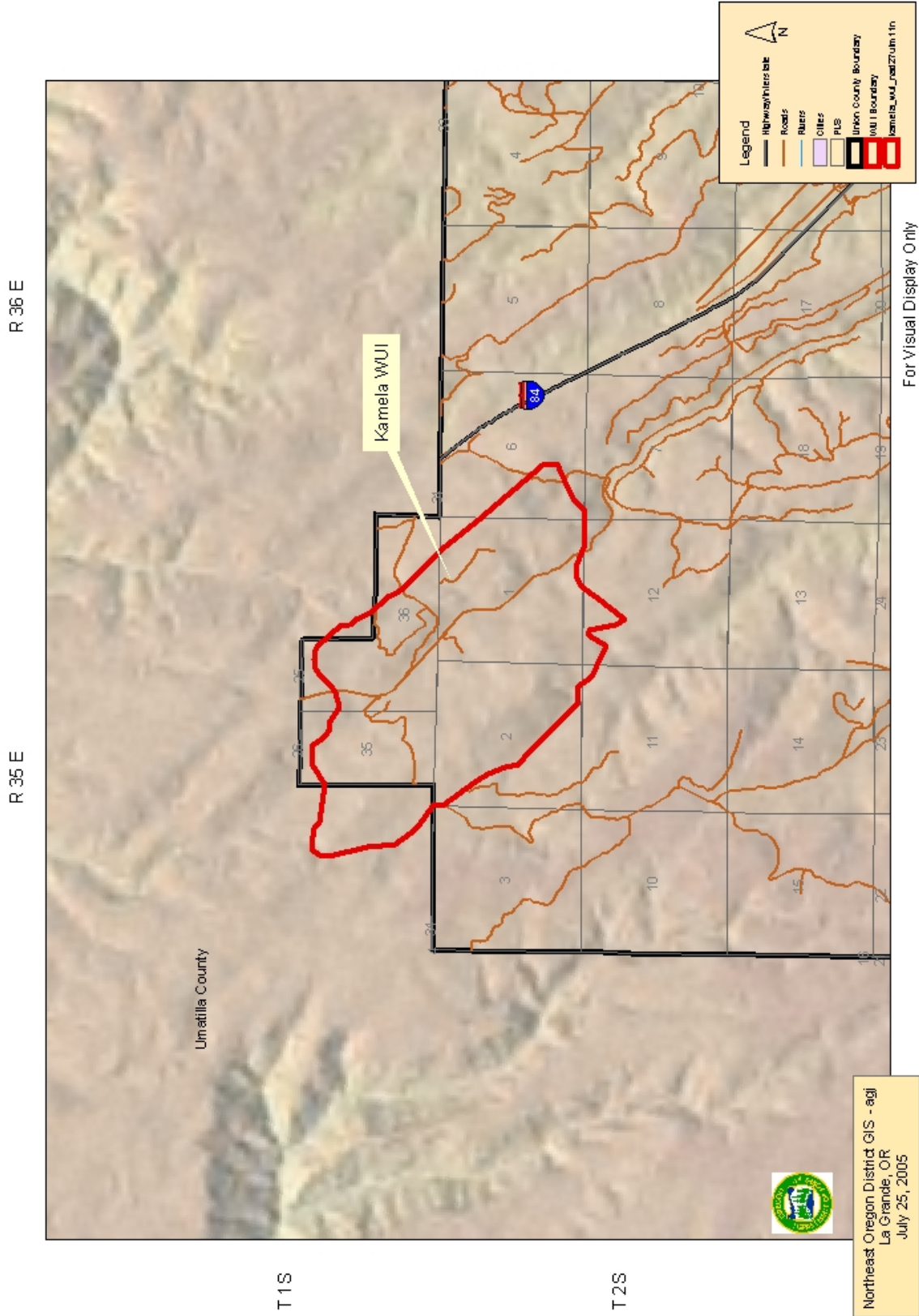
Communities at Risk: Kamela.

Structural Fire Protection Agency: Wildland fire protection only.

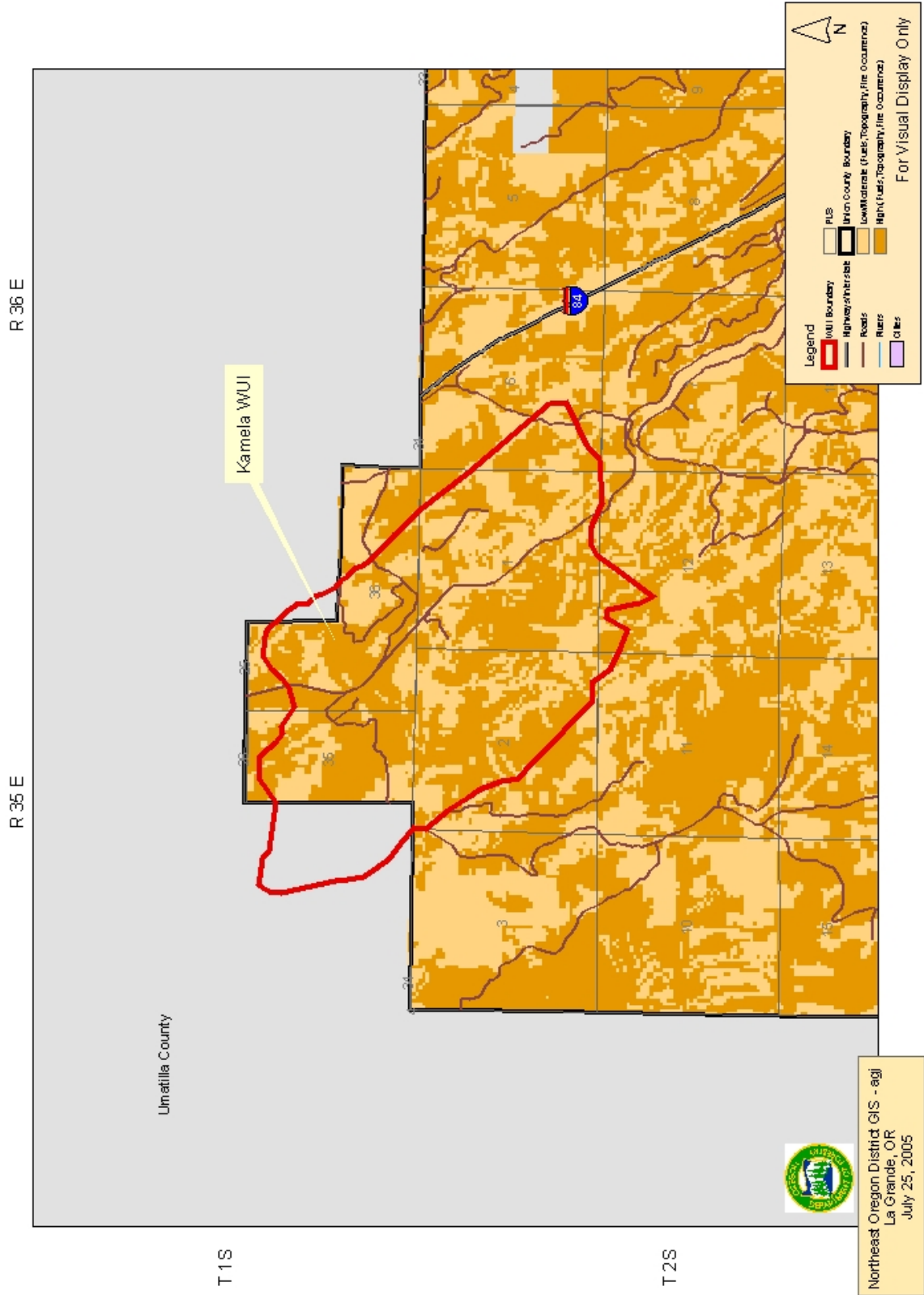
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Pumpkin Ridge

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	34	22.5	10	7.5	104	11

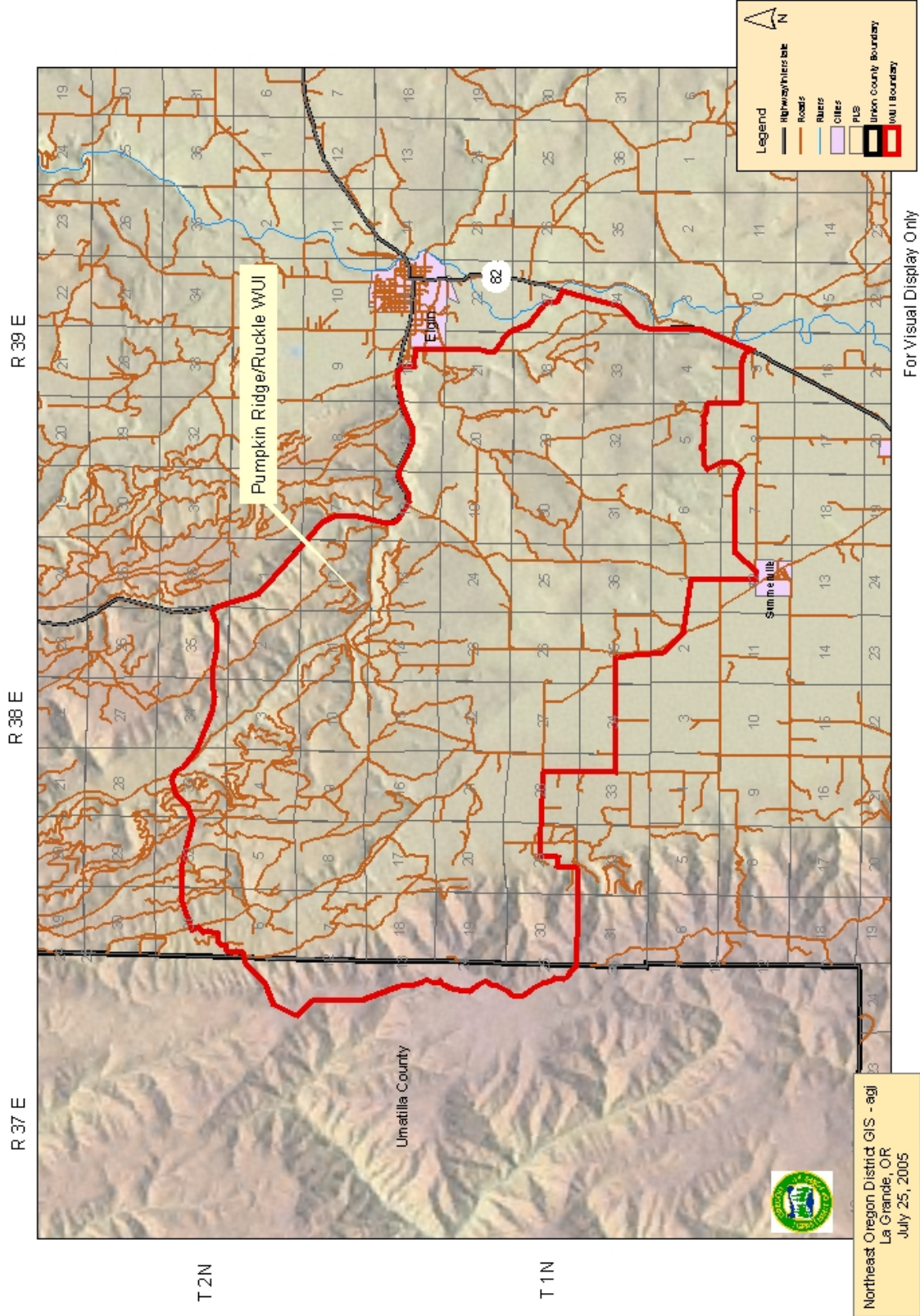
Communities at Risk: Pumpkin Ridge, Craig Loop, Ruckle Road and adjacent rural residential areas.

Structural Fire Protection Agency: Imbler Rural Fire Protection District.

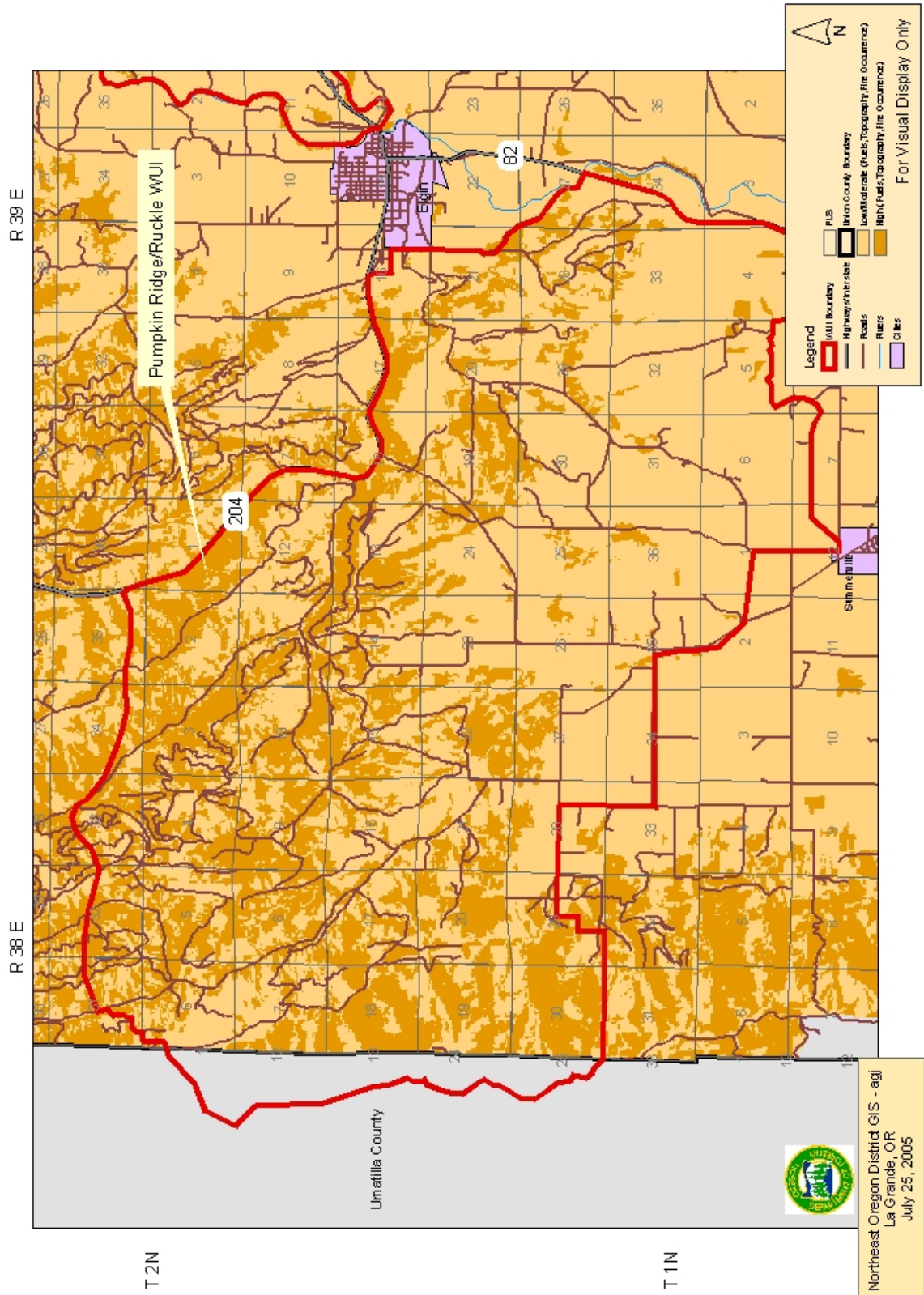
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
	•	•
	•	•
	•	•
	•	•

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Elkanah

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	39	15	10	7.5	101.5	12

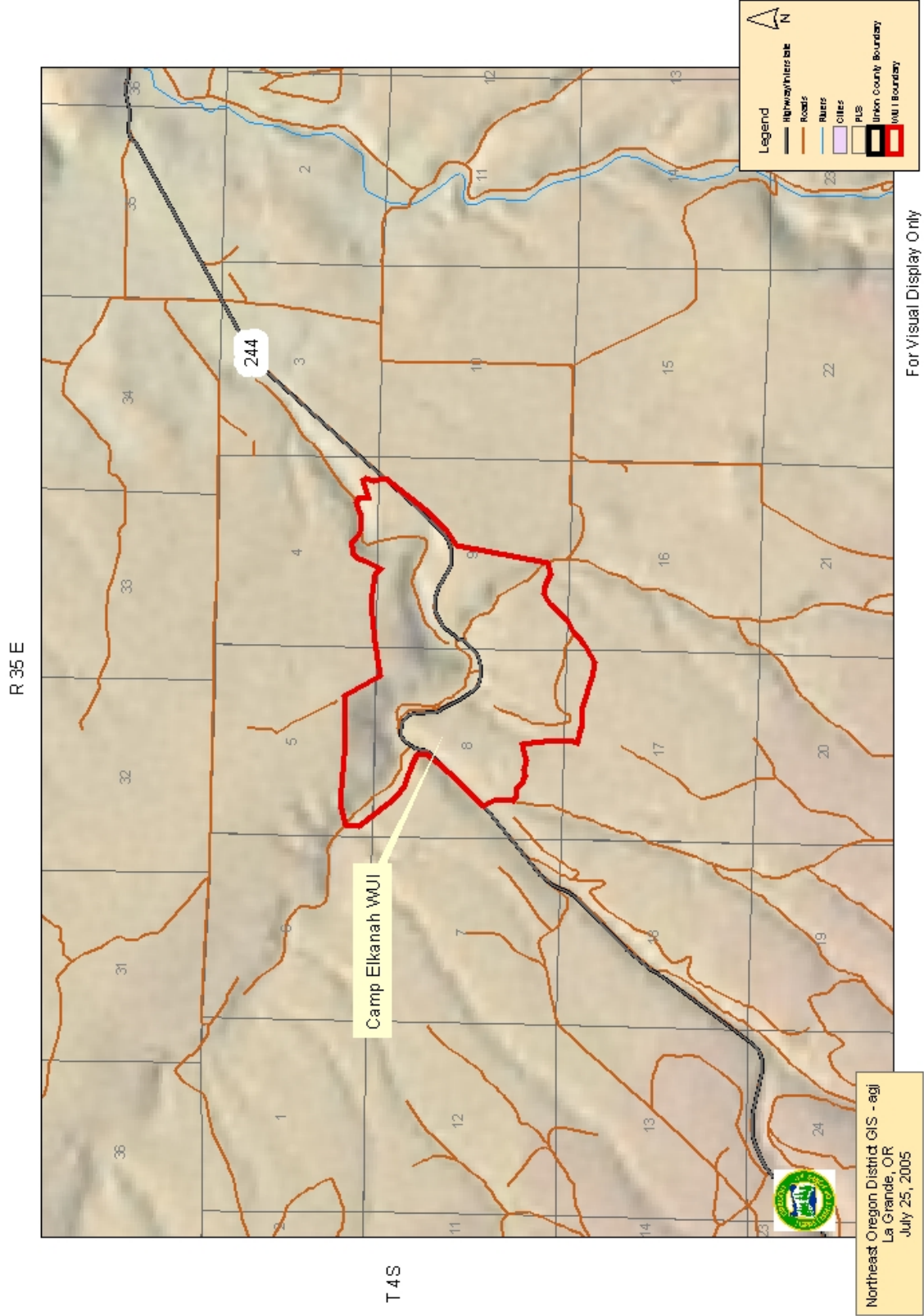
Communities at Risk: Camp Elkanah.

Structural Fire Protection Agency: Wildland fire protection only.

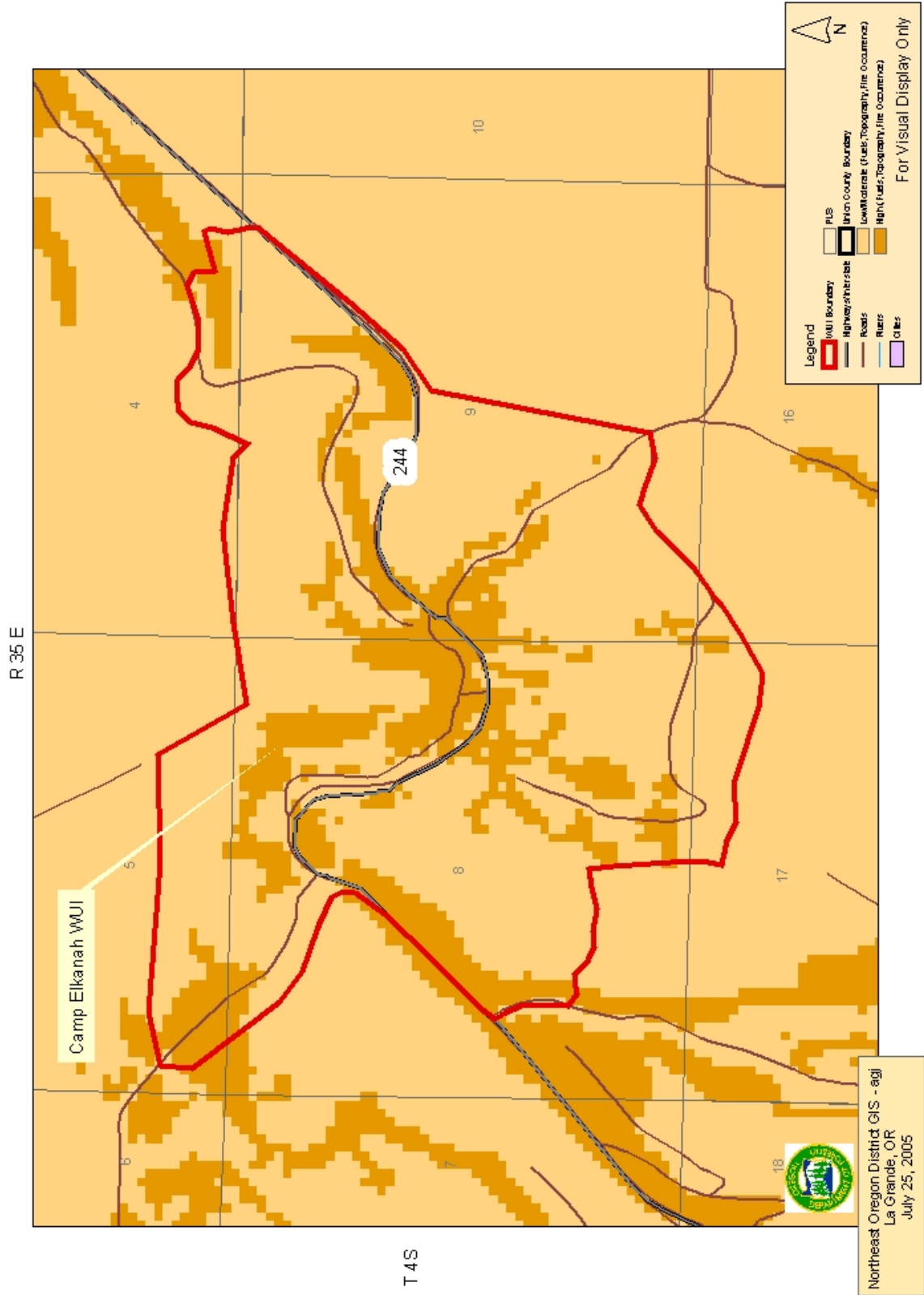
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Camp Elkanah (Texas Heat) Maintenance	• Ongoing	• USFS; Private Permit Holders
Grande Ronde River Corridor Private Lands	• 3 + years	• ODF; Landowners
Grande Ronde River Corridor Mapping	• 1-2 years	• ODF; Landowners; La Grande RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Clark/Indian Creek

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	30	22.5	10	5	97.5	13

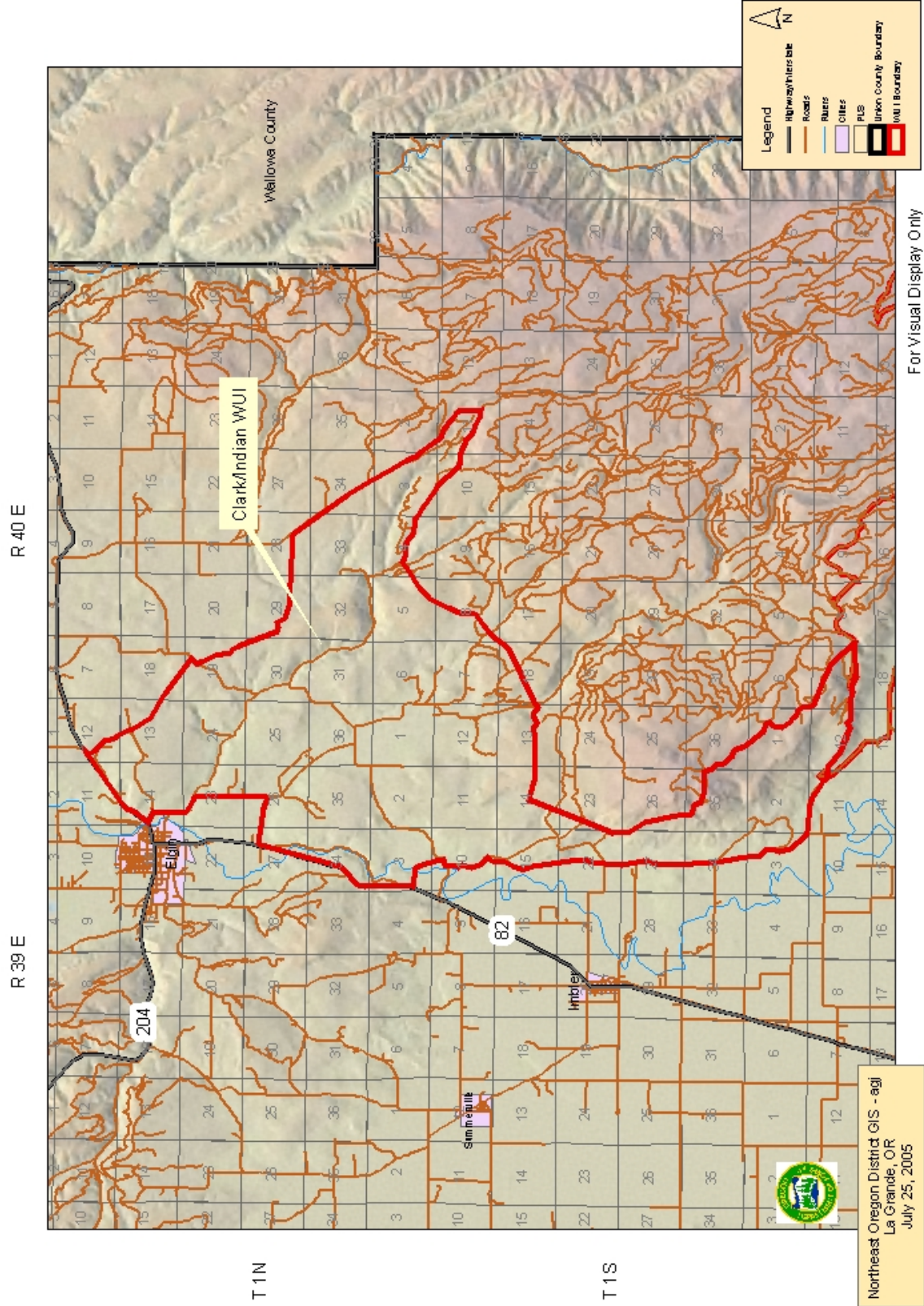
Communities at Risk: Clarks Creek, Indian Creek and adjacent rural residential areas.

Structural Fire Protection Agency: Elgin Rural Fire Protection District.

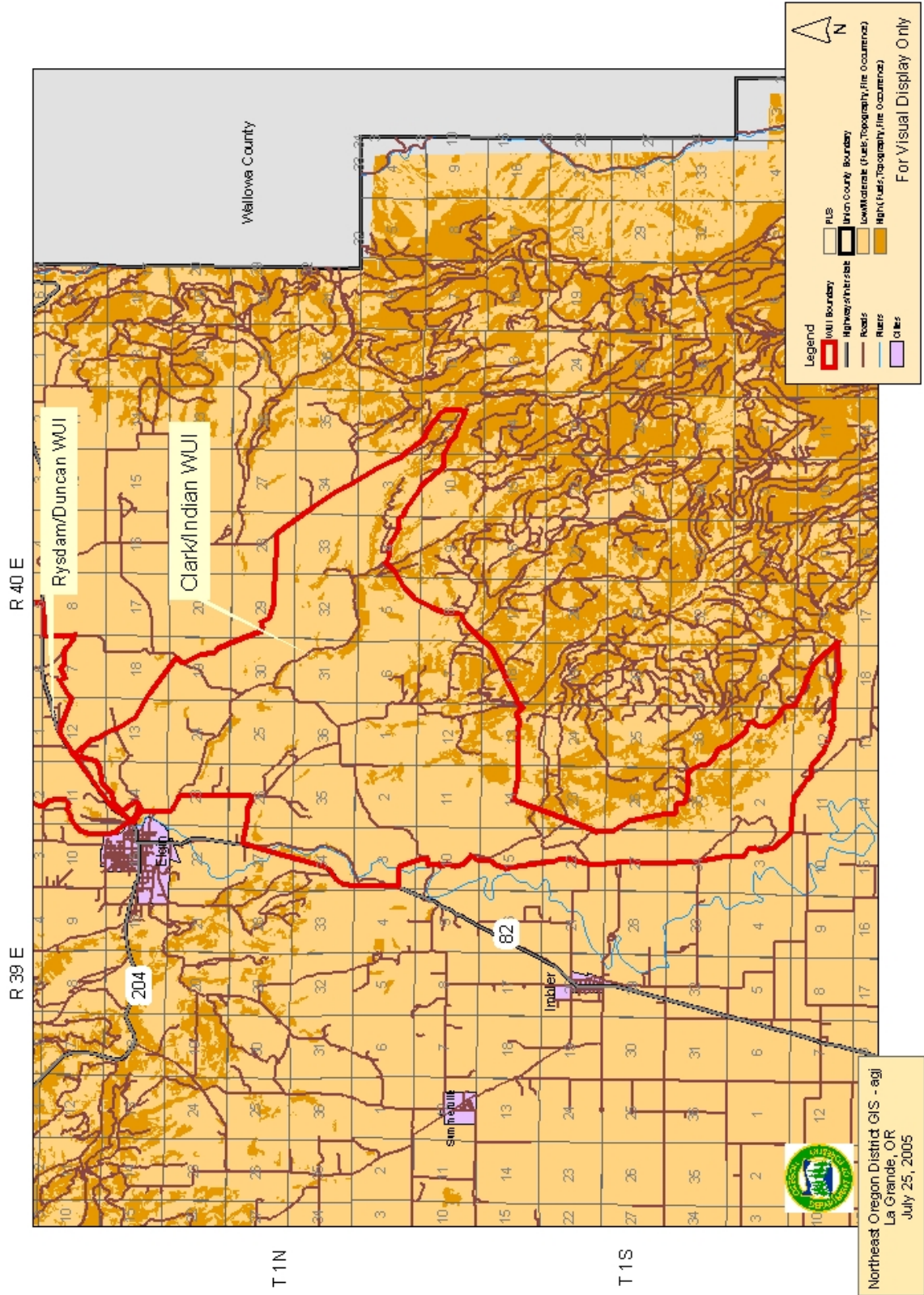
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Clark Creek Planning	• 3 + years	• USFS; ODF; Landowners; Elgin RFPD; UC Forest Restoration Board

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Rysdam

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	29	22.5	10	5	96.5	14

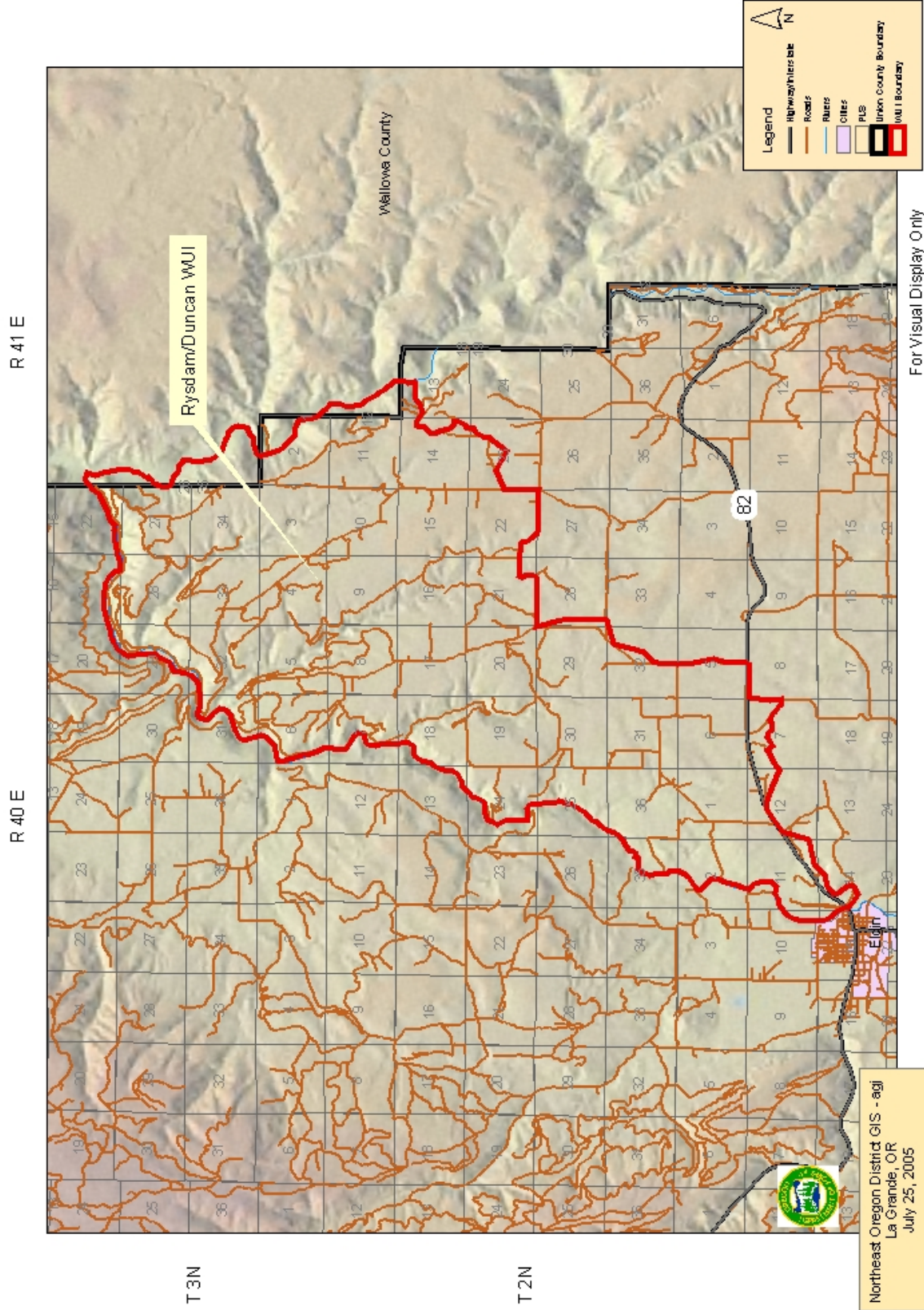
Communities at Risk: Cricket Flats, Thompson Road and adjacent rural residential areas.

Structural Fire Protection Agency: Elgin Rural Fire Protection District protects about ½ this WUI.

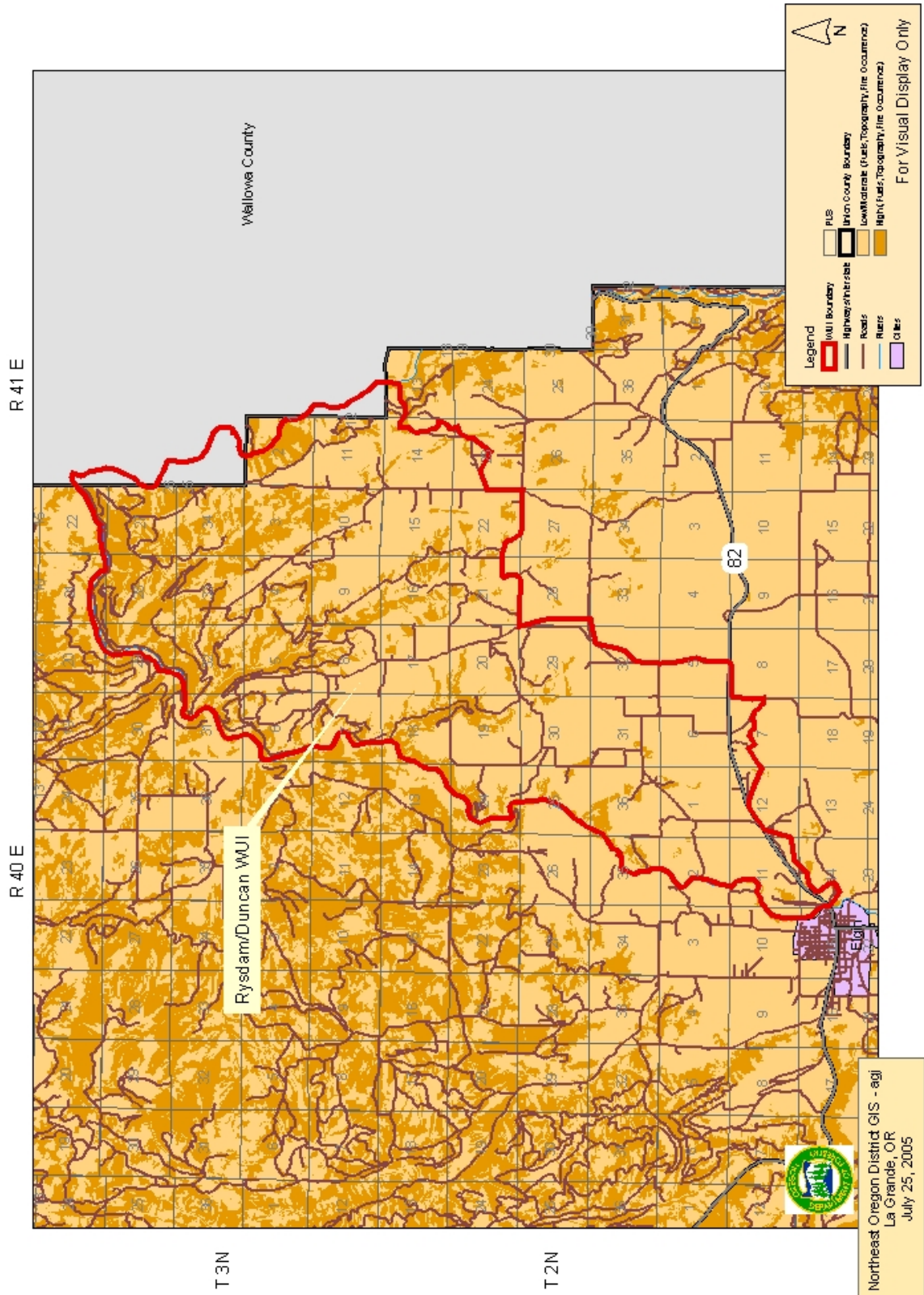
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Replace Yarrington Road Bridge	• 1-2 years	• UCPW; ODOT

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



WUI Name: Starkey

Priority Category: High

Risk Assessment Factors						
Wildfire Hazard, including: Fire Occurrence, Topography & Total Fuels	Overall Fire Protection & Structural Vulnerability	Values At-Risk	Weather Hazard	Opportunity for Fuels Reduction	Score	Rank
30	33	15	10	7.5	95.5	15

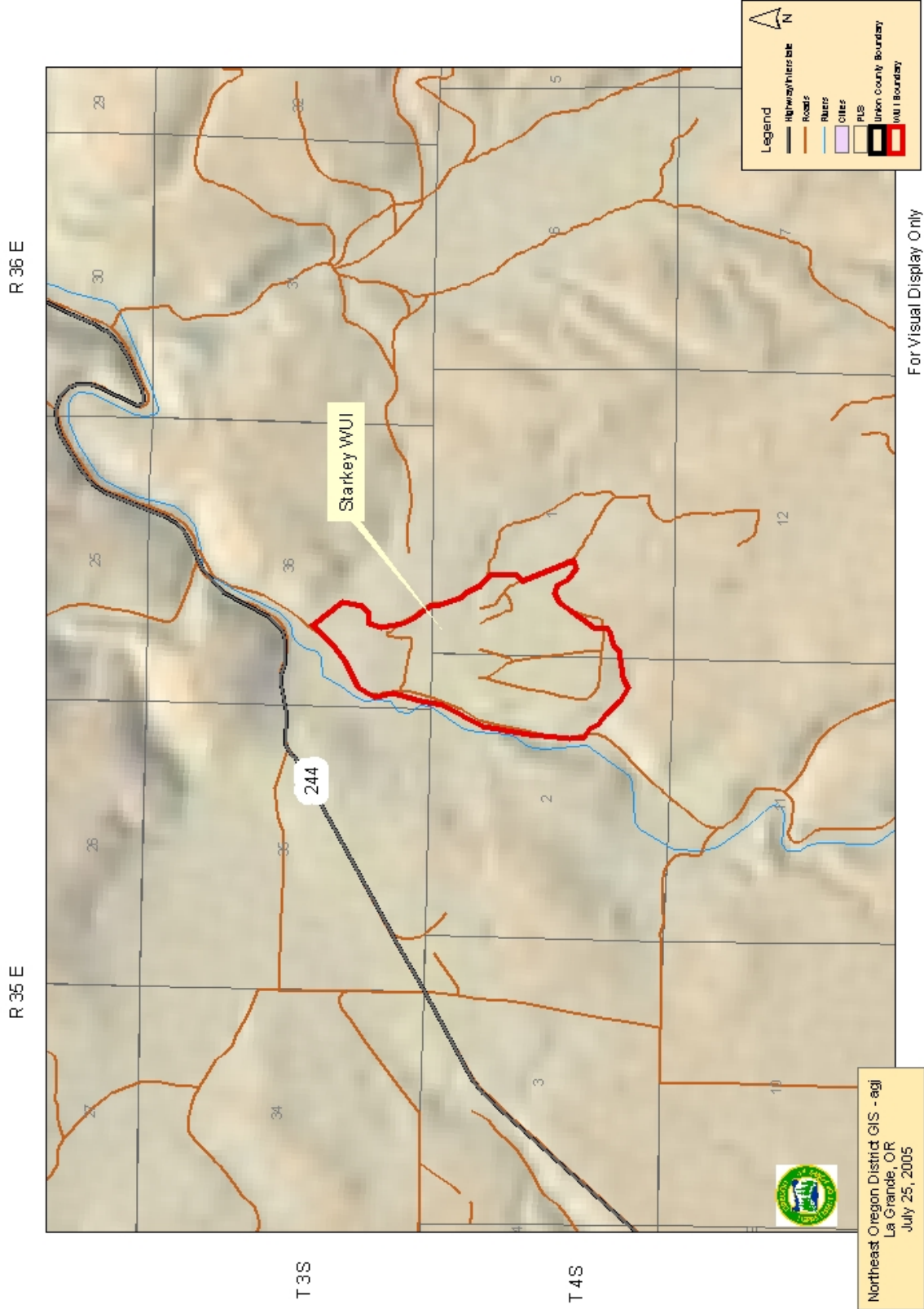
Communities at Risk: Starkey and adjacent rural residential areas.

Structural Fire Protection Agency: Wildland fire protection only.

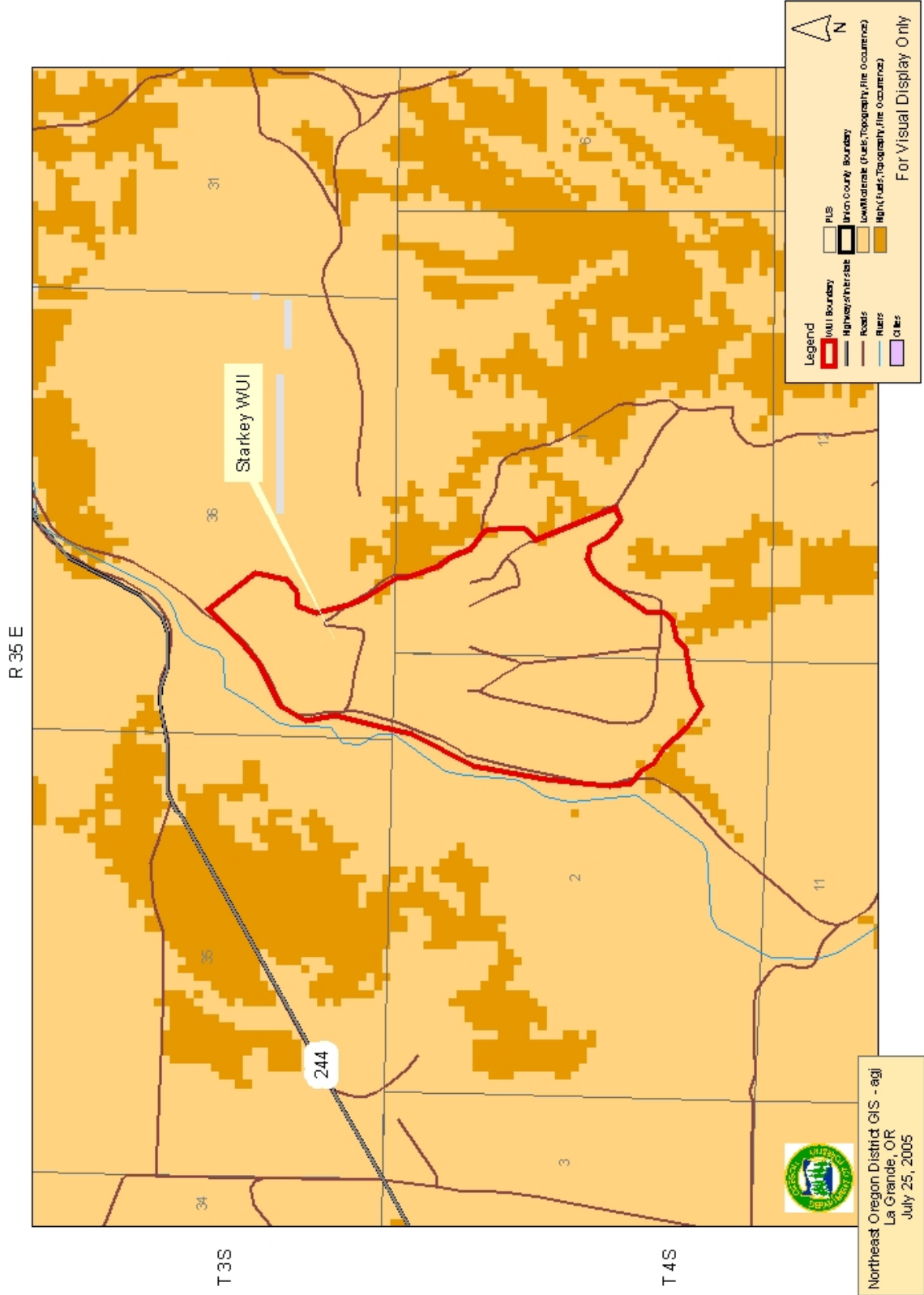
Projects: Many projects identified in this plan apply to all wildland-urban interface areas because they are broader in scope or represent general outreach messages or educational opportunities. Those listed here are specific to individual interface areas in Union County.

WUI – Specific Projects	Timeframe	Lead Agency/Cooperators
Grande Ronde River Corridor Private Lands	• 3 + years	• ODF; Landowners
Grande Ronde River Corridor Mapping	• 1-2 years	• ODF; Landowners; La Grande RFPD

Union County WUI Boundaries (with Shaded Relief)



Union County WUI Boundaries (with Wildfire Hazard)



VIII. Mitigation Action Plan

Action Items

See *Section X* for a discussion about project evaluation. The projects, also called action items that were identified by the steering committee, residents, landowners, agencies and other stakeholders are listed below in the priority reflected in the plan's goals and objectives. Projects that further emergency response are most important to the steering committee, followed by identifying and reducing fuel hazards, fostering support for the community wildfire protection plan, and using the plan as a resource and learning tool.

The projects are grouped into one of ten categories and include a brief description, list of project cooperators (the identified lead agency is listed first) and a general implementation timeframe.

Grant Funding

The strategies and needs to mitigate the risk of wildfire and respond to wildfire events are projects to which grant money may be directed. As such, the annual evaluation of the project list must include a consideration of other grant monies and how they are being spent towards the same goals. This ensures efficient use of the grant dollar and the potential ability to leverage grant money for greater benefit to Union County structural and wildland fire agencies. Other grant programs may include the State Homeland Security Equipment Program, Rural Firefighter Assistance / Volunteer Firefighter Assistance Equipment Program, Title III federal funding, FEMA Pre-Hazard Mitigation Funding or Oregon Transportation Investment Act funds, to name a few of the most likely sources.

Response

- 1. Project Title:** Assemble and install address stakes for all county addresses.
Description: Stakes are old; will allow more efficient response.
Cooperators: UC Public Works.
Timeframe: Short Term (3 + years).
- 2. Project Title:** Coordinate pre-suppression planning among all fire agencies.
Description: information is specific to topography, ingress/egress, water supply, strategic firefighting locations, staging areas, and communications.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies, the 911/Dispatch Center and the Northeast Oregon Interagency Fire Dispatch Center.
Timeframe: Short Term (1-2 years).
- 3. Project Title:** Establish a rural fire protection district at Morgan Lake complete with equipment, training and personnel.
Description: Provided there were enough interested people.
Cooperators: Landowners; Union County; Structural Fire Agencies.

Timeframe: Long Term (3+ years).

4. **Project Title:** Establish a rural fire protection district at Perry and Hilgard area complete with equipment, training and personnel.
Description: Provided there were enough interested people.
Cooperators: Landowners; Union County; Structural Fire Agencies.
Timeframe: Long Term (3+ years).

Communications

1. **Project Title:** Acquire interoperable communications equipment.
Description: Continue to implement the UC Communications Strategic Plan and related projects.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies, the 911/Dispatch Center and the Northeast Oregon Interagency Fire Dispatch Center.
Timeframe: Short Term (1-2 years).
2. **Project Title:** Implement Union County Strategic Communications Plan.
Description: Plan was developed by 911 Users to strategically replace and upgrade the entire emergency communications network.
Cooperators: All local emergency responders, including state and federal wildland fire agencies, OSP, the 911/Dispatch Center and the Northeast Oregon Interagency Fire Dispatch Center.
Timeframe: Long Term (3+ years).

Road System Improvements

1. **Project Title:** Replace Yarrington Road bridge.
Description: Bridge is load-limited and constrains response and RFPD expansion.
Cooperators: UC Public Works; Oregon Department of Transportation.
Timeframe: Short Term (1-2 years).
2. **Project Title:** Prepare Evacuation Plan for Morgan Lake area.
Description: One sub-standard road must be used by both evacuating residents and emergency response agencies.
Cooperators: UC Emergency Services, Public Works and Sheriff's Office; Oregon Department of Transportation.
Timeframe: Short Term (1-2 years).
3. **Project Title:** Reconstruct Morgan Lake Road.
Description: Travelers could benefit from engineered solutions to this road.
Cooperators: UC Public Works; Oregon Department of Transportation.
Timeframe: Long Term (3+ years).

Water Source Development

1. **Project Title:** Identify and inventory water supplies including access and deficiencies.
Description: Pre-identify water sources for response; updated seasonally.
Cooperators: ODF; USFS; Structural Fire Agencies.
Timeframe: Short Term (1-2 years).

Equipment & Training

1. **Project:** NIMS training.
Description: Conduct National Incident Management System (NIMS) training for emergency responders to ensure continued federal grant funding.
Cooperators: UC Emergency Services.
Timeframe: Short Term (1-2 years).
2. **Project:** Identify methods of funding to purchase up-to-date PPE.
Description: Pool resources in obtaining current PPE.
Cooperators: La Grande RFPD; North Powder RFPD; Union RFPD; Cove RFPD; Imbler RFPD; Elgin RFPD; La Grande FD and Medical Springs RFPD.
Timeframe: Short Term (1-2 years).
3. **Project:** Plan and conduct full-scale exercises.
Description: Involving fire suppression agencies and the community in drills and exercises.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.
Timeframe: Short Term (3 + years).
1. **Project:** Identify methods of funding to purchase type III wildland fire engines.
Description: Each RFPD needs engines for wildland response to augment wildland agencies responding in their jurisdictions.
Cooperators: Structural RFPDs.
Timeframe: Short Term (1-2 years).

Fuels Reduction

1. **Project:** Pelican Creek
Description: Prescribed burn.
Cooperators: US Forest Service, La Grande Ranger District.
Timeframe: Short Term (1-2 years).
2. **Project:** Three Cabin Creek
Description: Commercial thinning.
Cooperators: US Forest Service, La Grande Ranger District.
Timeframe: Short Term (1-2 years).
3. **Project:** Mt. Emily
Description: The Mt Emily fuels reduction project area is approximately 7,295 acres in size and is part of a larger analysis area (approx, 40,360 acres) which includes Umatilla National Forest and private and State lands located within three watersheds. The project will utilize mechanical fuels reduction treatments followed by low intensity Rx fire. This project is being coordinated with fuel reduction and "FIREWISE" projects, and education efforts occurring on adjoining private and state lands and the Umatilla National Forest. Priority areas identified within the project area are based on proximity to private values at risk from wildfire, and/or presence of logical locations to base suppression operations. Management activities include, thinning, hand piling, mechanical removal, pile burning as well as low intensity under burning.

Cooperators: US Forest service, La Grande Ranger District, Umatilla National Forest, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners.

Timeframe: Long term (3+ years).

Stage of Project: Implementing (Beginning stage, thinning/hand piling).

4. **Project Title:** Cove WUI

Description: Manage Vegetation and fuels (via mechanical fuels reduction treatments, followed by low intensity Rx fire) to modify fire behavior and create survivable and defensible space on federal, state, and private lands surrounding the community. Promote "FIREWISE" communities through prevention and education measures.

Cooperators: US Forest service, La Grande Ranger District, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

5. **Project Title:** South fork Catherine Creek

Description: Manage Vegetation and fuels, (via mechanical removal, piling, followed by low intensity Rx fire) to modify fire behavior and create survivable and defensible space on federal, state, and private lands surrounding the community. Promote "FIREWISE" communities through prevention and education measures.

Cooperators: US Forest service, La Grande Ranger District, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners Private landowners.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

6. **Project Title:** Clark Creek

Description: Manage Vegetation and fuels, (via mechanical removal, piling, followed by low intensity Rx fire) to modify fire behavior and create survivable and defensible space on federal, state, and private lands surrounding the community. Promote "FIREWISE" communities through prevention and education measures.

Cooperators: US Forest service, La Grande Ranger District, Oregon Department of Forestry, La Grande Office, Rural Fire Protection District, Union County Community Forest Restoration Board, Private and industrial Landowners.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

7. **Project Title:** Medical Springs (Bald Angel)

Description: Reduce heavy fuel load conditions, (via mechanical fuel reduction treatments followed by low intensity Rx fire) to minimize wildfire impacts to natural resources and private land ownership.

Cooperators: US Forest service, La Grande Ranger District.

Timeframe: Long term (3+ years).

Stage of Project: Planning.

8. **Project Title:** Camp Elkanah (Texas Heat)
Description: Natural Fuels Prescribed Burn (no harvest units involved). The overall objective of this project is to reintroduce and utilize fire as a disturbance factor in order to maintain ecological systems and processes. This project lies adjacent to WUI defined Elkanah area.
Cooperators: US Forest service, La Grande Ranger District.
Timeframe: Ongoing.
Stage of Project: Maintenance.
9. **Project Title:** Blue Springs
Description: Hazardous fuels reduction, via thinning small diameter understory, hand piling, followed by pile burning.
Cooperators: US Forest service, La Grande Ranger District, Private Permit Holders.
Timeframe: Ongoing.
Stage of Project: Maintenance
10. **Project Title:** Mt. Emily Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Imbler Rural Fire Department, La Grande Rural Fire Department.
Timeframe: Short Term (1-2 years).
11. **Project Title:** Cove Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Cove Rural Fire Department.
Timeframe: Short Term (1-2 years).
12. **Project Title:** Morgan Lake Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, La Grande Fire Department, La Grande Rural Fire Department.
Timeframe: Short Term (1-2 years).
13. **Project Title:** Palmer Valley Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Elgin Rural Fire Department.
Timeframe: Long Term (3-5 Years).
14. **Project Title:** Catherine Creek Corridor Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Union Rural Fire Department.
Timeframe: Long Term (3-5 years).
15. **Project Title:** Grande Ronde River Corridor Private Lands
Description: Commercial and pre-commercial thinning and slash disposal.
Cooperators: ODF- La Grande Unit, Private Forestland Owner.
Timeframe: Long Term (3-5 years).

Mapping & Data Development

1. **Project Title:** Create a monitoring system to gauge fuels reduction progress over time.
Description: Utilize ground plots.
Cooperators: ODF, USFS, BLM.
Timeframe: Long Term (3+ years).
2. **Project Title:** Identify data gaps.
Description: Coordinate efforts to integrate data sets and share information.
Cooperators: ODF, Union County, Structural Fire Agencies, USFS.
Timeframe: Short Term (3 + years).
3. **Project Title:** Develop a GIS layer of all fire districts/departments including areas with no structural fire protection.
Description:
Cooperators: UC Planning Department, Emergency Services.
Timeframe: Short Term (1-2 years).
4. **Project Title:** Create map books using GIS containing ownership, dwelling location, and site-specific information for each fire district/department.
Description: information is specific to ownership and dwelling location.
Cooperators: ODF, Union County, Structural Fire Agencies, USFS.
Timeframe: Short Term (1-2 years).
5. **Project Title:** Catherine Creek Corridor
Description: Map homesites and access routes to homes located in this WUI area.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Union Rural Fire Department.
Timeframe: Short Term (1-2 years)
6. **Project Title:** Grande Ronde River Corridor.
Description: Map homesites and access routes to homes located in this WUI area.
Cooperators: ODF- La Grande Unit, Private Forestland Owners, Union Rural Fire Department.
Timeframe: Short Term (1-2 years)

Prevention

1. **Project:** Resurrect and formalize the Union County Prevention Co-Op.
Description: Co-Op members pay to belong; meet monthly and discuss prevention issues.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.
Timeframe: Long Term (3+ years).
2. **Project:** Continue prevention efforts like Firewise and "I'm Concerned...".
Description: Build on progress made with these programs; spread among Union County communities.

Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.

Timeframe: Short Term (1-2 years).

3. **Project:** Participate annually in Fire Prevention Week.
Description: Pool resources to spread fire prevention message.
Cooperators: ODF, La Grande Office; UC Emergency Services.
Timeframe: Short Term (1-2 years).
4. **Project Title:** Firewise Communities
Description: Present 1-day workshop to communities interested in becoming a Firewise Community
Cooperators: ODF; Structural Fire Agencies.
Timeframe: Short-Term (1-2 years).

Partnership Development

1. **Project Title:** Continue workforce development.
Description: Programs through TEC, Oregon Youth Authority and the LHS FFA (wildland fire class) foster partnerships among those who are acquiring firefighting skills and those who need those skills.
Cooperators: La Grande High School; Training & Employment Consortium; RiverBend Facility; UC Commissioners, Emergency Services.
Timeframe: Long Term (3+ years).

Education and Outreach

1. **Project:** Identify common base information.
Description: Develop program for consistency in all public messages.
Cooperators: All local structural fire agencies, including state and federal wildland fire agencies.
Timeframe: Short Term (1-2 years).
2. **Project:** Identify prescriptive parameters for fuels reduction.
Description: Develop to aid private property owners in achieving an ideal forest condition class.
Cooperators: USFS; ODF; BLM; UC Forest Restoration Board; OSU Extension Service.
Timeframe: Short Term (1-2 years).

Projects are evaluated annually as described in *Section X*.

Biomass Utilization

Federal and state agencies, local government and private forest landowners are using thinning and prescribed burning in strategic locations to reduce forest fuels and wildfire risks. Most of the material generated from fuels reduction activities is not suitable for commercial wood products manufacturing. In many cases, biomass from these activities is left on-site or piled and burned at an additional cost. One alternative outlet for utilizing biomass now is the Warm Hearts/Warm

Homes firewood program. The program distributes firewood to limited capacity citizens across Baker, Union, and Wallowa Counties. Unfortunately the program utilizes a small percentage of the biomass generated and usually utilizes smaller thinning projects. An additional alternative outlet for small diameter wood could help reduce the costs of thinning and help mitigate environmental impacts associated with prescribed burning and wildfires.

Forest biomass is generated by forest fuels reduction, commercial timber harvest; non-commercial thinning and timber stand improvement (TSI) activities. Non-commercial thinning includes pruning and tree removal designed to help shape and guide development of forest stands to meet a variety of goals. It generally does not result in removal of trees that can be used to manufacture products, but it could be used in renewable energy production (heat, steam, electricity, and fuel). Timber stand improvement can accomplish similar goals, but often results in removal of some commercially valuable trees. Wood manufacturing residues including bark, sawdust, chips, and veneer cores are additional sources of raw material for renewable energy production. A biomass plant is currently operating in Grant County, but high transportation cost makes the exportation of small diameter wood material cost prohibitive.

Union County's Forest Restoration Board is exploring co-generation opportunities that utilize biomass as fuel. Heating and cooling public buildings using small biomass generators to offset the cost of electricity and oil is being explored. This appears to be the direction communities want to move in order to address biomass utilization at a manageable scale. Once the Union County Forest Restoration Board has determined the feasibility of this project and more conclusive information is available this section of the plan will be updated.

IX. Maintenance Plan for Fuels Treatmentⁱ

Fuels reduction programs require knowledge of how fire interacts with different vegetation and defining acceptable fire behavior parameters. For example, if one determines that near WUI areas a flame of four feet or less is acceptable, one can then prioritize projects accordingly.

Concepts to Consider in Developing a Fuels Maintenance Program

Once treated timber stands undergo the process of ecological succession in which under story and over story vegetation change over time resulting in incremental changes (often increases) in herbs, grasses, shrubs, and tree regeneration. The regeneration takes place because removing trees and other vegetation creates more growing space. Over story structure changes as residual trees expand their crowns and increase in diameter. These changes continually add biomass (fuel) such as needles, branches and downed logs to the site. Subsequent disturbances caused by insects and disease can kill trees and add more biomass to the forest floor. Although some biomass decays over time in dry southwest, central and eastern Oregon forests dead biomass tends to accumulate faster than it decays resulting in more fuel.

How long before treated areas require re-treatment is dependent on several inter-related factors including:

- Past treatment level (e.g., how much biomass [fuel] was removed initially in the under story and over story);
- Plant association groups;
- Site productivity;
- Rate of fuel accumulation;
- Fuel structure (i.e., condition class)
- Historic fire regime;
- Desired fire behavior (for effective control)
- Climatic regime.

Although condition class and fire regime are primary factors in prioritizing initial treatment areas, strategic location is factored as well. This prioritization method may have less bearing on which areas should be prioritized for future *re-*

treatment. For example, it's probably unlikely that managers would allow sites that were condition class 2 or 3 before treatment and treated to condition class 1, to revert back to condition class 2 or 3 before conducting a re-treatment, particularly in the WUI. It seems more likely they would allow a site that was originally in a condition class 2 or 3 and treated to condition class 1 to re-accumulate fuels only to a point or phase that resemble a condition class 1 *transitioning* into a condition class 2. Allowing fuels to accumulate any further would entail a more expensive re-treatment and increase the risk of losing the initial investment made in fuel reduction.

Fuels Treatment and Forest Healthⁱⁱ

Fuels treatment has an added benefit beyond reducing danger. Thinning overstocked stands will increase tree diameter growth and enhance tree vigor. Healthier trees are more resistant to pests and disease. Treatment should be site and species specific. Thinning spacing should be managed to take advantage of site specific resources such as water, nutrients and sunlight.

Remember that forests are dynamic and continually growing in diameter, height, and crown width. Fuels reduction activities that include thinning are a good thing, but thinning without consideration for forest health doesn't provide the benefits of pest resistance or good individual tree growth. Also, without future maintenance, the fire risk reduction benefits decline over time.

For more information about proper tree spacing for your timber stand, please contact Paul Oester, OSU Extension Forester, at (541) 963-1010 or Oregon Department of Forestry in La Grande at (541) 963-3168.

ⁱ A Conceptual Approach for a Maintenance Strategy for Fuel Treatments in Oregon: Maintaining the Investment, Fitzgerald, Stephen and Martin, Charlie, Oregon State FFHM Committee Report. (July 5, 2004).

ⁱⁱ Oester, Paul. *Blue Mountains Renewable Resource Newsletter*. Vol. 20, No. 3, (Fall 2004).

X. Monitoring and Evaluation

Schedule

Plan maintenance will be directed by the Union County Commissioners, via the Emergency Services Office and coordinated with the plan's steering committee members, a core group of who have agreed to be a standing committee to assist with monitoring and evaluation. Proposed plan maintenance will be set annually and will consist of a plan review, priority action item re-evaluation and progress evaluation, with a total revision of the plan set for every five years.

A total plan revision every five years is recommended, as the infrastructure needs of Union County change. Specific considerations include: population fluctuations, land use changes, completion of fuels reduction projects, emergency service improvements, computer software/hardware updates, new and revised data, and extreme wildfire hazard fluctuations.

Annual strategies and recommendations will be necessary as various projects and tasks are accomplished and areas at-risk decline in hazard rating. Annual review will be necessary, as county infrastructure needs change. Annual review will be advertised to include representation from the stakeholders who participated in the development of the Community Wildfire Protection Plan.

Monitoring

Continued public collaboration on the Union County Wildfire Protection Plan is necessary to meet identified needs while accomplishing the plan's mission.

Copies of the Community Wildfire Protection Plan are available at the Union County Emergency Services Office, at the Oregon Department of Forestry Office in La Grande, Wallowa-Whitman National Forest headquarters in La Grande, in Union County public libraries. It will also be available both electronically and via the Union County and ODF websites. The websites will provide citizens an opportunity to send comments or questions regarding the plan at any time.

Evaluation

Annual assessment of the identified projects is very important to determine whether or not progress is being made. Units of evaluation were identified corresponding with each of the ten project categories:

1. **Response:** number of projects accomplished, which improve fire agency/emergency service response time.
2. **Communications:** number of identified communication issues resolved that were identified in the plan.

3. **Road System Improvements:** number of transportation problems resolved.
4. **Water Source Development:** number of water sources added.
5. **Equipment/Training:**
 - a) Equipment - number of identified/needed equipment obtained
 - b) Training - number of courses provided.
6. **Fuels Reduction:**
 - a) Number of acres treated for fuels reduction (loading reduction, increased spacing, and/or ladder fuel reduction).
7. **Mapping & Data Development:** number of projects completed or issues resolved.
8. **Prevention:**
 - a) Number of events with prevention message delivery
 - b) Number of prevention courses conducted
 - c) Number of news releases or prevention campaigns conducted
 - d) Number of prevention co-op meetings held.
9. **Partnership Development:** number of partners/agencies/groups involved.
10. **Education and Outreach:**
 - a) Number of people contacted (meetings, courses, etc)
 - b) Number of educational items distributed (brochures, etc).

On an annual basis, the standing steering committee members will assess each identified project using these units of measure to determine progress. This plan does not serve as a means of bypassing the individual processes and regulations of the participating agencies. Each project must adhere to any pertinent local, state or federal rules or guidelines in determining the point of project implementation. The plan is a coordinating document for forest projects related to education and outreach, information development, fire protection and fuels treatment.

XI. Appendix A: Glossary/Acronym List

Glossary

At-Risk Community: a group of homes or other improvements (such as utilities or transportation routes) within or adjacent to federal land in which conditions are conducive to a large-scale wildland fire and pose a significant threat to human life or property.

Community Wildfire Protection Plan: a plan for at-risk communities identifying and prioritizing areas for hazardous fuels treatments, and recommending methods of treatment.

Conflagration: a raging, destructive fire. Often used to describe a fire burning under extreme fire weather. The term is also used when a wildland fire burns into a wildland-urban interface, destroying many structures.

Crown Fire: a fire that advances from treetop to treetop or shrubs independent of a surface fire.

Defensible Space: an area, typically a width of 30 feet or more, between an improved property and a potential wildfire where the combustibles have been removed or modified.

Escape Route: route away from dangerous areas on a fire and should be pre-planned.

Evacuation: the temporary movement of people and their possessions from locations threatened by wildfire.

Extreme Fire Behavior: a level of fire behavior characteristics that ordinarily precludes methods of direct control. One or more of the following is usually involved: high rates of speed, prolific crowning and/or spotting, presence of fire whirls, a strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environments and behave erratically, sometimes dangerously.

Fire Behavior: the manner in which a fire reacts to the influences of fuel, weather and topography.

Fire Front: that part of the fire within which continuous flaming combustion is taking place. Unless otherwise specified it is assumed to be the leading edge of the fire perimeter.

Hazard: a fuel complex defined by volume, type condition, arrangement and location (topography) that determine the ease of ignition and resistance to control. Hazards may also include the built environment such as constructed improvements, access to those improvements, and water availability.

Fire Prevention: activities, including education, engineering, enforcement and administration that are directed at reducing the number of wildfires, the costs of suppression and fire-caused damage to resources and property.

Fire Protection: the actions taken to limit the adverse environmental, social, political and economical effects of fire.

Fire Regime: periodicity and pattern of naturally occurring fires in a particular area or vegetative type, described in terms of frequency, biological severity and area extent.

Fire Storm: violent convection caused by a large continuous area of intense fire. Often characterized by destructively violent surface indrafts, near and beyond the perimeter, and sometimes by tornado-like whirls.

Fire Weather: weather conditions that influence fire starts, fire behavior or fire suppression.

Firebrand: any source of heat, natural or human made, capable of igniting wildland fuels. Flaming or glowing fuel particles that can be carried naturally by wind, convection currents, or by gravity into unburned fuels. Examples include leaves, pine cones, glowing charcoal and sparks.

Fuel Condition: relative flammability of fuel as determined by fuel type and environmental conditions.

Fuel Loading: the volume of fuel in a given area generally expressed in tons per acre.

Fuel Modification: any manipulation or removal of fuels to reduce the likelihood of ignition or the resistance to fire control.

Fuels: all combustible material within the wildland-urban interface, including vegetation and structures.

Fuel Break: an area, strategically located for fighting anticipated fires, where the native vegetation has been permanently modified or replaced so that fires burning into it can be more easily controlled. Fuel breaks divide fire-prone areas into smaller areas for easier fire control and to provide access for fire fighting.

Greenbelt: a fuel break designated for use other than fire protection.

Ground Fuels: all combustible materials such as grass, duff, loose surface litter, tree or shrub roots, rotting wood, leaves, peat or sawdust that typically support combustion.

Hazardous Areas: those wildland areas where the combination of vegetation, topography, weather and the threat of fire to life and property create difficult and dangerous problems.

Hazard Reduction (see also Mitigation): any treatment of living and dead fuels that reduces the threat of ignition and spread of fire.

Ignition Probability: chance that a firebrand will cause an ignition when it lands on receptive fuels.

Initial Attack: the actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire.

Ladder Fuels: fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease.

Mitigation: action that alleviates the severity of a fire hazard or risk.

Overstory: that portion of the trees in a forest that forms the upper or uppermost layer.

Preparedness: 1) Condition or degree of being ready to cope with a potential fire situation. 2) Mental readiness to recognize changes in fire danger and act promptly when action is appropriate.

Prescribed Burning: controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions, which allows the fire to be confined to a predetermined area, and to produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives.

Risk: the chance of a fire starting from any cause.

Structural Fire Agency: a firefighting organization, usually at the local level, trained and equipped to fight structure fires. Local structural fire agencies may also be trained and equipped to combat wildland fires.

Suppression: the most aggressive fire protection strategy, it leads to the total extinguishment of a fire.

Surface Fuel: fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants.

Survivable Space: the characteristics of a home, its materials and design, in concert with the flammable materials in a home's immediate surroundings that result in high ignition resistance from flames and firebrands (burning embers). Survivable space characteristics relate to the ignitability of a home without necessarily including the higher thermal vulnerability of firefighters.

Tree Crown: the primary and secondary branches growing out from the main stem, together with twigs and foliage.

Understory: low-growing vegetation under a stand of trees. Also, that portion of trees in a forest stand below the overstory.

Wildfire: an unplanned and uncontrolled fire spreading through vegetative fuels, at times involving structures.

Wildfire Causes: the general causes of wildland fires are 1) natural, like lightning; 2) accidental, like debris burning; and 3) intentional, like arson.

Wildland: an area in which development is essentially non-existent, except for roads, railroads, power lines and similar transportation facilities. Structures, if any, are widely scattered.

Wildland Fire: any fire occurring on the wildlands, regardless of ignition source, damages or benefits.

Wildland Fire Agency: a firefighting organization, usually at the state or federal level, trained and equipped to fight wildland fires. Typically, wildland fire agencies are not trained and equipped to combat structure fires.

Wildland-Urban Interface: an area within or adjacent to an at-risk community where wildland fuels intermix with combustible homes and structures. Wildland-Urban Interface areas in Union County are identified in the Union County Community Wildfire Protection Plan.

Acronym List

BLM – Bureau of Land Management

CAR – Community at Risk

CTUIR – Confederated Tribes of the Umatilla Indian Reservation

EOC – Emergency Operations Center

EOP – Emergency Operations Plan

FEMA – Federal Emergency Management Agency

HFRA – Healthy Forests Restoration Act

NFP – National Fire Plan

NOIDC – Northeast Oregon Interagency Dispatch Center

ODF – Oregon Department of Forestry

ODOT – Oregon Department of Transportation

OEM – Oregon Emergency Management

OSP – Oregon State Police

PLS – Public Land Survey

RFPD – Rural Fire Protection District

TSI – Timber Stand Improvement

UCES – Union County Emergency Services

UCZPSO – Union County Zoning, Partition & Subdivision Ordinance

USFS – United States Forest Service

WUI – Wildland-Urban Interface

XII. Appendix B: Collaboration Methodology

Steering Committee

The Steering Committee met approximately every six weeks to guide the plan's progress. Meetings were held:

August 20, 2003
November 5, 2003
January 21, 2004
February 18, 2004
April 14, 2004
May 24, 2004
June 30, 2004
July 28, 2004
September 2, 2004
September 23, 2004
October 21, 2004
December 1, 2005
February 9, 2005
March 9, 2005
March 16, 2005
July 13, 2005

The Steering Committee met at either the Oregon Department of Forestry Office in La Grande or at the Union County Courthouse. Agendas, sign-in sheets and meeting notes are on file at both the ODF Office and the Union County Emergency Services Office in La Grande.

Community Workshops

The first round of community meetings were held:

Tuesday, October 12, 2004, at the Elgin Community Center
Thursday, October 14, 2004, at the Imbler City Hall
Tuesday, October 19, 2004, at the Medical Springs Rural Fire Department
Wednesday, October 20, 2004, at the City of La Grande Fire Station.

The purpose of the meetings was to inform citizens of Union County about the progress of the committee tasked with developing a Community Wildfire Protection Plan for Union County. Topics included discussion of the risk assessment involved in determining high hazard areas around the county, discussion of Union County Emergency Services operations related to wildfire response, and involvement of citizens in defining wildland-urban interface boundaries using hazard, risk, and values that may be affected by threat of wildfire.

***City of Elgin
Elgin Community Center***

Values at Risk included Spout Springs Ski Resort, Looking Glass Fish Hatchery, and North End of Union County for hunting value.

Concerns that were raised were the possibility of a structure fire carrying out into the wildland and concern for the number of elderly that live outside the City of Elgin, for example Palmer Valley, that may not have the capacity to deal with creating defensible space around their homes.

Idea for outreaching to the public with the questionnaire was to go to the Senior Meals hour at the community center and ask the citizens that attend to fill out the questionnaire.

***City of Imbler
City Hall***

Values at Risk included Phillips Creek coming down into the Pumpkin Ridge area, homes, children, animals. Concerns were many:

- 1) Pumpkin Ridge is an island in itself. Difficulties responding to incidents in the area include extended response time and lack of visibility with road dust from large vehicles traveling on the gravel roads in the area.
- 2) Ruckle Road, as far as fuels and structural ignitability, seems to be "worse off" than the End Road area.
- 3) Annexation within the Imbler Rural Fire District contains "skips" in assessments. Hence, landowners that are within the fire district may not be covered if the property was never assessed during annexation. Landowner A, B, and C on the same road may be covered, but Landowner D (next parcel up from A, B, and C) may not be covered by the protection of the fire district.
- 4) There have been many "close calls" in the Pumpkin Ridge area, showing risk of ignition and potential for a large fire.
- 5) Fire resources need to make sure they tie in with local people living within a community. Those community residents, in the event of a wildfire, will likely know who to contact in an evacuation, and will know which roads are fit for

travel for emergency vehicles and evacuation routes. (It was felt this isn't done enough.)

- 6) Some of the smaller areas/neighborhoods outside of a city, rural, or volunteer fire protection district "may have to take care of themselves and take more responsibility for their protection." Communities should prepare themselves by developing phone trees and all-hazard neighborhood plans similar to the kind of preparation the citizens living in the Pumpkin Ridge area have done.

Ideas for fire prevention or hazard mitigation:

- 1) Beth Burry, citizen of Pumpkin Ridge and volunteer for the Imbler Rural Fire Department, has tried to outreach to other neighborhoods within the fire district to develop phone trees and all-hazard plans. She has succeeded with the Pumpkin Ridge residents and feels it is because she makes it more of a potluck gathering than a meeting. People seem to respond to that method.

Pumpkin Ridge does have an active phone tree and they have made an agreement with Summerville Baptist to use the church as an evacuation site.

- 2) Union County should come up with some sort of campaign on behalf of the fire districts that informs citizens of the possibility that they may not be covered by a fire district. They should encourage landowners to check with the tax assessor's office to find out what protection they do have.
- 3) Fire prevention shouldn't stop after elementary school. It was felt that 7th through 12th grade students should be targeted.
- 4) The possibility of adding a substation for Imbler Rural should be explored. With the expansion of fire protection boundaries, responding to an incident is taking longer. Other districts in the county are adding substations, e.g., North Powder.

Medical Springs

Medical Springs Rural Fire District - Pondosa Station

Values at risk included homes and people, and the new fire station. Attendees also mentioned that there were three old cemeteries and the old post office that represented historical value for them. The discussion of values at risk and a boundary for their wildland-urban interface will continue in a meeting the citizens will hold later. They decided to draw in the boundary themselves and contact Angie when the map is complete. Some of their ideas for a boundary included using the rural fire protection district boundary or expanding a 1/2 of a mile on either side of the highway [203] and a 1/4 of a mile from houses. The rural fire district boundary is 120 square miles and the fire district protects 60 homes.

Medical Springs is an active community that takes fire protection seriously. They have worked hard to establish a fire district and build a fire station, buy fire

equipment, and train personnel purely on grant funds. They also have a phone tree that was established as a way to notify them in case of an escaped inmate from Powder River Correctional Facility.

Concerns:

- 1) During past events, the county has not activated the phone tree, possibly because not everyone knew about it. The people of Medical Springs want to be notified in the event of an emergency. Just call the first person on the list to activate the tree.
- 2) Telephone is the best way to get a hold of folks in the Medical Springs area. Some of them, depending on location of residence, only get mail three times a week and radio signal is weak. Radio stations they do get are KCMB-104.7 on FM and 1490 AM.

***La Grande
City of La Grande Fire Station***

Values at Risk include:

- 1) Roadless areas, wildlife, old growth, and water quality.
- 2) Consider fire use before suppression. Let fire run its course.
- 3) "I'd like to see money spent on protecting public lands rather than human interests."
- 4) Consider the "big-scape."
- 5) Looking at burned areas left behind by wildfires is not necessarily bad or ugly. Fire has a positive role to play.

Concerns:

- 1) There should be restrictions on building homes in the wildland-urban interface. For example, Owsley Canyon represents an area where access is poor, vegetation hazard is high and close to homes, and building materials would not withstand a large fire. "Should restrictions be put in place for current structures?"
- 2) Long-term planning should include planning for liabilities and outcomes of hazards.
- 3) "Other values of the forest" won't be considered when planning for fuels treatment projects.
- 4) "We should fight fire with fire. Prescribed burning should be aggressive, both in planning and use. However, we need to make sure we keep in mind the best use of the land, wildlife, smoke management, etc."
- 5) We are passifying ourselves when just using a mechanical approach. Prescribed fire needs used more as a tool for reducing the fine fuels.
- 6) "Should you use a soils layer to determine potential fuel hazard?"

- 7) The county planning department needs to establish stringent regulations for new building or modification of existing buildings located in the wildland-urban interface.
 - 8) There was a concern raised regarding the use of federal money used to help people that can "afford to clean up." But, some money should still be made available.
 - 9) "Offering a one-time amount of grant money for initial clean-up is ok, but maintenance should be the responsibility of the landowner" from that point forward.
 - 10) Use of National Fire Plan funds should be funneled more toward emergency services needs like improving access routes. It should be used to promote emergency service and fire response.
 - 11) There is a tendency to save forest products and resources by preventing fire from running its course.
 - 12) Too much money is spent for treating a small amount of acres.
 - 13) Priorities should be well thought out in order to gain the most protection. We aren't going to completely prevent a large fire event.
-

The second round of community meetings were held:

Monday, April 18, 2005, at the Cove Ascension School

Tuesday, April 19, 2005, at the Elgin City Hall

Thursday, April 21, 2005, at the La Grande Rural Fire Hall (Island City)

The purpose of the meetings was to view and discuss draft Wildland-Urban Interface area boundaries. Topics also included communities at risk from wildfire and potential project ideas to address fire hazard and risk.

**Cove
Ascension School**

Comments:

- 1) Increased communication about cost-share opportunities and other financial benefits should take place between the ODF and Cove RFPD / residents.
- 2) More promotion of agency projects should take place in the Cove area to increase awareness of risk reduction.
- 3) Explore the possibility of bio-mass opportunities (such as Fuels for Schools).

**Elgin
City Hall**

Comments:

- 1) Several minor comments were made specific to identified Wildland-Urban Interface areas that slightly changed the boundary.
- 2) General support of the plan was voiced.

**Island City
La Grande Rural Fire Hall**

Comments:

- 1) Support for fuels reduction projects in high-risk areas was expressed by a landowner in the Mt. Emily Wildland-Urban Interface area.

Press Releases Submitted

October 1, 2004
NEWS RELEASE
FOR IMMEDIATE RELEASE
Contact: Dara Decker (541) 963-1009

**PUBLIC WORKSHOPS SET FOR UNION COUNTY'S COMMUNITY WILDFIRE
PROTECTION PLAN**

A series of community workshops will take place during October 2004 to review fire risk, identify community priorities for wildfire protection, and discuss emergency services relevant to wildfires. The workshops will take place on (pick the workshop that fits your schedule):

October 12, 2004	Tuesday	Elgin Community Center	6:30 to 8 p.m.
October 14, 2004	Thursday	Imbler City Hall	6:30 to 8 p.m.
October 19, 2004	Tuesday	Medical Springs RFPD	6:30 to 8 p.m.
October 20, 2004	Wednesday	La Grande Fire Station	6:30 to 8 p.m.

Representatives from the County Board of Commissioners, County Emergency Services and Sheriff's Office, Oregon Department of Forestry (ODF) and United States Forest Service (USFS) will attend and lead the discussions.

This is the first of two rounds of community workshops for you to learn about the Union County Community Wildfire Protection Planning process, to understand areas of Union

County that are at risk of wildfires and to tell us the forestland attributes of Union County that you value the most. The second round of community workshops will use GIS mapping to combine the areas-at-risk information with values identified by you to produce maps for discussion and refinement. The maps will become part of the Union County Community Wildfire Protection Plan and will guide risk reduction strategies. The second round of workshops will take place in communities other than those listed above to allow greater opportunity for citizens to participate.

Union County's fire planning effort is part of a broader national initiative launched by the White House and the Western Governor's Association following the extreme fire season of 2000. A report assessing the impacts of those wildfires highlighted the need for investment to reduce fire risk, and the importance of expanding local collaboration in the planning and implementation of such projects.

The planning process includes an evaluation of wildfire risk in relation to important community values, including private and commercial property, watersheds, wildlife habitat, and recreational areas. The process will also evaluate and prioritize strategies to protect areas of high risk. Union County could potentially benefit from grant opportunities that become available for community projects where community wildfire protection plans have been developed through a collaborative process.

The guiding principle is to have states and local governments as full partners with federal agencies in making decisions that relate to the goals of wildfire risk reduction, including prioritizing fuels reduction on private land. Union County is supporting the effort with Title III funds from the U. S. Department of Agriculture. The USFS and ODF provide additional funding and support.

Any questions about this process may be directed to:

Dara Decker (541) 963-1009, UC Emergency Services Officer and Committee Co-Chair

Angie Johnson (541) 963-3168, National Fire Plan Planning Coordinator, ODF-NE Oregon District and Committee Co-Chair

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April 11, 2005
NEWS RELEASE
FOR IMMEDIATE RELEASE
Contact: Dara Decker (541) 963-1009

FINAL ROUND OF WORKSHOPS SET FOR COMPLETION OF UNION COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

Citizens of Union County participated in a series of public meetings that were held throughout Union County last October meant to introduce them to the committee members who are preparing the county's Community Wildfire Protection Plan, and familiarize them with the process involved with putting a CWPP together. The second round of community workshops is set for this month. Citizens are encouraged to pick the meeting most convenient to them; the material presented will be the same at all meetings. The workshops will consist of discussing high hazard wildland-urban interface (WUI) areas and communities-at-risk, review the list of priority WUI areas of the county, and discuss ideas for projects within the WUI areas based on outcomes of the hazard assessment conducted. Also, a rough draft of the plan is available for review and comment. Representatives from the County and Oregon Department of Forestry will provide information and lead the discussions. Other agencies and fire departments that are participating in the planning effort will also be available for questions. The schedule for meetings is as follows (all will be from 6:30 p.m. to 8:30 p.m.):

April 18, 2005	Monday	Cove Ascension School (Kimsey Commons)
April 19, 2005	Tuesday	Elgin City Hall
April 21, 2005	Thursday	La Grande Rural FPD (Island City)

Union County's fire planning effort is part of a broader national initiative launched by the White House and the Western Governor's Association. Assessing the consequence of wildfire in Union County highlighted the need for investment to reduce fire risk. The importance of expanding local collaboration in the planning and implementation of projects geared at influencing the work plans of both the USFS and BLM improves fire prevention and suppression, reduces hazardous fuels, restores fire-adapted ecosystems, and promotes community assistance. Grant opportunities exist for community projects where community wildfire protection plans have been developed through a collaborative process.

Any questions about this process may be directed to:

Angie Johnson, NFP Planning Coordinator, ODF	(541) 963-3168
Dara Decker, Union County Emergency Services Officer	(541) 963-1009

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Website

The Union County website (www.union-county.org) and the Oregon Department of Forestry website (www.odf.state.or.us/areas/eastern/northeast/default.asp) were utilized to post copies of the draft plan, share risk assessment information, advertise community workshops and display the Values-At-Risk Questionnaire for download and completion. A final copy of the plan will be posted to both websites after adoption and the websites will be available for the duration as a communication tool for communities to express comment or concern about protection from wildfire.

Values-At-Risk Questionnaire / Blue Mountain Survey

Values-At-Risk Questionnaire

The Values-At-Risk Questionnaire was a grassroots effort by the Steering Committee to invite comments on the forest attributes valued most by residents. The questionnaire was posted on the Emergency Services website and was published in The Observer October 14-16, 2004 and October 19-21, 2004. It was also made available at community workshops and placed in community libraries and city halls throughout Union County (specifically: North Powder City Hall, La Grande Library, La Grande City Hall, La Grande Senior Center, Island City City Hall, Summerville City Hall, Union City Hall, Union Library, Cove City Hall, Cove Library, Imbler City Hall, Elgin City Hall and Elgin Library). The questionnaire was also distributed on the Eastern Oregon University campus and with the Union County Search and Rescue Unit. Questionnaire outcomes are included on the next page.

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Responses to Question #5 from questionnaire

Union County Community Wildfire Protection Plan Questionnaire Values List

Q5 – List 3 attributes you value most about your community:

Elgin

1. Small community atmosphere
2. Quiet and peaceful (3)
3. Beauty/scenic value (1)
4. Clean air/water
5. Timber resource/productivity
6. Wildlife/habitat
7. Natural trees and vegetation
8. Water resource
9. Friends

Q5 – List 3 attributes you value most about your community:

Imbler

1. No tavern
2. No cemetery
3. No taxi

Q5 – List 3 attributes you value most about your community:

Island City

1. Clean air/water (1)
2. Small community atmosphere (1)
3. Neat and attractive community
4. Natural trees and vegetation
5. Good government
6. Good retail mix

Q5 – List 3 attributes you value most about your community:

Pumpkin Ridge/Summerville

1. Forest/land (3)
2. Wildlife/habitat (4)
3. Friends/neighbors (8)
4. Family (1)
5. Animals
6. Home/property (1)
7. Open space (1)
8. Love the location (2)
9. Beauty/scenic value (4)
10. Community safety
11. Rural character (2)
12. Willingness to work together (1)
13. Small community atmosphere (1)
14. Forgiving
15. Quiet and peaceful

16. Mixed uses
17. Transition between forest and agricultural land
18. Hiking trails
19. Private land adjacent to federal land

Q5 – List 3 attributes you value most about your community:

Cove

1. The town
2. Love the location
3. Friends/neighbors (3)
4. Beauty/scenic value (2)
5. Schools
6. Helpful
7. Quiet and peaceful
8. Freshness
9. Mountains
10. Small community atmosphere
11. Timber
12. Home/property
13. Recreation
14. Wine
15. Knowing how to help in case of fire

Q5 – List 3 attributes you value most about your community:

Union

1. Small community atmosphere (3)
2. Historical nature of community (3)
3. Rural character
4. Fishing
5. Hiking
6. Horseback riding
7. Sense of community/community pride (5)
8. Volunteerism (1)
9. Quiet and peaceful (2)
10. Clean air/water
11. Beauty/scenic value (2)
12. Friends/neighbors (2)
13. Community safety
14. Catherine Creek (1)
15. Open space
16. Wildlife/habitat

Q5 – List 3 attributes you value most about your community:

North Powder

1. Beauty/scenic value
2. Climate
3. Rural character
4. Agriculture
5. Quiet and peaceful
6. Small community atmosphere

Q5 – List 3 attributes you value most about your community:

Rural County

1. Beauty/scenic value
2. Quiet and peaceful
3. Rural character
4. Forested habitat
5. Hunting
6. Fishing
7. Skiing
8. Horseback riding

Q5 – List 3 attributes you value most about your community:

Outside Union County

1. People (2)
2. Green lawns
3. Small community atmosphere (3)
4. Clean air/water (2)
5. Open space
6. Home/property
7. No traffic
8. Clean community
9. Community safety (1)
10. Convenient to larger cities

Q5 – List 3 attributes you value most about your community:

Did not specify

1. Wildlife/habitat (1)
2. Forest
3. Recreation
4. Home/property
5. Clean air/water
6. Electrical power
7. The town
8. People
9. Environment (1)
10. Greenery
11. Conservation

Q5 – List 3 attributes you value most about your community:

La Grande

1. Communication
2. Social support
3. Rural character (2)
4. Friends/neighbors (22)
5. Small community atmosphere (13)
6. Sense of community/community pride (10)
7. Community appearance (6)
8. Recreation (5)
9. Wildlife/habitat (16)
10. Timber resource/productivity (4)
11. Beauty/scenic value (11)
12. Economy (1)

13. Quiet and peaceful
14. Livability (3)
15. Fishing (3)
16. Hunting (2)
17. Clean air/water (6)
18. Forest/land (11)
19. Mountains (4)
20. University (12)
21. Community safety (5)
22. Diversity
23. Climate (2)
24. Rural character (5)
25. Many churches
26. Downtown
27. Few hazards
28. Love the location (1)
29. Possessions (1)
30. 30' from fire hydrant
31. Inexpensive cost of living (2)
32. Agriculture (2)
33. Wilderness
34. Fun
35. Bowling alley
36. Home/property (4)
37. Public services
38. Search and Rescue
39. Open Space (1)
40. Medical facilities

Responses to Question #7 from Questionnaire

Union County Community Wildfire Protection Plan Questionnaire Values List

Q7 – If you answered yes to #6, please list how:

Elgin

10. Fire threatens my home and the beauty of the area.
11. A wildfire would devastate the scenic value, timber resources and clean air and water.
12. Our 30 acres would be devastated and our timber lost.

Q7 – If you answered yes to #6, please list how:

Island City

1. Fire would threaten local business.
2. Dense smoke would be difficult to endure.

Q7 – If you answered yes to #6, please list how:

Pumpkin Ridge/Summerville

1. Fire would destroy wildlife and their habitat. (2)
2. Fire would destroy houses. (2)
3. Fire would destroy trees and land. (1)
4. Fire would destroy the scenic beauty of our area. (2)
5. I live by a non-treatable wilderness.
6. Wildfire could lead to death.
7. Fire could destroy the view of trees on Mt. Emily like it did Mt. Harris.

Q7 – If you answered yes to #6, please list how:

Cove

1. Fire could burn down the town.
2. Burned stuff isn't pretty and my house might burn down.
3. Fire is both good and bad; it helps the mountains but if out of control will take the freshness of the landscape away.
4. The backdrop may burn and homes may be destroyed.
5. I want to be helpful to other people in case of fire.

Q7 – If you answered yes to #6, please list how:

Union

1. If mountains are charred, why hike them?
2. We don't have the urban interface area like Cove, Starkey, Mt. Emily, etc.
3. Loss of life, natural resources and community.
4. Burning causes poor air quality and degrades scenery.
5. Wildfire would ruin the trees and streams.

Q7 – If you answered yes to #6, please list how:

North Powder

1. A fire would destroy the view of the forest, harm wildlife habitat and encourage the growth of noxious weeds.
2. Fire would burn crops and ranching.
3. People would move away.

Q7 – If you answered yes to #6, please list how:

Rural County

1. A wildfire would affect the beauty of the area by destroying the trees.
2. Threaten wildlife, erode soils, pollute waterways and desecrate the landscape.

Q7 – If you answered yes to #6, please list how:

Outside Union County

1. Values are burned up.
2. Fire would ruin the landscape and the air would stink.
3. Smog...
4. The air would get smoky.

Q7 – If you answered yes to #6, please list how:

Did not specify

1. Fire would affect the landscape in many ways; the trees would be gone.
2. Management is needed to prevent fires.

Q7 – If you answered yes to #6, please list how:

La Grande

1. Fire would destroy appearance and habitat.
2. All could be destroyed in a major event.
3. Loss of scenery for decades and a loss in real estate values.
4. Destruction of habitat, view sheds and trees.
5. The safety of the community would be compromised by an unchecked threat of wildfire.

6. I wouldn't be able to enjoy the livability, recreation and wildlife of the area.
7. I live at the base of the mountains and I enjoy the wildlife.
8. It would destroy habitat for the wildlife, which would affect sportsman's activities.
9. Physical beauty would be impacted.
10. Fire would destroy property, lives and wildlife.
11. Wildfire would burn timber, kill animals and possibly ruin habitat.
12. Fire would ruin some of the buildings and homes that have been here for years.
13. Fire would burn the trees on the mountains.
14. There would be dust but no trees, shrubs, beauty, wildlife or erosion control.
15. The scenic beauty, nice neighborhood and wonderful downtown would be destroyed.
16. Lost landscape, life and timber.
17. The views, air quality and recreational opportunities would be impacted.
18. There would be no hunting, camping or nature.
19. I recreate in the woods and fire would be a threat; thin and hand pile.
20. The landscape wouldn't be so great anymore.
21. Fire would burn the trees to nothing.
22. Possible destruction of the land.
23. The scenery and wildlife would no longer exist.
24. Loss of habitat for animals.
25. Fire would affect the wildlife population.
26. Fire could burn down the fun.
27. Wildlife!
28. There could be structural damage and love ones lost.
29. Fire damages the looks.
30. My home or school could burn!
31. Fire could burn over the highway when I want to go home.
32. Wildfire would burn down my house, be expensive to local government and cause loss of my neighborhood.
33. Wildfire could be detrimental to safety.
34. A wildfire would burn the grazing land and the trees.
35. There would be total destruction, loss of homes and life.
36. The surrounding area could burn down.
37. If a wildfire went through, the mountains would be burned and not as pretty.
38. Fire would burn private property (homes), cause smoke and smog and trees would burn.
39. The town, land and wildlife could be destroyed.
40. There would be no trees, no deer/elk and no Tree City USA for the 14th year.
41. The town, natural resources and jobs would be reduced by a large wildfire.
42. Fire would destroy the clean and beautiful scenery; it would take years to replenish.
43. People and trees could be burned to death.

Blue Mountain Survey

The Blue Mountain Wildland-Urban Interface Wildfire Study was a scientifically engineered study meant to gauge residents' understanding of wildfire issues in high-risk areas. The survey was mailed out using statistical sampling techniques in Union, Baker and Wallowa Counties. Survey outcomes are included here:

Blue Mountain Wildland-Urban Interface Wildfire Study SUMMARY OF RESULTS

September 2003

Surveys Mailed: 847
Surveys Returned: 225 (26.6%)

Question 1. Are you a forest landowner?

Yes: 86%
No: 14%
Total Responses: 218

Question 2. Do you live on your forested property?

Yes: 72%
No: 28%
Total Responses: 184

Question 3. How many forested acres do you own?

Total Acres: 14,814
(345,814 with Boise Solutions)
Average Acres per Respondent: 84
Total Responses: 176

Question 4. Please indicate the geographic area in which your forested property is located. (If you own property in more than one area, please mark all that apply).

Mt Emily: 42
Cove: 9
Morgan Lake: 10
Pumpkin Ridge: 23
Ruckle Rd: 23
Upper Lostine Subdivision: 0
Wallowa Lake Basin: 0
West of Wallowa Lk: 0

Alder Slope: 0
Imnaha River Woods: 0
Ferguson Ridge/Prairie Ck: 0
Sumpter Valley: 25
Stices Gulch: 5
Base of Elkhorn Mtns: 55
Sparta: 0
Halfway/Pine Valley: 1
Ukiah: 0
Meacham: 2
Weston Mtn/Tollgate: 1

Total Responses: 196

Question 5. How high do you feel the risk of a wildfire is in your neighborhood?

High: 31%
Med: 57%
Low: 12%
Total Responses: 183

Question 6. If a wildfire occurred in your area, what factors would place you and/or your home at risk?

A. Neighboring properties with high fuel load.

High: 70%
Low: 30%

B. Response time/capability/equipment of local fire agencies.

High: 54%
Low: 46%

C. Fuel loads on your properties.

High: 41%

Low: 59%

Low: 8%

Total Responses: 179

D. Flammability of your structures.

High: 43%

Low: 57%

Question 10. Have you worked around your home to create a defensible space?

Yes: 83%

No: 17%

Total Responses: 172

E. Access to your property.

High: 25%

Low: 75%

Question 11. If you did do this work, did you use National Fire Plan cost share assistance?

Yes: 18%

No: 82%

Total Responses: 166

F. Construction material used on home.

High: 43%

Low: 57%

G. Position of home on slope.

High: 24%

Low: 76%

Question 12. How interested are you in learning more about creating defensible space?

High: 36%

Med: 38%

Low: 26%

Total Responses: 176

H. Loss of services and utilities.

High: 45%

Low: 55%

Total Responses: 147

Question 7. Do you have a plan for what you would do if there were a fire in your neighborhood?

Yes: 54%

No: 46%

Total Responses: 184

Question 13. Where is the greatest need for fuels reduction work?

Private lands: 41%

U.S. Forest Service: 53%

Industrial Forest Land: 6%

Total Responses: 203

Question 8. Have you participated in National Fire Plan activities?

Yes: 28%

No: 72%

Total Responses: 185

Question 14. How concerned are you about your scenic view being impacted by National Fire Plan Fuels Reduction work?

Very Concerned: 16%

Somewhat Concerned: 29%

No Concern: 55%

Total Responses: 185

Question 9. Defensible space refers to the area between a house and an oncoming wildfire where the vegetation has been modified to reduce the wildfire threat and to provide an opportunity for firefighters to effectively defend the house. Sometimes a defensible space is simply a homeowner's properly maintained backyard. How knowledgeable do you feel you are regarding creating defensible space?

High: 54%

Med: 38%

Question 15. If you were interested in learning more, what kind of informational format would you prefer?

A. Direct mailed brochures: 22%

B. Centralized workshops or classes: 9%

C. Video: 9%

D. Hands-on demonstrations: 8%

E. Self-guided tour of demonstration areas: 8%

F. Local television: 2%

- G. Radio: 2%
- H. Internet website: 9%
- I. Neighborhood workshop: 10%
- J. Individual consultation: 14%
- K. Newspaper insert: 7%

Question 16. Please rate your level of concern regarding building a defensible space around your home (1=very little concern; 4=extreme concern).

Amount of physical work required.

- 1: 44%
- 2: 31%
- 3: 17%
- 4: 8%

Amount of time required.

- 1: 39%
- 2: 32%
- 3: 18%
- 4: 11%

Financial cost required.

- 1: 31%
- 2: 18%
- 3: 28%
- 4: 23%

Doing the work yourself.

- 1: 51%
- 2: 25%
- 3: 11%
- 4: 13%

Hiring a contractor/forestry professional.

- 1: 39%
- 2: 14%
- 3: 19%
- 4: 28%

The aesthetic value of your property.

- 1: 28%
- 2: 20%
- 3: 26%
- 4: 26%

Neighborhood covenants/restrictions.

- 1: 72%
- 2: 12%
- 3: 8%
- 4: 8%

Amount of maintenance required.

- 1: 48%
- 2: 34%
- 3: 10%
- 4: 8%

Question 17. How much would you be willing to pay to reduce the wildfire risk that your home faces?

- Very little: 40%
- Some: 55%
- A lot: 5%

Total Responses: 166

Question 18. Are you aware of the financial assistance available for treating fuels on homeowners'/landowners' properties?

- Yes: 55%
- No: 45%

Total Responses: 183

Question 19. If so, are you interested in applying for some of these funds?

- Yes: 58%
- No: 42%

Total Responses: 160

Question 20. If not, why would you be reluctant?

- A. Not interested in assistance: 19%
- B. Don't need it: 45%
- C. Don't want to do any work: 0
- D. Government requirement/regulation issues: 36%

Total Responses: 91

Question 21. Would you be willing to put on an educational program for your neighborhood?

- Yes: 25%
- No: 75%

Total Responses: 173

Local Radio / Newspaper

The Observer and two local radio groups, KCMB and KUBQ, were utilized to advertise the planning effort and promote participation opportunities. The Observer also provided copies of photos from the 1973 Rooster Peak Fire. Copies of articles and ads are included in the next five pages (not numbered - photocopies and faxed material).

(If you are viewing this document on-line, then you will need to contact Angie Johnson, (541) 963-3168, or Dara Decker, (541) 963-1009, to see copies of the articles and ad.)

XIII. Appendix C: Union County Emergency Operations Plan - Wildland Fire Annex

Wildland Fire

I. PURPOSE

The purpose of this hazard specific annex is to provide an outline of the roles and responsibilities of the different agencies that may be involved in an urban / wildland interface fire.

The goal of this wildland fire annex is to ensure the safety of life and property during a wildfire event.

Many agencies and jurisdictions within the county could be involved if a wildfire threatens people and property. It will take coordination and cooperation of all agencies to adequately protect the lives and property of Union County citizens.

II. SITUATIONS AND ASSUMPTIONS

Situation

Union County is predominately rural, with many outlying farms and ranches. Some areas in Union County have no available structural fire protection.

Union County covers approximately 2,038 square miles of land committed to various uses. Resource land uses like agriculture, timber, grazing and aggregate mining, along with other uses such as residential, commercial and industrial development are present in Union County, and may be protected by several different agencies, each with specific boundaries and jurisdictions.

All areas of the county are subject to thunder and lightning storms throughout the spring, summer, and fall months, which can cause many fires per year. As 49% of Union County is publicly owned, many hunters, hikers and other outdoor enthusiasts take advantage of outdoor recreation in Union County, which can be a cause for concern related to human-caused wildfire ignitions.

Assumptions

The protection of life and property is paramount in decisions relating to firefighting procedures.

With numerous agencies and jurisdictions potentially becoming involved, coordination and cooperation among agencies is vital in achieving maximum fire suppression.

Assistance through mutual aid agreements may be necessary, and mutual aid agreements are in place among rural fire protection districts (RFPDs) and wildland fire suppression agencies.

Resource procurement assistance may be necessary through the county and private contractors.

The first responding RFPD or agency will assume Incident Command (regardless of jurisdiction) until relieved by the responsible agency. If the wildland fire remains within one jurisdiction, that RFPD/agency assumes Incident Command and uses the Incident Command structure. If the wildland fire incident involves more than one state/federal agency or any municipality and a state/federal agency, then the Unified Command structure will be used.

All affected agencies or municipalities will be notified through the 911 Center, Northeast Oregon Interagency Dispatch Center (NOIDC), or the Emergency Services Officer.

III. CONCEPT OF OPERATIONS

General

Primary responsibility for incident command and control rests with agency representatives. The on-scene commander has the authority to deploy departmental resources. The incident command/unified command system will be used in all county emergency situations. Each agency will maintain contact as best as they can to ensure proper coordination.

Preparedness

1. Update mapping of area jurisdictions, and provide to all mutual aid agencies.
2. Preplan and coordinate communications and frequency use.
3. Identify vulnerable areas and plan for their defense or evacuation.
4. Pre-plan and be familiar with evacuation plans and routes.
5. Be familiar with requirements for requesting State and Federal disaster assistance in a timely manner.
6. Agencies will ensure all equipment is in operational working order.
7. Make available public information handouts on how citizens can prevent and defend their property, and lives.
8. Train and exercise regularly; then review and update. Overall response among affected agencies will be strengthened and streamlined by practicing together in drills and scenarios on a regular basis.

Response

All affected departments/agencies within the county with response obligations are as follows:

1. *911/DISPATCH RESPONSE:*
 - Maintain standard 911 service.
 - Maintain standard dispatch protocol.
 - Maintain incident communications unless the lead dispatcher determines that the EOC must be opened to assume incident communications.
 - Relay emergency warning as directed by the Incident Commander.
 - Notify NOIDC of wildland fires burning within one mile of the protection boundary.

2. *FIRE SERVICE RESPONSE:*
 - Containment and control of fires.
 - Related rescue events (if trained).
 - Hazardous materials expertise (up to their individual qualifications) and containment (if trained).
 - Request additional resources from existing mutual aid agreements.
 - Request activation of the State Conflagration Act (County Fire Chief) according to state guidelines.

3. *LAW ENFORCEMENT RESPONSE:*
 - Preservation of law and order.
 - Implementation of warning system.
 - Provide security, traffic and crowd control.
 - Assist in evacuation and egress procedures.

4. *PUBLIC WORKS RESPONSE:*
 - Logistical support associated with the incident.
 - Debris removal.
 - Road maintenance on a priority basis.

IV. ORGANIZATION AND ASSIGNMENT OF RESPONSIBILITIES

General

Organizational response procedures practiced on a day-to-day basis will be familiar during disaster situations and augmented as necessary. Support will be provided by other agencies or through contractors as the events dictate.

Task Assignments

Union County Fire Agencies:

1. Coordinate all fire control and rescue activities between all affected

- agencies within fiscal policies.
2. Provide on-scene hazardous materials expertise up to qualifications, then request hazardous materials regional team.
 3. Request and coordinate mutual aid response from other agencies.
 4. Provide on-scene prevention and code enforcement to minimize the incident.
 5. Provide support and assistance for warning, sheltering, evacuation, and other public safety operations as needed.

Those duties (as outlined above) pertain to all activities within district boundaries. Mutual aid assistance to Union County cities or RFPDs is outlined in current agreements.

Oregon Department of Forestry will take the lead role in fire suppression and manpower relating to private forested lands.

U.S. Forest Service will take the lead role in fire suppression and manpower relating to federal forest lands.

The *Bureau of Land Management* has contracted with the US Forest Service for initial attack responsibilities on BLM land in Union County. An agreement is in place between the BLM and the USFS specifying that the nearest resources to the incident, regardless of ownership or suppression responsibility, are deployed for initial attack.

Union County Law Enforcement Agencies:

1. Responsible for uninterrupted law enforcement activities, to the extent possible, within the unincorporated areas of Union County during emergency conditions.
2. Request the evacuation of residents affected by incident.
3. Coordinate outside law enforcement assistance in unincorporated areas.
4. Initiate Warning and Communications functions.
5. Provide direction and support for other response departments and public safety agencies (fire, public works).
6. Direct traffic control.
7. Assist with affected area security.
8. Coordinate, assist with evacuation procedures.
9. Assist the Sheriff and coordinate outside resources when necessary.

Oregon State Police will assist county law enforcement with site security, evacuation, and technical expertise as requested.

Law enforcement is responsible for those duties, as outlined above, within their jurisdiction.

Union County Public Works Agencies:

1. Provide equipment, manpower, and materials necessary for logistical support to assist in fire suppression.
2. Maintain communications link with EOC.
3. Be available to support cities inquiries and requests.
4. Repair and restore vital facilities and essential services.
5. Utilize and coordinate outside private resources at the county's disposal.
6. Assist utilities in essential emergency repairs.
7. Assist other public safety agencies in search and rescue, evacuation, site security, and other pertinent response functions as time and manpower permit.

ODOT will participate in wildland fire emergencies as outlined in the *ODOT Emergency Operations Plan, Annex E – Incident Management, Appendix 4 – Wildland Fire*. ODOT may also provide assistance and coordination for road maintenance and debris removal activities on the city/county road system in concert with public works officials.

Union County Emergency Services:

1. Notify and update Union County Commissioners on the situation.
2. Activate the EOC if required.
3. Notify Oregon Emergency Management of situation.
4. Advise adjacent counties of potential mutual aid requests.
5. Alert sheltering organizations of crisis potential.
6. Prepare emergency declaration if required.
7. Prepare a county public information release.

State of Oregon Departments:

Involvement of state agencies other than what is normally provided for on a day-to-day basis will require a local emergency declaration requested by the county and approved by the Governor.

Union County Unprotected Areas:

Union County has approximately 50,890 acres of unprotected land. When a wildfire event is imminent and meets the criteria for activating the State Conflagration Act, the Union County Fire Chief will request assistance and support for wildland fire suppression.

V. DIRECTION AND CONTROL

Routine operations will be handled by individual departments/agencies' standard operating procedures. During heightened emergency conditions requiring activation of the EOC, the department head/agency representatives will coordinate activities from the EOC. Each department/agency will name an alternate to cover any shift change or the absence of the primary responder.

It may also be necessary to staff individual command posts (incident command) with supervisory personnel. The major activity at the site will dictate overall incident command. Each department ranking officer at the command post will establish and maintain communications, direct emergency operations, and coordinate all requests for assistance through agency representatives at the EOC. When on-scene capabilities are exceeded, outside assistance will be requested and coordinated from the EOC.

VI. CONTINUITY OF GOVERNMENT

Lines of succession within each department and division are outlined in established standard operating procedures. The Incident Commander (IC) and Command Post (CP) location will be quickly identified and relayed to all responding agencies.

The Union County line of authority succession is listed in the Basic Plan, Section XI.

During a "declared" emergency event, consideration may be given to utilizing State Emergency Management personnel to fill vacant key positions.

Procedures must be followed to ensure protection of all vital county and individual departmental records, whether disaster related or from everyday operations. Safe storage facilities, not prone to disaster events (i.e. flood damage) should be utilized where possible.

VII. ADMINISTRATION AND SUPPORT

Communications

Communications play a vital role during department/agency response, which are primarily handled through the Union County 911/Dispatch Center and supported by EOC participation. Any resources responding to a county wildfire incident will be assigned a radio frequency from either 911 or NOIDC.

To the extent possible, state/federal agency radio frequencies should be programmed into local fire agency radios and local fire agency radio frequencies should be programmed into state/federal agency radios. Additionally, any new frequencies used in Union County should be programmed into all agencies' handheld and mobile radios.

911 Center / NE Oregon Interagency Dispatch Center Interface

Due to the fact that numerous agencies and departments will respond to a wildland fire of any size, communications can become hectic, especially for dispatching agencies. To minimize confusion and streamline communications as much as possible, 911 and NOIDC have come to the following agreement:

At this time, NOIDC and 911 do not share radio frequencies. If a fire occurs on or near a mutual boundary, federal, state and rural fire agencies shall be dispatched. 911 will dispatch rural fire districts via radio and call NOIDC to advise them of the incident. Since the dispatch centers do not share radio frequencies, 911 will maintain radio communications with the rural fire districts and NOIDC will maintain radio communications with federal and state responders. Incident Command may maintain radio contact with NOIDC and may choose federal or state frequencies to handle all communications. NOIDC and 911 will communicate via phone when necessary.

Administration

The timely and efficient response of public safety agencies during emergency events requires extraordinary coordination between field units and the EOC. Priorities assigned by department heads will facilitate an orderly and efficient use of response personnel. Records generated during emergency events will be collected and filed chronologically. Good record keeping procedures are essential for review, future planning, and event reconstruction. Resource lists are available in the Emergency Services Office.

VIII. ANNEX DEVELOPMENT AND MAINTENANCE

It is the responsibility of the county and each city's public safety agencies to ensure its own operational capability.

The Emergency Services Officer will coordinate with all agencies for the maintenance of this Annex and coordinate input from each response agency.

APPENDICES (*inquire at Emergency Services Office*)

- Appendix 1 – Emergency Response Log
- Appendix 2 – Disaster Area Permit
- Appendix 3 – Conflagration Act
- Appendix 4 – Resource Lists

XIV. Appendix D: Sources

Website Sources

<http://www.fireplan.gov/reports/351-358-en.pdf>

<http://www.nwfireplan.gov>

<http://www.fireplan.gov/content/home>

<http://www.fireplan.gov/reports/7-19-en.pdf>

<http://www.whitehouse.gov/infocus/healthyforests/toc.html>

<http://www.fema.gov/fima/planning10.shtm>

http://www.odf.state.or.us/DIVISIONS/protection/fire_protection/prev/sb360/docs/overview.pdf

CWPP References

Section I - Introduction

<http://www.communitiescommittee.org/pdfs/cwpphandbook.pdf>

ⁱⁱ Oregon Emergency Management; *Emergency Management Plan, Natural Hazards Mitigation Plan, Fire Chapter*, (December 2003).

ⁱⁱⁱ Oregon Department of Forestry; *Forest, Farms and People: Land Use Change on Non-Federal Land in Eastern Oregon, 1975-2001* (August 2004).

http://www.odf.state.or.us/DIVISIONS/resource_policy/resource_planning/Annual_Reports/EORDZ.pdf

Section II - Union County Profile

ⁱ *The Climate of Oregon: From Rain Forest to Desert*, Taylor, George H. and Hannan, Chris, Corvallis, OR: OSU Press (1999) pp. 80.

ⁱⁱ *Ibid*, pp. 8-9.

ⁱⁱⁱ Taylor, *Climate of Oregon*.

^{iv} *Union County Population Analysis and 2020 Forecast; Final Draft*, The Benkendorf Associates Corporation, (January 25, 2001) pp. 1.

^v *Union County 2002 Strategic Plan*, Elesco Limited and Auyer Consulting, (June 2002) pp.15.

^{vi} Union County Assessment and Tax Collection Department, (March 2005).

Section V - Community Outreach and Education

ⁱ Union County Zoning, Partition and Subdivision Ordinance, Siting Standards for Dwellings and Structures and Development and Fire Siting Standards (Adopted November 2, 1983).

Section VI - Wildfire Risk Assessment

¹ This document was authored by Angie Johnson, Oregon Department of Forestry-Northeast Oregon District, and edited by Trish Wallace, US Forest Service-Wallowa-Whitman office. The hazard assessment was conducted by both Trish and Angie.

² *Expanded Fire Condition Class Definition Table*. Available at <http://www.frcc.gov>.

Section IX - Maintenance Plan for Fuels Treatment

ⁱ A Conceptual Approach for a Maintenance Strategy for Fuel Treatments in Oregon: Maintaining the Investment, Fitzgerald, Stephen and Martin, Charlie, Oregon State FFHM Committee Report. (July 5, 2004).

ⁱⁱ Oester, Paul. *Blue Mountains Renewable Resource Newsletter*. Vol. 20, No. 3, (Fall 2004).

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Twin Lake in eastern Oregon. Photo: Karen Antell

Protect This Place: Oregon's Twin Lake

A proposed high-voltage power line threatens a mountain lake and its surrounding wetlands.

Voices

January 9, 2023 - by Karen Antell

The Revelator

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The Place:

Atop a ridge in the Blue Mountains, just west of the small town of La Grande in northeast Oregon, hides a beautiful small lake and associated wetland. What we now call Twin Lake or Little Morgan Lake — its Indigenous name is unknown to me — offers the promise of secluded summer breeding habitat for aquatic species, as well as food and respite for many birds following ancient migration routes. Clean, perennial water supports a complex community of aquatic plants, invertebrates and amphibians.

Why it matters:

Twin Lake hides behind its larger sister, Morgan Lake, on Glass Hill. Construction of a small dam in the early 1900s increased the size and depth of Morgan Lake, creating a reservoir for irrigation and, soon thereafter, electrical power. Water released from the dam tumbled down 1,000 feet, passing through turbines to generate electricity for the growing town below. Twin

Lake, however, escaped development and remains a place of peaceful natural beauty.

PROTECT THIS PLACE



By the 1960s local power no longer depended on the dam, and Morgan Lake reservoir appeared to be doomed to become an exclusive, gated development of waterfront homes. Against long odds, a dedicated group of local conservationists affiliated with the Isaak Walton League helped to forestall this plan. The lakes and remaining wetlands were deeded to the city of La Grande in 1967, providing some measure of protection for native vegetation, wildlife, and recreation.

Today the city of La Grande owns and manages the property as Morgan Lake Park. Stocked with fish each summer, Morgan Lake attracts boaters, fishers and picnickers. Twin Lake, though part of the park, has largely escaped public attention. Somewhat hidden to the west, it remains in near pristine condition, where it provides refuge for an extraordinary diversity of emergent aquatic plants, invertebrates, reptiles, amphibians, and countless seasonal nesting birds and annual migrants.

These ridgetop wetlands harbor secrets of some ancient geologic magic. No inlet stream enters either lake, yet both Twin and Morgan lakes remain wet year-round. Subterranean springs pump water upward from an active aquifer hidden somewhere below. Snowmelt also contributes moisture to the system.

Twin Lake comprises a broad, shallow pond filled with emergent plants that exhibit surprising botanical diversity. A lush growth of native great yellow pond-lilies (*Nuphar polysepala*) thrust their large flowers up through dense mats of floating leaves. Common bladderwort (*Utricularia vulgaris*) catches and digests tiny insects and crustaceans in trapdoor bladders hidden among their leaves submerged beneath the water. An unusual plant known as bogbean (*Menyanthes trifoliata*), found nowhere else along Glass Hill, flourishes in Twin Lake.

The threat:

Idaho Power Company has applied for a permit to construct a 500-kilovolt power line that would run through the property directly adjacent to Twin and Morgan Lakes. Following official condemnation of the surrounding private lands, deep blasting will commence in order to set the footings prior to construction of immense towers. In addition to a higher wildfire threat from the high-voltage lines, construction and operation of the power line will introduce invasive plant species and possibly alter the area's hydrology irreparably.

The underlying geology of Glass Hill is complicated and not well understood. No one knows exactly how the flow of subterranean water to Twin and Morgan Lakes might be altered by tower construction. Without life-sustaining spring water, Twin Lake may dry up quickly, leaving behind only a dry, fire- and weed-prone field of little ecological value.

My place in this place:

The origin story of Glass Hill includes explosive volcanic eruptions, lava flows from ancient fissures in the underlying rock, and faults thrusting layers of basalt upward in seismic events buried in long, geologic time. Next, layers of fine volcanic ash spewing from the great eruptions of Mt. Mazama 7,700 years ago added layers of fertile soil throughout the forests of northeast Oregon. Indigenous people walked this ridge for many thousands of years, creating their stories and life histories in harmony with the land. People from the Cayuse, Umatilla, Walla Walla and Nez Perce Tribes arrived to harvest abundant camas bulbs and fish in the Grande Ronde Valley below.

Eventually wagon trains following the Oregon Trail westward from Missouri brought many new people to this place, including some of my own ancestors. Changes to the landscape were profound, as farming, mining and railroads replaced sustainable hunting and gathering. As a botanist, I grieve the many losses and acknowledge that what remains is precious.



Plants emerge from Twin Lake. Photo: Karen Antell

Innumerable stories could be told about the complex web of interactions of any native ecosystem. These stories inform the collective wisdom and experiences of the communities they embrace. Our lives, like those of Indigenous people before us, become impoverished when these connections disappear from living memory. I feel protective of this place and have sought to keep knowledge of the natural ecosystems alive through public education. The unique wetlands springing to life along this obscure ridge top might continue to fill us with wonder and inspiration for many more generations, if we can only keep it whole.

Who's protecting it now:

Twin Lake has no official protection beyond its inclusion within Morgan Lake Park. A grassroots organization, the [Stop B2H Coalition](#), has formed in opposition to the transmission line, which will run 305 miles and require 1,200 towers.

What this place needs:

Strong environmental protection ultimately requires time, money, political savvy, and sustained community involvement. The economic forces driving big energy projects like this one quickly overwhelm small communities. Twin Lake needs the legal protections that a strong conservation easement might provide. Legal documents require attorneys. Attorneys require fees. Fundraising requires dedicated volunteers, donors, and an engaged community.

Lessons from the fight:

We must practice constant vigilance. Concerned residents and the Isaak Walton League helped save this area once before from commercial development. We became complacent, assuming that this special, peaceful place would always be here for morning birdwatching, afternoon walks, and summer star-gazing. No one ever imagined that the day would come in which the very existence of this important wetland would be threatened by construction of high-voltage electrical power lines. Special places require special protections, and once the threat appears, it may be too late.

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IN THE SUPREME COURT OF THE STATE OF OREGON

In the Matter of the Application for Site
Certificate for the Boardman to
Hemingway Transmission Line

IRENE GILBERT

Petitioner

v.

OREGON DEPARTMENT OF ENERGY,
OREGON ENERGY FACILITY SITING
COUNCIL, and IDAHO POWER
COMPANY

Respondents

Energy Facility Siting Council

OAH Case No. 2019-ABC-02833

Supreme Court No. S069924

AMENDED APPELLANT'S BRIEF

To the Justices of Oregon Supreme Court:

Petitioner, IRENE GILBERT, unrepresented Pro Se, provides the following arguments regarding the above-captioned case:

APPEAL TO OREGON SUPREME COURT

INTRODUCTION

I participated in the contested cases before the Oregon Energy Facility Siting Council as a limited party for the issues included in this appeal. I appeared as Co-Chairman of STOP B2H, representative of the public interest, and to represent my personal interest and concern for the impacts of this proposed development.

This document addresses appeals regarding three issues before the court. Each is presented in a separate section of this document with one table of references since many of the statutes and rules apply to more than one issue. I also included copies of some of the more significant references. The basis for the appeal are included after the Issue Statement.

I had intended to present arguments on additional Site Certificate issues, however, I was unable to access the Contested Case Record. After calling the Court Clerk yesterday, I found that I was not required to use the Oregon Department of Energy (ODOE) Bate Stamp files. I was then able to identify references supporting my arguments, however, did not have time to develop additional concerns. I would like to draw your attention to some things that I found to be of concern regarding the processes that were used in the Contested Case procedures: (1) All requests for Summary Determination from Idaho Power and ODOE were approved and the cases were denied access to a Contested Case process. (2) All citizen requests to require Discovery from Idaho Power and ODOE were denied. (3) All citizen requested Site Certificate Conditions were Denied. (4) Oregon Department of Energy was allowed to develop the Statements of the Contested Case Issues resulting in narrowing of issues and (4) Petitioners were required to use the referencing methods developed by ODOE rather than standard referencing

in spite of multiple requests to use standard referencing and notices that the files provided for Petitioners use had multiple “glices”.

I have reverted to standard referencing for this document per the Court Clerk and the fact that I have been unable to access the court records submitted by ODOE due to the sizes of the files and lack of a table of contents that is readable and takes me to the documents.

CONTESTED CASE REGARDING OREGON TRAIL RESOURCES

“Whether Historic, Cultural and Archaeological Resources Condition 1 (HPMP) related to mitigation for crossings of Oregon Trail Resources provides adequate mitigation for visual impacts and sufficient detail to allow for public participation.”

BACKGROUND

Oregon Statutes establish the importance of Oregon Trail Resources to the state as a major tourist attraction (ORS 358.055). The statutes also establish the need to both recognize the value of these trails (ORS 358.057) and require the state to preserve and protect them due to them being finite, irreplaceable and nonrenewable(ORS 358.910) The Project Order states that all requirements of the Historic, Cultural and Archaeological Resources standard apply. (Second Amended Project Order 2018-07-26 Page 21, Lines 1-6) The Energy Facility

Siting Council agreed to allow the developer to delay providing information Regarding Oregon Trail resources, impacts and mitigation for resources located on private land **where landowners denied the developer access.** Information regarding these resources was to be **provided by an amendment** after site certificate was issued but before the start of construction. Information required to address visual impacts to locations that could be accessed was to be included in the submitted application including identifying the resources present, the site specific impacts, planned mitigation, and all paragraphs of the Historic, Cultural and Archaeological Resources standard apply to this development. Second Amended Project Order 2018-07-26, Page 21 Lines 1-7, Lines 17-19, and Lines 23-26; a Page 28, Lines 19-25). This required information was not included in the application, draft Historic Properties Plan or site certificate.(Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 27, 2022, Page 497 Lines 7-14) ; (Marbet v. Portland General Electric, 277 Or 447, 561 P2d 154 (1977))

ERROR ONE:

- The statement of my contested case limited the scope of my arguments beyond my accepted issue. (DLCD v Curry County, 33 Or LUBA 728 (1997) (DLCD v Tillamook Co., 34 Or LUBA 586 (1998)) My accepted contested case language included:

”I am requesting party status and a contested case regarding the fact that the proposed mitigation listed on Page 463 of the proposed order fails to provide mitigation for damages to an irreplaceable public resource that are consistent with the visual damages the plan is supposed to provide mitigation for and the fact that the mitigation plan has not been completed to the extent that the public is able to participate in the plan. The plan fails to identify what mitigation is proposed for what site and where that mitigation activity will be occurring and fails to provide clear and objective methods that will address the actual impacts at the site.....”

ERROR TWO:

ORS 469.401(1)469.405(1),ORS 469.370(7), OAR 345-021-0010 (dd)(2) EFSC issued a site certificate lacking required documentation of eligibility. Mitigation for impacts (OAR 345-001-0010(33))is not in the record and will not be determined for several years for some Historic Properties due to relying on Section 106 review results. (Jan. 23 & 24 Council meeting Minutes, Pages 14 Last 2 Sentences and Page 15, first 3 lines and third paragraph; Page 16, Middle Paragraph,) ORS 469.503) and (OAR 345-022-0000(1)(a) and (b) require the record to contain a preponderance of evidence showing compliance with Council statutes and rules. Absent the specific information identifying what resources will be impacted, the extent of the negative impacts and how those impacts will be mitigated, the file fails to contain a preponderance of evidence the construction and operation of the

facility, including mitigation are not likely to significantly, as defined in (OAR 345-001-0010(52)) adversely impact Oregon Trail resources listed or likely to be listed on the National Register of Historic Places (OAR 345-022-0090(1)(a) ; or archeological sites located on private land (OAR 345-022-0090(1)(b) or archaeological sites on public land(OAR 345-022-0090(1)(c). Courts have established that mitigation cannot be vague, imprecise, hortatory statements that could not function as legally sufficient conditions of approval. (Sisters Forest Planning Committee v Deschutes Cty. Court of Appeals State of Oregon, March 16, 2005 PAGE NUMBER) (Gould v Deschutes Cty. 216 Or Ap. 150(2007 PAGE NUMBER) (Scott v City of Jacksonville Or LUBA (Jan. 2010, 2009-107 AGE NUMBER) Table HCA-4b provides a generic listing of the types of mitigation that may be required. (Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 27, 2022, Page 497,) The Site Certificate fails to address the identification and mitigation of indirect impacts to Oregon Trail Sites OAR 345-022-0090(1)(b) and(c) It only address the requirement that the transmission line not directly damage or destroy them. The Site Certificate includes a statement that resources not likely eligible for NRHP listing are not protected and need no further evaluation. (Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 27, 2022, Page 477, Lines 23-32).

ERROR THREE

EFSC is not making the final eligibility determination on this issue.

469.401(1)469.405(1),ORS 469.370(7), Requires the Energy Facility Siting Council (EFSC) to make the final decision regarding eligibility. (Note: This objection is not as a result of EFSC allowing the developer to delay submission of Information until after the site certificate was issued for Historic Properties which are on private property which they were denied access to if they were being addressed through a Site Certificate Amendment as required in the Project Order. It is due to the fact that the developer failed to provide the required information on resource impacts and mitigation for areas which they did have access to in the Application, and delegating the approval of mitigation for all impacts to the Oregon Department of Energy in a way that avoids required public participation in the siting process.) Neither EFSC or the public are required to be included in the decisions regarding whether the mitigation that ODOE requires will result in the development complying with the rule requirements. The public will have no recourse in the event the mitigation required does not protect the Historic Property views being damaged by the project. The information in the site certificate and application regarding impacts fails to identify what the impacts will be at specific properties and the mitigation being proposed to address those impacts. (Jan. 23 & 24 Council meeting Minutes Page 16, First 3 lines of last paragraph.) The final eligibility

decision was delegated to ODOE to occur at a future date after the Site Certificate and Contested Case Process is completed and without public involvement or opportunity to review the decisions.

ODOE will argue in error that they have the authority to make the final eligibility decision under ORS 469.420. This fails to comply with the plain language of the statute and related statutes addressing approval of site certificates. Under ORS 469.300(2) EFSC is the only entity allowed by statute to make the eligibility determination and it must be made prior to the issuance of a site certificate. ORS 469.370(7), 469.(1). ORS 469.405(1) all refer exclusively to “the council” and none to the Department or staff). ORS 469.503 states: “In order to issue a site certificate, the **Energy Facility Siting Council** shall determine that the preponderance of the evidence on the record supports the following conclusions:

The facility complies with the applicable standards adopted by the council pursuant to ORS 469.501. Arguments that ORS 469.402 allows ODOE to make the eligibility decision are without merit and fail to comply with the plain language of ORS 469.402 which states, “If the Energy Facility Siting Council elects to impose conditions **on a site certificate or an amended site certificate**, that require subsequent review and approval of a future action, the council may delegate the future review and approval to the State Department of Energy.....” The language of the statute indicates that there must be a certificate or an amended site certificate

which requires some future action. In order to issue a site certificate the file must contain a preponderance of evidence in the record that the standard is met. In this case, the Historic Properties Plan is the document which is to contain the information regarding impacts and mitigation for the impacts to Oregon Trail Resources necessary to determine whether the Historic Properties standard is being met. This requires the final plan be approved prior to the issuance of a site certificate, not after. This application is also supported by OAR 345-025-0016 which requires completed plans to be approved by council and included in the site certificate. A change in the interpretation of the plain language of this rule would constitute an exceedance of authority which is specifically precluded under *Keiser v Wilke* 588 US __Q019 Kiser US Supreme Court providing that the rule must be ambiguous, decisions cannot be one time decisions which are not being required of other applicants, must be the official determination of those able to make decisions regarding the issue, cannot be a surprise to those impacted. In the case of ORS 469.402, the plain language of the statute and the legislative record show that the interpretation of the rule exceeds the legislative intent for the following reasons: The rule requires the delegation to occur in a site certificate, , so the council would already have had to clear eligibility. If the legislature had intended to include the department in those authorized to determine eligibility they would have adopted changes to statutes specifically requiring EFSC to do so including

ORS 469.504 and ORS 469.503. Attachment 5 to P. Rowe Declaration, Page 14 of 14, Section-by-Section Analysis of A-Engrossed Senate Bill 951, May 12, 1995, discusses the delegation of responsibility for completion of actions to the Oregon Department of Energy. It states: “There has been continuing uncertainty under existing law regarding whether the **EFSC may delegate the approval of the fulfillment of conditions to a site certificate. These reviews commonly require relatively little discretion, or require the expertise of particular state agencies other than the EFSC. Some site certificates contain a relatively large number of these types of conditions,....**” The description of the types of approvals that can be delegated as requiring “little discretion or the expertise of state agencies” clearly indicates that the approvals would not include a complex set of requirements and conditions that must be met to establish eligibility for the Historic Properties standard where decisions must be made regarding the significance of the impacts at given locations, whether the proposed mitigation is adequate given the impacts and whether it will reduce the impacts to a level where they are no longer significant. The delegation of approving the final Historic Properties Management Plan to the department without any Council decision, without any public process, or any amendment to the site certificate exceeds the respondent's statutory authority and facially violates the Siting Act's substantive siting standards. Table S-10 in the application is entitled “Project Effects to and

Proposed Mitigation of Above ground Resources”. All NHRP Oregon Trail Segments listed on this table state there are “Potential Adverse Effect and make the same recommendation for Mitigation which is “Design Modification, Public Interpretation Funding, Print/Media Publication” (B2HAPPDoc1-21.2 ApASC Exhibit S Revised_Cultural 2018-08-09, Pages 104-106)) The actual Adverse Effect is not identified and quantified for the segments in order to determine the significance of the effects. Also, the mitigation recommended in Table S-10 is the same list of Final Environmental Impact Statement (FEIS) allowed mitigation for all locations whether there will be direct and indirect effects, or only indirect effects. (B2HAPPDoc1-21.2 ApASC Exhibit S Revised_Cultural 2018-08-09, Pages 104-106)

What is clear as reflected on Table S-12 (B2HAPPDoc1-21.2 ApASC Exhibit S Revised_Cultural 2018-08-09, Pages) is that the actual adverse impacts to Oregon Trail resources have not been determined other than there are “Potential” effects and the site specific mitigation for impacts have not been identified due to the repeated use of potential mitigation methods which may or may not be implemented at the sites. (B2HAPPDoc1-21.2 ApASC Exhibit S Revised_Cultural 2018-08-09 Pages 111 and 112) The Oregon Department of Energy and Idaho Power have both stated that the file does not contain site specific mitigation (“Direct Evidence Exhibit 4 IPC Responses to Discovery” NEED

PAGES)(“Oregon Department of Energy Response to Exceptions – Issue HCA-3 OAH Case No. 2019-ABC-02833”).

ERROR FOUR: The Site Certificate cannot rely upon the Environmental Impact Statement final 106 HPMP requirements for determining mitigation for historic properties when the federal requirements and time frames are not consistent with EFSC rules. (ORS 469.370(13)) (B2HAPPDoc15 ASC Second Amended Project Order 2018-07-26 Page 27, Lines 32-34.) “When a development requires a NEPA review, EFSC is required to use information prepared for the federal agency to avoid duplicative study and reporting requirements, and the use of documents prepared for the federal agency **to the extent the information is consistent with state standards.**” (ORS 469.370(13)) The federal HPMP fails to comply with EFSC requirements for the following reasons: (A) According to Idaho Power's Supplemental Response to Irene Gilbert's Discovery Request No. 1 (Mar 12, 2021, page 4, last paragraph, it states, “The methodology that the BLM applied in the NEPA review process was specifically tailored to assess compliance with the federal NePA requirements. In the EFSC process Idaho Power developed its own methodology to determine compliance with the Council's Historic, Cultural and Archaeological Resources Standard. Any differences in results between the state and federal studies are due to the differences between the applicable standards, differing prescribed methods of analysis in the federal and state process, or the

timing of the different studies” (B)It allows mitigation that is not allowed in EFSC rules. (C)The federal 106 HPMP only includes or requires mitigation for NRHP eligible or likely eligible resources covered by EFSC rule OAR 345-022-0090(1)(a),. (Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 27, 2022, Page 477, Lines 8-10, Lines 24-33) (D) The EIS required HPMP does not require mitigation for Oregon Trail resources on public or private land that are not NRHP eligible or likely eligible as required by EFSC. (OAR 345-022-0090(1)(b) and (1)(c)) (E) Council cannot delay documentation of eligibility until after a site certificate is issued. (ORS 469.503) (OAR 345-022-0000(1)) (ORS 469.370(13)) (E)To rely upon information from the Final Environmental Impact Statement to provide documentation for compliance with the Historic Properties Standard, IPC would have to had supply the needed information or specific references to the information from the FEIS (or its supporting resource reports) in the application for site certificate. The Site Certificate is proposing the use of documents that were not developed when the site certificate was issued and suggesting that the mitigation from this future document should be considered as meeting the requirement that the file contain a “preponderance of evidence” that the Oregon Trail resources have been addressed as required by the EFSC rules, The Project Order requires the use of the FEIS, but only where federal rules are the same as EFSC, and in this case, the mitigation

allowed is not consistent. (B2HAPPDOC15 ApASC Second Amended Project Order 2018-07-26, Page 26, Lines 27-29) and (35-37) To rely upon the NEPA 106 results would require evaluation of the visual impacts data, methodology, standards, methods of analysis to determine differences and whether or not those differences impact the appropriate mitigation for the specific site being evaluated for negative impacts and appropriate mitigation.

ERROR FIVE-The Site Certificate changed OAR 345-025-0006(5) absent a rule revision.

This rule states:

OAR 345-025-0006(a) "For wind energy facilities, transmission lines or pipelines, if the certificate holder does not have construction rights on all parts of the site, the certificate holder may nevertheless begin construction, or create a clearing on a part of the site if the certificate holder has construction rights on that part of the site. (a) The certificate holder would construct and operate part of the facility on that part of the site even if a change in the planned route of a transmission line or pipeline occurs during the certificate holder's negotiations to acquire construction rights on another part of the site.

This is a mandatory condition is clear on its face. The Site Certificate includes the full language of condition as CON-GS-02 since it is mandatory, however, in the Final Order they changed the language to say “Modifications Proposed to the OAR 345-025-0006(5) mandatory condition language are as follows “The certificate holder may begin construction as defined in OAR 345-001-0010, or create a clearing on any part of the site if the certificate holder has construction rights on that part of the site even if a change in the planned route of transmission line occurs during the certificate holder's negotiations to acquire construction rights on another part of the site. For purposes of this rule, “construction rights” means the legal right to engage in construction activities..” This change was made in a **FOOTNOTE** in the Final Order after review of the Proposed Order. I find no discussion or approval of this change in the Mandatory procedures for approval of a Site Certificate. There has been no rule revision adopted under ORS 183.355 (ORS 469.503)(ORS 469.504), no notice to the public regarding the fact that the Council intended to overrule a site certificate condition. Under OAR 345-025-0006(5)(a) it is required that the certificate holder must establish that they would construct the portion of the line even if the route of the remaining line did not obtain construction rights. This change is not based upon a lack of clarity in the existing rule. It is made in reference to this one development, and it was not included in the department report to the council regarding significant changes in

the Final Order. The department and council lack the authority to (a) add what is not there or remove what is there or (b) Reinterpret the application of their rules to change the requirements where the plain language of the rule is clear, as it is in this case. The US Superior Court severely limited the ability of an agency to interpret their rules in (Keiser v Wilke 588 US__Q019 Kiser US Supreme Court) requiring the following: (a) The rule must not be clear on it's face; (b) the change must be the official stance of the person(s) in agency who are authorized to make the change (c) the change cannot be a “surprise” to those impacted; (d) Also, (Marbet v. Portland General Electric, 277 Or 447, 561 P2d 154 (1977) The fact that this major change in a mandatory rule was made in a Footnote leaves the change suspect to having been made with the hope that it would not be noticed by those with appeal rights on issues which it directly impacts such as my contested case regarding Oregon Trail Resource scenic impacts.This document addresses appeals regarding three issues before the court. Each is presented in a separate section of this document with one table of references since many of the statutes and rules apply to more than one issue. The basis for the appeal is included after the Issue Statement.

STATEMENT OF THE SECOND CONTESTED CASE ISSUE

RFA-1: Whether the \$1 bond amount adequately protects the public from Idaho Power Co.'s facility abandonment and provides a basis for the estimated useful life of the transmission line.

INTRODUCTION

This appeal is regarding the fact that the Council failed to follow the plain language of OAR 345-022-0050(2) and the statutory context in allowing the Bond amount to be less than the \$140,779,000 they determined it would require to restore the facility to a useful, nonhazardous condition (September 27, 2022, Final Order on the ASC for the Boardman to Hemingway Transmission Line, Pg. 332, Ln. 20-24). According to the Law Insider, Restoration Bond means a performance Bond; a letter of credit or cash deposit posted to ensure the availability of sufficient funds to assure that right-of-way excavation and restoration work is completed in both a timely and quality manner. It is not a bond of \$1.00 to restore a project site that it has been determined will cost \$140,779,000. This reduction transfers the risk and responsibilities to the utility users and citizens of Oregon to assume the costs the bond is intended to protect them from.

Rules related to the above issue:

ORS 469.401 , ORS 469.501 and OAR 345-022-0050(1).

“Before beginning construction of the facility, the certificate holder shall submit to the State of Oregon, through the Council, a bond or letter of credit in a form and satisfactory amount to the Council to restore the site to a useful, non-hazardous

condition. The certificate holder shall maintain a bond or letter of credit in effect at all times until the facility has been restored. The Council may specify different amounts for the bond or letter of credit.”

Sarah Esterson provided memo to council dated Sept. 10, 2021, Agenda D of September 24, 2021, Page 5 council meeting providing three reasons for bond adjustments. They include (1) Inflation adjustment to present value when construction, starts (2) annual inflation adjustment (3) adjustment due to final number of facility componenets. Page 6 discusses request for reduction to \$1.00 bond and council decision this should be handled through rulemaking. The plain language of OAR 345-025-006(8) states that the bond or letter of credit must be provided prior to the need for site restoration. The amount must be consistent with Council's determination regarding the amount required to “restore the site to a useful, non-hazardous condition” OAR 345-025-006(8). The plain language of the rule, as well as the statutory context provided in OAR 345-027-0110 stating the council can draw on the bond to restore the site (September 27, 2022, Final Order on the ASC for the Boardman to Hemingway Transmission Line, Pg. 329, Ln. 20-24) do not leave the rule subject to interpretation ORS 174.010.

THE RULES DO NOT:

ERROR ONE—Council applied discretion to allow a \$1.00 bond amount.

1. Provide for discretion on the part of the council beyond determining the amount that would be required to restore the site OAR 34522-0000(2) and (3)(c). The

arguments that the amount should be “fair”, should be based upon the level or risk, or concerns regarding the cost to the developer to provide the bond are not relevant to Council decisions regarding compliance with this rule. (EFSC Transcript Jan. 23-24 Meeting Minutes, Page 10, 2nd to last paragraph) These items would only apply if the Council were applying a “Balancing Determination” which is not allowed for this standard OAR 345-022-0000(2) and (3)(c).

ERROR TWO –Bond amount is not dependent on amount of risk.

Rule does not Provide any language that would indicate council should adjust the bond amount based upon the likelihood that Idaho Power will default on their commitment to restore the site to a useful non-hazardous condition.

THE RULES DO:

ERROR THREE-Site Certificate fails to mitigate risk to state and citizens if developer fails to restore site“

Provide a site restoration remedy to protect the state of Oregon and its citizens if the certificate holder fails to perform its obligation to restore the site or abandons the proposed facility. The site certificate fails to provide this. (September 27, 2022, Final Order on the ASC for the Boardman to Hemingway Transmission Line, Pg. 329, Ln. 20-24). In ODOE's presentation to Council in support of department recommendation to accept as little as a \$1.00 bond, it was stated that since Idaho

Power is a regulated facility, the Public Utility Commission can do recovery from customers provides documentation that the Site Certificate provides for recovery from the citizens the rules are to protect from that. (Transcript of EFSC Thurs. Jan. 23, 2022 meeting, Page 10, Paragraph before last & Page 11, 2nd paragraph) Page 11, 2nd Paragraph, Commissioner Winters questioned that PUC would approve money from ratepayers.

ERROR FOUR-Fails to protect public from existing risk that developer will not restore site.

Protect the public from risks that exists if the developer fails to restore the site.

The file contains a preponderance of evidence that a risk does exist.

- a) Council member Winters summed up why council should not make the adjustments being objected to. She said:” Of course the entities are going to give good reports, they aren’t going to say they will be going under in 3 years, Reality is, it’s going to happen a couple years after they come in. It is a risk”. (Transcript EFSC Jan 23 and 24, 2020, Page 12, last 2 paragraphs.)
- b) The Public Utilities Commission staff report Docket No. LC 74, March 5, 2021, for the 2019 Integrated Resource Plan lists multiple questions and information that make the long-term need for this transmission line less than certain (Exhibit 9, Pg. 2 and 4).

- c) The company has provided a two-page list of factors that could impact “financial performance, cash flows, capital expenditures, dividends, plans for future operations, etc.” in their 2020 10K and 10Q reports to the Securities and Exchange Commission (Exhibit 12, Pg. 19-21).

SUMMARY AND CONCLUSION

- **ERROR FIVE: The Council failed to comply with the rules or use reasonable judgment in determining the time frames and amount of bond** (Footnote 339, Pg. 337 of Final Order on the ASC for the Boardman to Hemingway Transmission Line, September 7, 2022).
- **ERROR SIX: The bond amount is not adequate to protect the public from the risk of having to restore the site.** The department and council established \$140,779,000 as the amount required to restore the site. The \$1.00 bond amount, or other figures less than the amount, determined to be necessary based upon the amount of the facility developed would not provide funding adequate to restore the site.
- Council's actions are not consistent with recommendations and actions on other site certificates based upon their consultant's evaluation of reduced bond amounts. November 2019, ODOE Consultants Golder & Associates provided a report addressing bond reductions. In the Site Certificate for this Bakeoven Energy Development, Council made the following statements: “the variation in

proposal to meet the standard, from the historically accepted full bond or letter of credit amount necessary for facility decommissioning, would be more appropriately evaluated through rule making,” ... “rather than relying solely on information provided by the applicant in favor of the proposal” (Exhibit 7 Bakeoven Solar Project-Final Order on Application for Site Certificate, Pg. 139, Ln. 19-26) “While the probabilities for the applicant to become insolvent and declare bankruptcy (ie., no new investors step forward) are likely to be small, they are not zero”. “Council will not consider a phased decommissioning surety as sufficient for meeting the Council's standard.” (Bakeoven Solar Project-Final Order on Application for Site Certificate, Pg. 141, Ln. 9-31).

Retirement and Financial Assurance Conditions 4 and 5 (B2H PO Attach/Draft S.C. Pg. 25-30) fail comply with OAR 345-022-0050 due to the following:

1. Any application of the rule must include the entire language of the rule and related rules.
2. The rules regarding the bond are clear on their face precluding the Council applying them differently for this development *Gonzales v. Oregon* only supports an agency interpretation of their own rules when they are ambiguous *Auer v. Rosbbins*, 519 U.S. 452, 461,117 S. Ct. 905, 137 L Ed. 2d. 79 (1997).
3. A reduced bond amount will place the public agencies and citizens at financial risk and move responsibility for costs from the developer to the public for

unplanned future events (September 27, 2022, Final Order on the ASC for the Boardman to Hemingway Transmission Line, Pg. 333, Ln. 34-35).

4. Reducing the bond amount is not consistent with past practices (August 13, 2021, Exhibit 1, Pg. 2, Table 1 of Christopher M. Clark's memo to council for Agenda Item G).
5. An evaluation of the risk of unplanned events is not relevant beyond determining that a risk exists.

REQUESTED ACTION:

Remand the Order and require that once operation begins and for the life of the project, the bond amount be consistent with the amount the Counsel determined would be required to restore the site.

**APPEAL OF SUMMARY DETERMINING REGARDING FOREST
DEFINITION**

Ms. Irene Gilbert, Pro-Se Petitioner, requests that the Oregon Supreme Court reverse the Summary Determination denying a contested case on Issue **LU-5** “Whether calculation of forest lands must be based on soil class or whether it is sufficient to consider acreage where forest is predominant use.” and allow a Contested Case regarding this issue.

Ms. Gilbert raises four issues identified as material to the Ruling on Motion for

Summary Determination which she has stated disagreement with demonstrating that there is disagreement regarding the facts and analysis contained in the Contested Case Decision. Each error is material to the Council decision and must be reviewed to “determine whether any genuine issue of material fact exists and whether defendant is entitled to judgment as a matter of law.” (*Herman v. Valley Ins. Co.*, 145 Or App 124, 127-28 928 P2d 985 (1996) and whether the evidence and inferences were viewed in a manor favoring the non-moving party. (*Moore v. Mutual of Enumclaw Ins. Co.*, 317 Or 235, 237. 855 P2d 626. (1993).

Errors in Stating there was no disagreement with the following:

Exception #1: The ALJ erred in finding that it is undisputed in that Union County, the Timber/Grazing Zone includes farmland, range land and forest land. (Proposed Contested Case Order, Findings, Pg. 65, Item 90).

I fully disagree that the factual issue is undisputed regarding the use of the Union County Zoning, Petitioning and Subdivision Ordinance.

No NRCS ratings identified for the areas and soils identified as Agricultural or Range in the Table 1 used in identifying “Forest Land” in the combined zones or 18 parcels adjoining National Forest Land. (**REFERENCE**) It is undetermined whether these soils, which compose 53% of the Preferred Route and 60% of the alternate route, are Forest Land. (Proposed Contested Case Order, Page 66, Item 94). In Scott Hartell's sworn responses to Discovery, he was asked whether he used

anything other than the 1993 document and that he had not gone to other information. The lowest soil capacity was 63 on this document. When asked what he was calling forest land in the chart he responded, “What the chart indicates.” Asked if that is the only thing, he responded “Correct”. Miss Pease identified the document as the pilot program soil rating for Union County dated March 16, 1993. Mr. Hartell stated that for land not identified as forest land, he did not figure cubic feet per acre (Transcript of Scott Hartell's deposition. Pg. 12-19 and 21-22).

(UCZPSO) Article – 5.00 A-4 Timber-Grazing Zone, Section 5.01 states “The purpose of the Timber-Grazing Zone (A-4) is to **protect and maintain forest lands** for agriculture, grazing, and forest use, consistent with existing and future needs for agricultural and forest products”. This purpose statement provides documentation indicating that all the land in the A-4 zone may be “Forest Land”.

Exception #2: The Contested Case Order erred in finding Item 92 is undisputed. The finding states that Idaho Power used data from the National Resources Conservation Service Soil Survey Geographic Database (SSURGO), Union County tax lot data, and GIS mapping software to determine predominant use on each hybrid-zoned parcel.

I fully disagree that this factual statement is not disputed. The file contains a preponderance of evidence that no NRCS ratings were determined for any of the areas identified as Agricultural or Range in the combined zones or for the 18

parcels adjacent to National Forest Land. (See Finding 94, Pg. 66). Scott Hartell's sworn statement (page 82) states the chart he used indicated only land with 63 cubic feet per acre or greater was considered "forest land". Pg. 22 of Mr. Hartell's deposition states in response to my question regarding whether he figured out cubic feet per acre of productivity for all soils in the chart was, "No, I did not".

(Potts v. Clackamas Co.)

Exception #3: The Contested Case Order erred in finding Item 95 is undisputed. These finding states that Idaho Power Explained that the "economic impact to forest sector jobs in Union County is approximately \$97,000 which will be partially offset by agricultural, or range land uses after conversion.

I fully disagree that this factual statement is not disputed. I provided argument that the above amount was understating the value of forest land based upon the statute requiring compensation in the event of condemnation of forest land. The correct calculation just for the lost forest growth over the life of the project is included in the Site Certificate.

Exception #4: The Contested Case Order erred in finding Item 96 is undisputed. These finding states that the Project will not cause (1.) a substantial change in accepted forest or farm practices, or (2.) a significant increase in the cost of accepted forest or farm practices on either land to be directly impacted by the project or on surrounding lands devoted to farm or forest use.

This Item is in dispute. The contested case file contains a great deal of testimony and exhibits regarding the increased costs because of the lack of a weed control program that will preclude weeds spreading to adjacent farm and forest lands, the costs associated with being unable to do aerial spraying around the transmission line, etc.

The file and I personally provided a preponderance of evidence that the above items are in dispute. Since the hearings officer raised these issues of material fact and I have documented that they are disputed, the granting of the Summary Determination removing this issue from the contested case is incorrect.

There are multiple additional factual and legal areas of disagreement which are included in the contested case file, but which were not included in the Proposed Order granting Summary Determinations on five issues for which a summary determination was requested and granted. I have provided a preponderance of evidence supporting the fact that the SD on just one of my cases was based upon an incorrect application of the law and rules governing this action. Due to the strict limits on the number of pages that are allowed in this appeal, I am only able to argue one of the Summary Determination Cases. I strongly believe that most, if not all the other 32 issues disposed of in similar manner were based upon an incorrect application of the rules.

Additional issues which are reflected in this Contested Case denial:

- The Contested Case issue was restated in a manner that inappropriate limited the scope of the case.
- Council lacks the authority to interpret rules of another agency, however, they interpreted Goal 4 requirements without contacting LCDC to establish how they were supposed to be applied.
- The Summary Determination Order did not include factual disagreements which had been presented.
- **I was denied the use of Exhibits provided in the record for this contested case to support arguments on other related cases based upon a “Proposed” Summary Determination on this issue. (Pg. 1, ¶ 1-3)**
- The Department failed to require the use of the mandatory alternate methods for identification of forest land where SSURGO data was unavailable
- The file contains no documentation or any statement indicating that ODOE contacted LCDC to obtain an interpretation of how the Goal 4 decisions are to be applied as required by statute.
- ORS 469.504 and OAR 345-021-0050 and the Second Project Order require the

Energy Facility Siting Council to determine that:

The facility complies with applicable substantive criteria from the affected local government’s acknowledged comprehensive plan and land use

regulations that are required by the statewide planning goals and in effect on the date the application is submitted. State law regarding the identification of forest land for Goal 4 included the requirement that all land in the combined zones have a determination regarding soil capacity to produce timber. When rules are not amended within one year with the new material, they must apply the state law to their decisions ORS 197.646(1) and (3) ORS 197.250.

Appeals court decision in *Wetherell v. Douglas County*, 50 Or LUBA_167(2005) determined that soils with potential to produce between 17 and 76 cubic feet per acre per year in wood fiber are considered moderately productive Forest Lands. The Union County Planning Ordinance does not comply with the following requirements for determining Goal 4 forest land:

- Forest land definition depends upon the property's capacity for production of commercial tree species (*Potts v. Clackamas County* 42 Or LUBA).
- The set of prioritized, mandatory methods to determine areas in the combined Agricultural/Timber zone subject to Goal 4 must be used and **it cannot be** determined that land is not forest land by using a different methodology (*Rogue Advocates v. Josephine County*, 66, Or LUBA 45 (2012)).
- A county cannot determine land is not forest land simply because it is not predominantly forested *Cattoche v. Lane Co.* 79 Or LUBA 466 (2019).

Hartell's chart, which he refers to as Exhibit 1, identifies 16 soil types as “Forest Land” and they include none with a cubic foot capacity per acre per year rating less than 63. There are 66 soil types with no cubic foot rating that are designated as “crop” or “range” that are being treated as “agricultural” land in the Grazing/Timber zone.

Allowing a developer to avoid complying with land use laws denies forest landowners and the public the Goal 4 protections which do not exist for Agricultural land such as the requirement to compensate for habitat damages.

An even greater concern, and the reason I chose this Summary Determination to appeal, is the fact that allowing a County Ordinance to waive State Land Use Laws means that State Land Use Statutes become meaningless. Any county could overrule them.

I believe the above arguments and documentation provided you show that there is a need to reconsider all Summary Determinations. Denying contested cases for many different people regarding many different standards should be remanded. I am asking that the Summary Determination decisions be remanded back to Council to evaluate whether there were factual areas of disagreement in some of the 33 contested cases denied through this process. **To accept this outcome, you must believe that there was no disagreement regarding the facts of any of the cases where Summary Determinations were requested and given and that none of**

the individuals and groups would have prevailed in litigation regarding the issue.

I am requesting, based upon the results before you, that this case as well as all the cases dismissed through Summary Determination be remanded back to the Energy Facility Siting Council requiring a reassessment of whether the Summary Determination decisions were consistent with the Rules and Statutes.

Dated: December 21, 2022.

By:

Irene Gilbert, *Petitioner, Pro Se*
Representing Public and Personal Interest
310 Adams Avenue
La Grande, Oregon 97850

CERTIFICATE OF FILING

I hereby certify that on this date I filed this Request for Amended Appellant Brief with the Appellate Court Administrator by Regular Mailing pursuant to ORAP 9.05(3).

DATED: December 21, 2022.

Irene Gilbert, *Petitioner, Pro Se*
Representing Public and Personal Interest
310 Adams Avenue
La Grande, Oregon 97850

AMENDED APPELLANT'S BRIEF

CERTIFICATE OF SERVICE

I further certify that I have this date served a copy of this Amended Appellant Brief on each party in this case by U.S. Postal Service, Certified Mail.

DATED December 21, 2022.

Irene Gilbert, *Petitioner, Pro Se*
Representing Public and Personal Interest
310 Adams Avenue
La Grande, Oregon 97850

Denise G. Fjordbeck, OSB No. 822578
Patty Rincon, OSB No. 162336
Jordan Silk, OSB No. 105031
Oregon Department of Justice
1162 Court Street NE
Salem, OR 97301
Telephone: 503-378-6002
denise.fjordbeck@doj.state.or.us
patty.rincon@doj.state.or.us
jordan.r.silk@doj.state.or.us

Attorneys for Respondents Oregon Department of Energy and Energy Facility
Siting Council

Lisa Rackner, OSB No. 873844
Jocelyn C. Pease, OSB NO 102065
McDowell Rackner & Gibson PC
419 SW 11th Avenue, Suite 400
Portland, OR 97205
Telephone: 503-595-3925
lisa@mrg-law.com
jocelyn@mrg-law.com

AMENDED APPELLANT'S BRIEF

Sara Kobak, OSB No. 023495
Andrew J. Lee, OSB No. 023646
Schwabe, Williamson & Wyatt, P.C.
1211 SW 5th Aven., Suite 1900
Portland, OR 97204
Telephone: 503-222-9981

Attorneys for Respondent/Applicant Idaho Power Company

Karl G. Anuta, OSB No. 861423
Law Office of Karl G. Anuta, PC
735 SW First Avenue, 2nd Floor
Portland, OR 97204
Telephone: 503-827-0320
kga@integra.net

Mike Sargetakis, OSB No. 174607
Law Office of Mike Sargetakis, LLC
735 SW First Avenue, 2nd Floor
Portland, OR 97204
Telephone: 971-808-1495
mike@sargetakis.com

AMENDED APPELLANT'S BRIEF

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BEFORE THE OFFICE OF ADMINISTRATIVE HEARINGS
STATE OF OREGON
for the
OREGON DEPARTMENT OF ENERGY

IN THE MATTER OF:)
)
THE APPLICATION FOR SITE) OAH CASE NO.
CERTIFICATE FOR THE BOARDMAN) 2019-ABC-02833
TO HEMINGWAY TRANSMISSION LINE.)

DEPOSITION OF SCOTT HARTELL

Taken in Behalf of the Petitioners

June 10, 2021
La Grande, Oregon

KATIE BRADFORD, CSR 90-0148
Court Reporter
katokatie@aol.com
(503) 267-5112

Proceedings recorded by digital audio recording;
transcript provided by Certified Shorthand Reporter.

1 BE IT REMEMBERED THAT, pursuant to the
2 Oregon Rules of Civil Procedure, the deposition of
3 SCOTT HARTELL was taken in behalf of the Petitioners
4 and recorded on Thursday, the 10th day of June, 2021,
5 commencing at the hour of 10:00 a.m., at
6 location 1112 1/2 Adams Avenue, La Grande, Oregon.

7 * * *

8
9 APPEARANCES

10 Charles H. Gillis, Attorney at Law,
11 Appearing on behalf of ODOE by Zoom;

12 Patrick G. Rowe, Assistant Attorney General,
13 Appearing on behalf Oregon Department of Energy.

14 Jocelyn Pease, Attorney at Law,
15 Appearing on behalf of Idaho Power Company.

16 ALSO PRESENT

17 Barbara Teresa Peden, Notary Public;
18 Kathryn Andrew and Irene Gilbert, Pro Se
19 Petitioners; Scott Hartell, Union County
20 Planner; Wyatt S. Baum, Union County Counsel;
21 Joe Stipple, Idaho Power (by Zoom); Sara
22 Esterson, ODOE.

23 * * *

24
25

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* * *

OBJECTIONS

Listed in Keyword Index under "object" and "objection."

* * *

EXHIBIT INDEX

<u>Number</u>	<u>Description</u>	<u>Identified</u>
Exhibit 1	(pilot program soil rating for Union County)	43
Exhibit 2	(Union County Comprehensive Plan, April 1978)	43
Exhibit 3	(Union County zoning petitioning and subdividing rules)	43

* * *

Deposition of Scott Hartell

1 (Thursday, June 10, 2021, 10:00 a.m.)

2 SCOTT HARTELL

3 Was thereupon called for a deposition on behalf of
4 Petitioners; and, having been first duly sworn by a
5 Notary Public, was examined and testified as follows:

6 MS. PEDEN: Okay. I'll have you just go
7 ahead and sign again right there.

8 MR. GILLIS: All right. We'll turn it
9 over to Ms. Kathryn Andrew.

10 MS. ANDREW: Thank you for coming today,
11 Mr. Hartell and Mr. Baum. Please -- could you please
12 state and spell your name.

13 THE WITNESS: Scott Hartell,
14 H-a-r-t-e-l-l.

15 EXAMINATION

16 BY MS. ANDREW:

17 Q Could you please state your place of
18 employment and explain your job description.

19 A I work for Union County. I'm the Union
20 County planning director and I administer the Oregon
21 statewide planning program for the County of Union.

22 Q Have you ever been convicted of a crime
23 involving perjury or fraud?

24 A No.

25 Q All right. I'll start with the questions.

Deposition of Scott Hartell

1 My first question to you was, please detail the
2 method you used to determine acreage of forest land
3 for Idaho Power's report to ODOD regarding the V2H
4 transmission line. Your response -- do I just read
5 his response so that I can follow up?

6 MR. GILLIS: It's your question.

7 BY MS. ANDREW:

8 Q You stated you did not determine the
9 acreage of forest land for Idaho Power's report to
10 ODOD regarding the V2H transmission line. I would
11 ask, therefore, a follow-up question of -- I ask you
12 to please describe specifically what your role was in
13 Idaho Power's determination in the acreage of forest
14 land in Union County.

15 A So my -- my determination with this
16 application was based on parcel. So if a parcel --
17 in doing a predominance analysis to figure out, one,
18 whether we're going to apply a forest rule or if
19 we're going to apply a farm rule, I look at
20 individual parcels that were being impacted by the
21 proposed route at the time and figure out if 51
22 percent of that property is predominantly range or
23 timberland.

24 Q All right. And can you tell me -- okay.
25 We'll just -- okay. Thank you.

Deposition of Scott Hartell

1 So you -- your role was to -- you didn't
2 perform the actual calculation, but you told them
3 how, according to parcels and percentage on the
4 parcel?

5 A We -- we communicated back and forth with
6 Idaho Power's consultant through GIS, their -- they
7 had a GIS consulting firm working with them. I
8 consulted with them on how I performed that analysis
9 and we -- we both effectively looked at the same
10 materials and -- and came up with the same
11 conclusions.

12 Q Okay. So -- and you have parceled land and
13 you looked at it on -- with the GIS. And you gave
14 the amount of 51 percent. Was that, what, something
15 that looked like trees or --

16 A No. Those were all based on USDA soils
17 information for the county.

18 Q Okay. And was that this chart you gave us,
19 pilot program?

20 A It has a lot to do with it, yes.

21 Q Was there any other information on soils
22 that you used?

23 A No.

24 Q So this chart has a lot of missing
25 information, you know, like, there's even things that

Deposition of Scott Hartell

1 are ticked as forest, but there's no cubic feet per
2 -- per acre on it.

3 MR. GILLIS: Ms. Andrew --

4 MS. PEASE: Objection. Question --

5 MR. GILLIS: -- would you

6 (indiscernible) --

7 MS. PEASE: Objection. Question lacks
8 foundation.

9 MR. GILLIS: (Indiscernible) as good as
10 you can.

11 BY MS. ANDREW:

12 Q Okay. I can show an example.

13 Okay. So here on the third page of it, the
14 soil called OLOT stony silt loam, it's got an X in
15 forest, but there's no cubic feet per acre.

16 A You said that was on Page 3?

17 Q I think so. It's Page 2 of the one I have.
18 It's called OLOT stony silt loam.

19 A The map symbol 44C?

20 Q 45F.

21 A 45F.

22 Q It's got a tick in forest, but there's no
23 cubic feet per acre.

24 A Okay. I don't have a response to that. I
25 would have to go back to the USDA soils information

Deposition of Scott Hartell

1 and find out where -- if there's an error that
2 occurred with this on the rating, whether it's crop,
3 forest or range or if we just did not include the
4 cubic feet per acre.

5 Q So when you did it, did you -- did you use
6 the ones that had a cubic feet per acre or did you
7 use the ones that were ticked as forest?

8 A When I did the analysis?

9 Q Yeah.

10 A When I did the analysis, I -- I conducted
11 that on a GIS software platform.

12 Q Mm-hmm.

13 A I overlaid the USDA soils information on
14 the parcels and through that, it was able to
15 calculate the amount of acreage of each soil type on
16 the properties.

17 Q Okay. But this is what you used? This is
18 what you input to the GIS?

19 A Correct.

20 Q Okay. And so I'm -- I -- I guess my
21 concern is that there are things -- I would like to
22 know if you inputted soils that had
23 cubic-feet-per-acre ratings or if you inputted soils
24 that were forest and range or what exactly you
25 inputted from this chart.

Deposition of Scott Hartell

1 A I inputted the whole chart.

2 Q But it -- it -- it doesn't have -- okay.
3 So were you counting forest land as soils that had
4 cubic-feet-per-acre listings?

5 A Based on that chart, I took that chart and
6 created a database in an Excel file that could be
7 used and was compatible with the GIS software.

8 Q I guess my question is: What were you
9 calling forest land in this chart?

10 A What that chart indicates.

11 Q Well -- okay. So the column that says
12 "forest"?

13 A Correct.

14 Q And that's the only thing?

15 A Correct.

16 Q Okay. All right. This is good. So did
17 you check or give feedback regarding forest land
18 acreage determinations made by Idaho Power? After
19 they were done, did you check what they did?

20 A I did, correct.

21 Q Okay. So you were -- it sounds like you
22 were relying on information from parcels and then you
23 were trying to integrate this soil stuff into that.

24 A Correct. We have to know what properties
25 the impact of the proposed application was going to

Deposition of Scott Hartell

1 be on in order to do a predominance test to
2 determine --

3 Q Okay.

4 A -- the soil type of the parcel and whether
5 we would apply forest standards or farm standards.

6 Q Okay. All right. So in the -- my second
7 question, I asked to please identify the specific
8 criteria that needed to be met for land to be
9 designated as forest land. And you responded that
10 that could be found in Oregon Administrative Rule
11 660-006-0010.

12 My follow-up question to that is: Can you
13 show me where in this rule any method -- method
14 utilized in predominant use is advised? I do have a
15 method here. (Indiscernible).

16 A Yeah. I -- I cannot show you in that rule
17 or that -- where that would be located in that rule.

18 Q Okay. So I have a question about aerial
19 photographs because that was -- that was in the PO.
20 Did you use aerial photographs to determine if
21 51 percent of the land -- how did you determine --
22 okay. You used soils. Okay. Did you use aerial
23 photographs at all?

24 A Yes.

25 Q Can you explain to me how you used aerial

Deposition of Scott Hartell

1 photographs?

2 A Outside of what the USDA has mapped for
3 soil identification in the northern part of Union
4 County, northwest side of it, there is no soils
5 information basically going into the Forest Service
6 ownership of the plans.

7 And so I used the aerial photo in those
8 areas to get a basis of what the soil type most
9 likely would be and whether we would be applying
10 forest or farmland rule standards.

11 Q Okay. So that was, basically, in -- in
12 designated government forest land that you did that?

13 A It was anything outside -- anything that
14 was impacted by the proposed Idaho Power route that
15 was outside of what has been delineated as soil types
16 by the USDA.

17 Q I'm a little confused by that 'cause
18 there's a whole book and everything's been -- you
19 know, I didn't bring that book; but, you know,
20 there's that old book and all soils have been
21 identified in that book.

22 A Well, on state-owned and privately held
23 lands, but not on public lands.

24 Q Okay. So on public lands, that's -- you
25 used aerial photographs?

Deposition of Scott Hartell

1 A Correct.

2 Q And is there anywhere in the rule where --
3 any of those methods where aerial photographs are
4 advised to be used?

5 A I don't know if the correct term would be
6 "advised;" but, yes, aerial photos -- photographs can
7 be used.

8 Q And where does it say --

9 A (Indiscernible) 4, I think it is, for
10 forest lands.

11 Q Can you tell me where in the rule it says
12 that?

13 A I'm not sure that I can, but I'll look
14 here. No, I can't tell you that today or at this
15 time.

16 Q So when I looked at this chart, there was a
17 lot of cubic feet. So when you used soil, did you
18 use (indiscernible) chart for cubic feet?

19 A Yes.

20 Q So, as I said before, there's a lot of
21 missing data in here for cubic feet. You know,
22 everything's ticked somewhere, but there's not a lot
23 of data for cubic feet. And the lowest any of them
24 goes is 63.

25 So I'm wondering if you are aware of any

Deposition of Scott Hartell

1 other resource for data for soil types in areas that
2 are categorized as timber grazing or timber grazing
3 agriculture and Union County's UCZPSO or classified
4 as crop forest and range in this. Is this all you're
5 aware of for cubic feet per acre?

6 A Working from 1993 when that soils pilot
7 program was -- went through and we adopted it and the
8 LCD signed off on it, going forward, we haven't had
9 any opportunity for planned amendments to the A-4
10 timber-grazing zone or the comprehensive land-use
11 plan that would require us to go back and look at the
12 newer information. So I'm aware there is information
13 out there --

14 Q Well --

15 A -- that is probably newer.

16 Q Okay.

17 A But until a planned amendment application
18 is presented to the County for review, I do not have
19 to go back to that information.

20 Q Can you tell me what -- what else that
21 you're aware of is out there?

22 A There's all kinds of things through the
23 Oregon Department of Forestry, land-use notes;
24 suggestions for land use, you know, compatibility
25 with forested areas. There's surveys of different

Deposition of Scott Hartell

1 timber and -- and whatnot through the Oregon
2 Department of Forestry that's available.

3 Q And -- and did those have
4 cubic-feet-per-acre information on them?

5 A Since I've never reviewed a plan amendment
6 application, I have no idea because I've never been
7 required to go and -- and study and analyze those
8 document.

9 Q Okey-doke. Thank you.

10 MR. ROWE: This is Patrick Rowe with the
11 DOJ. The chart, Ms. Andrew, that you've been
12 referring to, has that been provided? I -- I haven't
13 seen that.

14 MS. ANDREW: He gave it to Irene.

15 MS. PEASE: I think it went to everyone,
16 didn't it?

17 MR. ROWE: You know when that was
18 circulated?

19 MS. PEASE: It was, I think, before the
20 previously scheduled deposition. I -- I do have a
21 copy of that. And if we can maybe take a -- take a
22 little break, I can forward that to Patrick, so he
23 has that as well. Would that be acceptable?

24 MS. ANDREW: I think it would --

25 MR. ROWE: Yeah, that -- that would be

Deposition of Scott Hartell

1 helpful. And then, of course, we'd also ask that it
2 be attached as an exhibit to the transcript.

3 MS. ANDREW: Certainly, yes.

4 BY MS. ANDREW:

5 Q Okay. So did you use the Union County
6 (indiscernible) --

7 MS. PEASE: Can I --

8 MS. ANDREW: Oh, sorry.

9 MS. PEASE: Can I -- I was asking for a
10 break, so that I could --

11 MS. ANDREW: Oh, okay.

12 MS. PEASE: -- share the relevant
13 documents with Patrick Rowe. So could we take maybe
14 five minutes and resume --

15 MR. ROWE: Yes, that's --

16 MS. PEASE: -- at 10 -- 10:25?

17 MR. ROWE: Absolutely.

18 THE DEPONENT: Thank you.

19 MR. ROWE: Five minutes.

20 (Six-minute break taken.)

21 MR. GILLIS: So we'll resume the
22 deposition.

23 MS. PEASE: I just want to say, I --
24 that's my understanding, too, Patrick, that the
25 document that we're talking about is the pilot

Deposition of Scott Hartell

1 program soil readings for Union County dated March
2 16th, 1993 that was included in the Word document
3 that Irene had distributed on May 9th.

4 MR. ROWE: Great, thank you.

5 MS. ANDREW: I'm showing all the pages.

6 MS. PEASE: And as a -- as a point of
7 clarification, Ms. Andrew, that -- that's the only
8 chart that you're referring to; is that correct?

9 MS. ANDREW: Well, that's the only chart
10 we got.

11 MS. PEASE: Okay.

12 BY MS. ANDREW:

13 Q So, I'm sorry, I'm still -- I got a little
14 confused. If you could just, again, state what did
15 land have to be on here to be counted as forest land?

16 A The 51 percent or greater of the acreage of
17 soils comprised in the parcel that I was reviewing
18 would have had to have been listed under the forest
19 land column on that chart.

20 Q Okay. So you took stuff out of here that
21 was ticked in forest and that's what you used?

22 A I used all three columns: Forest, range
23 and crop. And then calculated the amount of acres on
24 each parcel to figure out if it was predominantly
25 forested, range or cropland.

Deposition of Scott Hartell

1 Q But forest was just forest, it wasn't
2 range.

3 A So if the soil indicates that it's forest,
4 then I use the forest.

5 Q Okay.

6 A I put that amount of acreage in the forest
7 column.

8 Q Just forest, though. You didn't count
9 anything that said range?

10 A No, that's incorrect. You misunderstood
11 what I just said. When I look at the property as a
12 whole, I've got a jumble, let's say, 20 or 30
13 different soil types that are on that property. I
14 calculate each of those soil types based on what they
15 are represented on that chart, either crop, range or
16 forest.

17 Q Right. But for it to be called forest
18 land, it needed to be in the forest column, ticked in
19 the forest column?

20 A Correct.

21 Q Okay. Thank you.

22 So my next question is: Did you advise
23 Idaho Power to use the Union County Zoning Partition
24 and Subdivision Ordinance, UCZPSO, in the
25 determination of forest land? So it sounds like you

Deposition of Scott Hartell

1 used that to find the parcels. And how did you use
2 that document?

3 MR. BAUM: Just as a point of
4 clarification, I think we have various questions in
5 that question. So --

6 MS. ANDREW: Okay.

7 MR. BAUM: -- could you just restate it
8 and we'll do them one at a time and let Mr.
9 Hartell --

10 MS. ANDREW: Okay.

11 MR. BAUM: -- respond to each question
12 as we go.

13 BY MS. ANDREW:

14 Q Did you use the Union County Zoning
15 Partition and Subdivision Ordinance in your
16 determination of forest land?

17 A Yes, I did.

18 Q Okay. What sections did you use?

19 A I used Article 1 under "Definitions for
20 Predominance." And then I used the A-4
21 timber-grazing zone, which I believe is Article 5.

22 Q And can you tell me when these sections
23 were last updated?

24 A The definition sections in Article 1 were
25 probably last updated in 1995. The A-4

Deposition of Scott Hartell

1 timber-grazing zone, Article 5, would have been
2 updated, I believe it would have been right around
3 2015.

4 Q Okay. I think that covers everything that
5 I have for all of the questions. I mean, I could go
6 -- the last question, I asked about -- I asked, what
7 is the justification for using your criteria?

8 And you stated, "The Oregon statewide
9 planning goal for forest land sets out the process
10 for utilizing the criteria provided in the
11 situation." Could you tell me what specific part of
12 Oregon Statewide Planning Goal 4 you advised Idaho
13 Power to apply in this situation?

14 A So I did not advise them to use anything
15 directly outside of the Statewide Planning Goal 4 for
16 because that's a policy document. It would have been
17 out of the Zoning Ordinance or the Administrative
18 Rules, which are implementation sections of the
19 land-use regulations.

20 Q Is that the 660-006-0010 that you gave me
21 in the previous question?

22 A In -- in that whole chapter, correct.

23 MS. ANDREW: Okay. I think that's done.
24 Let's move on.

25 MR. GILLIS: The next person who will be

Deposition of Scott Hartell

1 asking questions is Ms. Irene Gilbert.

2 THE WITNESS: Good morning.

3 MS. GILBERT: And I'm assuming he's
4 still under oath when we change?

5 MR. GILLIS: I believe so, yes.

6 MS. GILBERT: All right.

7 EXAMINATION

8 BY MS. GILBERT:

9 Q And some of the responses that you gave for
10 Kathryn's questions also relate to mine, so I'll try
11 not to be too repetitive here.

12 But just so I can kind of confirm what I
13 heard so far, it was that what you used entirely in
14 terms of identification of forest land was that
15 document that you've provided where it lists some
16 different -- (indiscernible) that document. Pardon?

17 MR. BAUM: Can I just clarify for the
18 record, too, we'll refer to that document as
19 Exhibit 1.

20 MS. GILBERT: Okay. Exhibit 1.

21 Okay. In Exhibit 1 --

22 MS. PEASE: And can I -- can I stop for
23 a second? Ms. Gilbert, you're cutting in and out a
24 little bit. I think it might be the -- the movement.
25 If you can maybe just get settled and -- and then

Deposition of Scott Hartell

1 start.

2 MS. GILBERT: Okay.

3 BY MS. GILBERT:

4 Q On Exhibit 1, the only soils that you used
5 to identify forest land were the ones that are listed
6 on this Exhibit 1; is that correct? Those are the
7 soil -- only soils that you called forest land?

8 A Correct.

9 Q Okay. And as I look at this document, the
10 cubic feet per acre is -- the -- the -- the smallest
11 amount that I see is about 63. What is your
12 understanding of what constitutes forest land as far
13 as the cubic-feet-per-acre rating?

14 A I would have to go back and look at the
15 Administrative Rules to answer that question. I --
16 I, again, have not been through a plan amendment
17 application that required to do such, so I can't
18 provide you a sound answer to that question.

19 Q Okay. So my -- another question then would
20 be, were -- were there any soil classifications,
21 cubic feet per acre per year, done for the other --
22 the other topics that you have here, meaning the
23 grazing and also the farm -- crop, farms, whatever,
24 grazing sections.

25 What -- was a cubic-feet -- foot-per-acre

Deposition of Scott Hartell

1 evaluation done on all of the lands in these mixed
2 zones?

3 A For the determination of predominance on
4 the parcel, per-parcel basis, that that chart was
5 used. And so if the soils did not indicate it was a
6 forest soil, it wasn't identified as -- as forest, it
7 was identified as crop or range.

8 Q Okay. But what I -- what I believe I'm
9 hearing you say -- I just want to be clear -- is you
10 did not establish what the cubic feet per acre per
11 year was for any of these soils that you're listing
12 here under Exhibit 1 as either crop or rangeland. Is
13 that -- is that a correct statement?

14 A I guess I'm having confusion with the
15 question.

16 Q The -- the question is, really, when --

17 A If you're --

18 Q -- when you look at these -- at these
19 soils, the -- the bunch of soils listed here, did you
20 -- did you figure out what the cubic feet per acre,
21 the soil ability to produce trees, what -- what it
22 actually was for all of the soils that are listed on
23 this chart that are --

24 A No, I did not.

25 Q Okay. So -- and you are not real clear --

Deposition of Scott Hartell

1 you're not clear on what the -- the minimum soil
2 rating per acre is to be identified as forest land.
3 I believe I heard you say that, too. But the only
4 ones you used as forest land were the ones that are
5 listed here.

6 A Correct.

7 Q Okay. All right. The -- so your role was
8 primarily providing Idaho Power information for them
9 to do the analysis? Is that a correct statement?

10 A No.

11 Q Okay. So tell me exact -- again, what --
12 did you -- did you do this evaluation of -- of the
13 51 percent of land being forest or being range or
14 whatever it was, were you the one who did that?

15 A Yes.

16 Q Okay. Can you provide the document that
17 you provided to Idaho Power that gave them that
18 information? I think you said something about
19 there's an Excel spreadsheet.

20 A There's some GIS files that were shared
21 back and forth when we were doing this with Idaho
22 Power's consultant. There is an Excel file and I can
23 provide all of that information. But unless you have
24 GIS software, you're going to have a hard time
25 reading that information.

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1 Q All right. I'm just trying to figure out
2 how I could -- I -- I want access to the information.
3 Is there a way for me to have access to it as far as,
4 can it be printed? Is it -- is it volumes and
5 volumes to print?

6 A So -- so clarify what it is for me what
7 you're asking to receive.

8 Q I -- I would like to know what information
9 was provided about the soil classification, the soil
10 rating for everything in terms of soils that was --
11 were included in these different mixed zones. And
12 you have a couple of them in Union County.

13 I believe you have the -- the grazing
14 forest zone and you also have one that's called ag
15 forest grazing, which I was not aware of 'til last
16 night; but -- so, apparently, there are -- is that
17 correct, you have two different zones that Idaho
18 Power crosses that are mixed zones?

19 A Idaho Power's project crosses, I'm
20 thinking, five or six different zones. Four of those
21 are regulated by the County.

22 Q Okay. Did you give them any information or
23 did they ask for any information about this -- this
24 zone that's a three-way zone? It's an agricultural,
25 grazing, timber combo.

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1 And -- and where that came from, you see,
2 last night I was kind of going through this
3 information and I -- all of the sudden, I ran into
4 this -- these maps of -- from the State Comprehensive
5 Plan that shows some of the areas headed out towards
6 Ladd Marsh, it looks like, were -- were a -- a
7 three-way -- three-way -- let's see. Where -- where
8 did I see that? 'Cause I -- where did this come
9 from? There's an ag timber grazing zone.

10 A Which --

11 MS. PEASE: Objection.

12 THE DEPONENT: -- that --

13 MS. PEASE: Foundation.

14 MS. GILBERT: What -- pardon?

15 MS. PEASE: I said, "Objection.

16 Foundation," as to what --

17 MS. GILBERT: What --

18 MS. PEASE: -- what documents you're

19 talking about and --

20 MS. GILBERT: I'm -- I'm talking about

21 -- right now, what I'm talking about --

22 MR. BAUM: I join in that objection.

23 MS. GILBERT: Huh? Is -- is the Union

24 County Comprehensive Plan, which is located in Salem.

25 It's the one that was filed with -- with LCDC and it

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1 is dated April 1978. And it is the County plan that
2 typically is used to base the significant issues
3 comments on when -- when -- when counties are asked
4 to provide what their significant issues are.

5 I believe you asked for information
6 coming from the State Comprehensive Plan and I
7 believe -- Scott can correct me if I'm wrong here --
8 but I believe what he gave you was information from
9 the County zoning petitioning rules, the local rules.

10 MS. PEASE: Ms. Gilbert, we'd ask that
11 if there were any materials that you plan to refer to
12 in the deposition, that you share those with us, so
13 that we can be able to refer to them also during the
14 deposition and verify.

15 MR. GILLIS: Why don't we take a
16 five-minute break and --

17 MS. GILBERT: Let's take another break.

18 MS. PEASE: I would ask that we take a
19 break and --

20 MS. GILBERT: Yeah.

21 MR. BAUM: Ms. Gilbert, this -- that --
22 can I see the document?

23 MS. PEASE: Mr. Rowe, do you have a copy
24 of that that you can refer to easily?

25 (Whispered discussion, off the record.)

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1 MS. GILBERT: Okay. I guess the -- the
2 Union County state --

3 UNIDENTIFIED SPEAKER: We're on break
4 right now --

5 MS. GILBERT: Okay.

6 UNIDENTIFIED SPEAKER: -- so wait.

7 MS. GILBERT: Okay. I'm -- I'm --

8 MR. BAUM: The -- yeah. I think the
9 reason there's a break is so that if you have
10 documents that you've provided to those other
11 participants of the deposition.

12 MS. GILBERT: I don't know how to do
13 that. How do I --

14 UNIDENTIFIED SPEAKER: Do you know how
15 to send documents on Zoom?

16 MS. GILBERT: Yeah, but we have to have
17 them on the computer.

18 UNIDENTIFIED SPEAKER: Okay. So
19 (indiscernible) --

20 MS. GILBERT: And I don't have it
21 because you -- what you do is you go to -- you just
22 do a search on the Internet for Union County land-use
23 plan (indiscernible) --

24 UNIDENTIFIED SPEAKER: Well, that --
25 yeah.

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1 MS. GILBERT: That's -- this is the --

2 UNIDENTIFIED SPEAKER: That's in the
3 record.

4 MS. GILBERT: -- state plan.

5 UNIDENTIFIED SPEAKER: It's in the
6 record, I know. We have to get the -- the thing --

7 UNIDENTIFIED SPEAKER: The -- the best
8 -- the best you're going to be able to do --

9 MS. PEASE: I believe -- I believe it is
10 in the record. I just -- I need a -- a reference so
11 that I can --

12 MR. GILLIS: I understand.

13 MS. PEDEN: Mark it as Exhibit 2, say
14 what it is again and then we'll attach this to the
15 transcript.

16 MS. GILBERT: Okay. It should be in the
17 record because that's what they --

18 UNIDENTIFIED SPEAKER: It is.

19 UNIDENTIFIED SPEAKER: Yeah.

20 MS. GILBERT: I'd have to -- I haven't
21 been able to find things in the record, so --

22 UNIDENTIFIED SPEAKER: I know.

23 MS. GILBERT: -- that's why.

24 MS. PEDEN: So --

25 MR. GILLIS: All set?

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1 MS. PEDEN: -- can she just reference
2 and then -- or attach it to the record or have a --
3 (indiscernible).

4 MR. ROWE: We need -- we need to be able
5 to reference the document also during the deposition,
6 so if you know where in the record we can find it, we
7 could take a break and pull it up within the record.

8 MS. GILBERT: I can't find things in the
9 record. I have not been able to use that document.
10 That's my problem here. That's why I'm using hard
11 copies, because I know that -- that you folks -- you
12 folks need a -- an exhibit of the entire record, but
13 I can't view -- I haven't been able to use it.

14 I don't know -- I don't know how to
15 access things. I don't know how to reference things.
16 I don't even have the disks right now because I got
17 so frustrated with it, I threw them away and I
18 haven't received the replacement, which I was told I
19 was going to receive.

20 MR. ROWE: Do you know --

21 MS. GILBERT: Huh?

22 MR. ROWE: -- which portion of the
23 record it might appear in? Would it be as part of
24 the draft proposed order, part of the application?

25 MS. GILBERT: I have no idea.

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1 MS. ESTERSON: This -- this is Sara
2 Esterson with the Department of Energy. And the
3 Comprehensive Plan, we introduced that as a record
4 document in response to an informal discovery request
5 on Issue SR4.

6 So -- and I can -- I can direct you,
7 Patrick, to where to find it.

8 And I can direct others on the OneDrive
9 online to where it's at. It's 17 megabytes, so it
10 might be hard to e-mail. I don't know if that's
11 helpful at all.

12 MR. ROWE: Yeah. Let's just -- let's
13 take a short break, Sarah, and then maybe you could
14 send at least Jocelyn and I an e-mail noting where in
15 the record we can find it. And then we'll pull
16 it up.

17 MS. ESTERSON: Okay.

18 MS. PEASE: That would be helpful. And
19 then I would also ask -- I -- I don't know if
20 Mr. Hartell has a copy of the plan, too, but I -- I
21 -- I think he should also be able to see --

22 MR. ROWE: Oh, yeah.

23 MS. PEASE: -- what he's being asked
24 questions about and confirm --

25 MR. BAUM: For -- for clarification, the

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1 document that Ms. Gilbert is referring to is six
2 pages. It's not --

3 MS. GILBERT: No, no, it's 140 --

4 MR. BAUM: Yeah.

5 MS. GILBERT: -- something.

6 MR. BAUM: But that's not what you have
7 with you --

8 MS. GILBERT: Right.

9 MR. BAUM: -- right now. The document
10 she has is very small. And it's going to be
11 difficult, I think, if we're trying to figure out
12 which pages that she has with her present apply to
13 which pages are in that -- that big document.

14 MS. GILBERT: I think they're -- they're
15 numbered, I believe, at the bottom.

16 MR. ROWE: Does -- does the deponent
17 have access to that document now? Do you have a copy
18 in front of you?

19 MR. BAUM: We don't have a -- we do not
20 have a copy in front -- we have the copy that
21 Ms. Gilbert has.

22 MS. GILBERT: Okay. Perhaps the -- the
23 easiest way to go about this, I don't believe that
24 Scott used that document in -- in deciding issues
25 around Goal 4. And so I guess that's really the

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1 question that he needs to answer. And perhaps it
2 isn't as important to have the document. I will
3 avoid --

4 MS. PEASE: I --

5 MS. GILBERT: -- asking questions --

6 MS. PEASE: I -- I would --

7 MS. GILBERT: -- about it.

8 MS. PEASE: -- disagree. I -- I think
9 it is important if --

10 MS. GILBERT: Okay.

11 MS. PEASE: -- if we are asking that
12 question.

13 MS. GILBERT: Okay.

14 MS. PEASE: I would like to have an
15 opportunity to review it.

16 MS. GILBERT: Okay.

17 MR. GILLIS: The disagreement is noted.

18 MR. ROWE: Okay. So let's take a short
19 break. Sara will e-mail to Jocelyn and to me where
20 we can find it in the record. Then we'll need to
21 locate it and make sure that we're looking at what
22 you're looking at there, so this may take a few
23 minutes.

24 MS. PEASE: I would -- I would also,
25 while we're -- while we're doing this sort of

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1 coordination, Ms. Gilbert, if there are any other
2 documents that you plan to refer to that you've not
3 provided --

4 MS. GILBERT: No, that's it.

5 MS. PEASE: -- to all participants, now
6 would be a good time.

7 MS. GILBERT: The only documents that I
8 was referencing in this was that -- the state plan
9 and also this Union County zoning petitioning
10 subdividing rule, which is the one that -- this must
11 be in the record because Scott referenced it.

12 And, in fact, the document, Jocelyn,
13 that you sent me quotes -- the quotes included in
14 that document are from that Union County zoning
15 petitioning document.

16 It's what Scott used to tell you how to
17 address Goal 4 forest land.

18 MS. PEASE: I suppose we can let Scott
19 tell us that.

20 MS. GILBERT: Okay. We're -- we're not
21 -- are we officially on --

22 MS. PEASE: Oh, we're -- we're -- we're
23 on a break right --

24 MS. GILBERT: Okay.

25 MS. PEASE: -- now. We're --

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1 MS. GILBERT: Okay. Scott, the question
2 is, did you --

3 (Multiple people speaking over each
4 other.)

5 MS. PEASE: No, no. We're not -- we're
6 not going right now, Ms. Gilbert.

7 MS. GILBERT: Okay.

8 MS. PEASE: We're -- we're on a break.

9 MS. GILBERT: So we are on break?

10 MR. BAUM: Yep.

11 MS. GILBERT: I guess they're trying to
12 send this information back and forth.

13 MS. PEDEN: I mean, do you have -- do
14 you have other documents? 'Cause I can find one.

15 MR. BAUM: Is the wi --

16 MS. GILBERT: I have this one.

17 MR. BAUM: Is the wifi just the guest?

18 UNIDENTIFIED SPEAKER: Yes, yes.

19 MS. GILBERT: These two are -- and the
20 one that's already Exhibit 1 are the only ones I was
21 referencing.

22 (Whispered discussion, off the record,
23 two minutes.)

24 MS. GILBERT: Maybe Sara can tell them
25 where the Union County zoning petitioning rule is in

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1 their file.

2 MS. ESTERSON: Yes. I just sent an
3 e-mail with instructions of how it can be found on
4 the webpage, so that's available for everyone.

5 MS. GILBERT: Okay. So they now have
6 access to both the Union County zoning and
7 petitioning rules and also the State Comprehensive
8 land-use Plan, right?

9 MR. ROWE: And it's -- if you can just
10 wait a moment until I confirm that I've -- I've
11 located it.

12 MS. ESTERSON: And -- and just for
13 confirmation, it was the Union County Comprehensive
14 Plan only. The zoning partition subdivision
15 ordinance is not in this file path.

16 (Whispered discussion, off the record.)

17 MS. GILBERT: The petition -- the
18 subdivision one is the one that you have all kinds of
19 references to it in your application.

20 MS. ESTERSON: Right. I'm just
21 clarifying the document that we were originally
22 talking about.

23 (Whispered discussion, off the record,
24 one minute.)

25 MR. ROWE: Okay. So I have -- Sarah has

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1 sent us -- directed us where in the record to find
2 it. It's -- it is the -- I'm showing it's the April
3 1970 Union County comp plan, but as -- as has been
4 mentioned, it's over 100 pages long.

5 So it sounds like, Ms. Gilbert, you have
6 about six pages within the comp plan that you're
7 referring to?

8 MS. GILBERT: Yeah, they were making
9 copies. I can go --

10 MR. ROWE: And --

11 MS. PEASE: And I would also ask that as
12 you're referring to any specific pages, that you give
13 us a page number reference so that we can --

14 MS. GILBERT: Okay.

15 MS. PEASE: -- follow along.

16 (Whispered discussion, off the record,
17 one-minute.)

18 MS. GILBERT: So, Scott, while they're
19 doing that, maybe I can just confirm. You said that
20 the Union County --

21 MR. BAUM: We're -- we're -- I don't
22 think we're on the record yet.

23 MS. PEDEN: We're on break, so just --

24 MS. GILBERT: Okay. We're still on
25 break?

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1 MS. PEDEN: Yeah, so just sit here
2 quietly.

3 MS. GILBERT: Okay.

4 MS. PEDEN: Thank you.

5 MS. PEASE: I had also shared a link
6 with Mr. Baum.

7 Mr. Baum, were you able to access the --
8 the comp plan?

9 MR. BAUM: I was, thank you. Do you
10 have it up for -- so, now, Scott has -- Mr. Hartell
11 has that exhibit also.

12 MS. PEASE: Thank you.

13 (Whispered discussion, off the record,
14 30-seconds.)

15 MS. GILBERT: I'm sorry, I thought Scott
16 was going to give (indiscernible).

17 (Whispered discussion, off the record,
18 one minute.)

19 MR. GILLIS: Would you gentlemen know if
20 this is actually submitted in the record?

21 MS. GILBERT: He said the --

22 THE WITNESS: No idea.

23 MS. GILBERT: Let me see.

24 MR. GILLIS: Okay. (Indiscernible).

25 MS. GILBERT: That is -- that -- that is

Deposition of Scott Hartell

1 the Union County zoning partitioning --

2 MR. GILLIS: Oh, thank you so much. All
3 right. Thank you.

4 MR. BAUM: Is it in the record?

5 MS. GILBERT: Well, Sara Esterson said
6 it -- said it was.

7 MR. BAUM: Okay.

8 MS. GILBERT: And she gave them a link
9 to it.

10 MR. GILLIS: But this is a different
11 document.

12 MR. BAUM: Yeah.

13 MS. GILBERT: That's just the -- the
14 table of contents from that.

15 MR. GILLIS: I don't --

16 MR. BAUM: The document you just -- I
17 think I gave it back to you.

18 (Whispered discussion, off the record.)

19 MS. PEDEN: Let's ask Irene.

20 MS. GILBERT: What?

21 MR. GILLIS: That's this.

22 MS. GILBERT: Yeah.

23 MR. GILLIS: Yeah, okay. Is that in the
24 record? That's --

25 MR. BAUM: I don't know. That's a

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1 different document than the actual 1979 version.

2 MS. GILBERT: This is the Union County
3 zoning partitioning subdivision --

4 MR. BAUM: Right, that's on their
5 website.

6 UNIDENTIFIED SPEAKER: Right.

7 MR. BAUM: It's available on their --

8 MS. GILBERT: Yeah.

9 MR. BAUM: -- website.

10 MR. GILLIS: Is it in the record?
11 That's the question.

12 MR. BAUM: No.

13 MS. GILBERT: Sara said it was.

14 MR. ROWE: Well, I -- I don't know what
15 document you're talking about right now, so --

16 MS. GILBERT: We're talking about the
17 Union County zoning partitioning subdividing rules
18 that Scott referenced. And, actually, the -- that
19 formed the basis of -- I understand, of all of his
20 comments regarding significant, substantive
21 issues.

22 MS. PEASE: I guess, Ms. Gilbert, you --
23 you'd mentioned earlier that the portion of the
24 subdivision ordinance that you planned to reference
25 are included in the application --

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1 MS. GILBERT: Yes.

2 MS. PEASE: -- is that right?

3 MS. GILBERT: Yes.

4 MS. PEASE: So we could refer then to
5 the application?

6 MS. GILBERT: You could. Actually, I
7 was just using what you sent me --

8 MS. PEASE: Okay.

9 MS. GILBERT: -- where it lists the
10 Union County rules, if you will.

11 (Whispered discussion, off the record,
12 30 seconds.)

13 MS. GILBERT: What they're -- what
14 they're copying, I believe, and messing with right
15 now is what you sent me. It was the attachment that
16 you sent me.

17 MS. PEASE: Okay.

18 MS. GILBERT: So --

19 MR. BAUM: Exhibit K?

20 MS. GILBERT: Jocelyn, Ms. Pease, sent
21 me a copy of five pages --

22 MR. BAUM: Yeah.

23 MS. GILBERT: -- that she planned on
24 referencing.

25 MR. BAUM: Right. Exhibit --

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1 MS. GILBERT: That's what I -- that's
2 what I think they're trying to (indiscernible) and
3 it's all part of the Union County zoning and
4 partitioning ordinance.

5 MR. BAUM: We brought copies of what
6 Ms. Pease sent.

7 MS. GILBERT: So I don't -- they have
8 copies of that, folks. And I'm -- and I'm sure
9 everybody should have -- you sent it to everyone, did
10 you not, Ms. Pease, the -- the (indiscernible) --

11 MS. PEASE: I did. I -- I sent -- I
12 sent that document to everyone who was included on
13 the invitation list for -- for this meeting. And it
14 was, I think, a five or six-page excerpt of
15 Exhibit K.

16 MS. GILBERT: Yes.

17 MS. PEASE: And --

18 MS. GILBERT: It's five pages
19 (indiscernible) --

20 MS. PEASE: -- if there's anyone else
21 who didn't receive that and needs to, I can certainly
22 forward that around before we ask any questions
23 about it.

24 MS. GILBERT: Great.

25 MR. ROWE: Jocelyn, is this what you

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1 sent in your e-mail yesterday?

2 MS. PEASE: It was either yesterday or
3 the day before.

4 MR. ROWE: Okay.

5 (Whispered conversation, off the record,
6 one minute.)

7 MR. ROWE: Jocelyn, I'm looking at an
8 e-mail you sent yesterday. Oh, boy. Maybe the
9 quickest -- would you be --

10 MS. PEASE: I'll -- I'll forward it to
11 you. I -- I'm seeing that you weren't on -- it looks
12 like you weren't on the invitation for the Zoom
13 meeting that I had responded to.

14 MR. ROWE: Okay.

15 MS. PEASE: So I'll -- I'll forward that
16 to you, Patrick.

17 MR. ROWE: All right. Thanks.

18 (Whispered discussion, off the record,
19 two minutes.)

20 MS. PEASE: Okay. Well, for Idaho
21 Power, we have --

22 MS. GILBERT: (Indiscernible) that's
23 Exhibit 3 and I think (indiscernible).

24 (Whispered discussion, off the record,
25 one minute.)

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1 MS. GILBERT: Okay.

2 MR. GILLIS: Ready to go, Ms. Gilbert?

3 MS. GILBERT: What -- I think so. I --

4 MR. GILLIS: Okay. So we're --

5 MS. GILBERT: -- think so.

6 MR. GILLIS: -- back on the record then.

7 MS. GILBERT: Okay. So what I
8 understand we have and that everyone is able to
9 access is Exhibit 1, which is this pilot program soil
10 rating for Union County.

11 Exhibit 2, which Sara Esterson provided
12 the link from the record. It is the -- the Union
13 County Comprehensive Plan that was filed with the
14 State in -- in April of 1978.

15 Exhibit 3 is the Union County zoning
16 petitioning and -- and -- what is it -- subdividing
17 rules that is also, I understand, in the -- in the
18 application. And I think Sara sent the link to that
19 also.

20 MR. ROWE: Okay. So on Exhibit 2, I
21 have the 100-plus-page document from the
22 comprehensive plan.

23 MS. GILBERT: Right.

24 MR. ROWE: But I -- and you're referring
25 to just portions of that and that is -- is that

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1 correct?

2 MS. GILBERT: I'm referring to the plan
3 generally and it will be very brief because the only
4 question I have is: Did Scott use information from
5 that plan in determining forests? So --

6 MR. ROWE: Okay.

7 MS. GILBERT: -- that's really all it
8 amounts to.

9 MR. ROWE: I -- I'm just trying to keep
10 our record --

11 MS. GILBERT: Right.

12 MR. ROWE: -- straight as far as a
13 transcript of this deposition. So what you intend to
14 attach as Exhibit 2, is it portions of the comp plan?
15 And if it's portions of the comp plan, if you could
16 please identify what portions.

17 MS. GILBERT: If -- I -- I think it's
18 easiest to just attach the entire plan --

19 MR. ROWE: Okay.

20 MS. GILBERT: -- as an exhibit.

21 MR. ROWE: And then with regard to
22 Exhibit 3, what Ms. Pease has forwarded to me appears
23 to be excerpts from the application for the site
24 certificate, Exhibit K.

25 MS. GILBERT: Right.

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1 MR. ROWE: And are there -- there's --

2 MS. GILBERT: Oh, that is not Exhibit 3,
3 though. Exhibit 3 is the Union County zoning and
4 petitioning and subdividing --

5 MR. BAUM: Ordinance.

6 MS. GILBERT: -- ordinance.

7 MS. PEASE: And -- and that, I don't
8 think we have a copy of yet --

9 MS. GILBERT: I -- I think Sarah --

10 MS. PEASE: -- if -- if it's anything
11 else besides what's referenced in Exhibit K.

12 MS. GILBERT: I think Sara said she was
13 sending the link that is already in the record.

14 Is that true, Sara?

15 MS. ESTERSON: No. What I had started
16 on was just the Union County comp plan. And we -- I
17 think we would mirror what Jocelyn has said in that
18 the zoning ordinance provisions were in Exhibit K.

19 MS. GILBERT: Right.

20 MS. ESTERSON: And, I mean, Union County
21 did provide excerpts of the zoning ordinance during
22 initial review, but I had not planned on going to dig
23 those record documents out at this time. But they
24 are part of the record.

25 MS. GILBERT: Okay. And wherever in the

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1 application Idaho Power has -- has used this because
2 they -- the -- the information that is -- it is --
3 they're basing their decisions on is quoted in -- in
4 boxes, like, on the information that -- that
5 Ms. Pease sent on Page -- if I can get back, Page 29.

6 But on Page -- or on Page K-229 --
7 some -- some of this is missing from mine -- there's
8 a box with -- with some rule language. Can you find
9 that?

10 MR. ROWE: Yeah, I -- I have that in
11 front of me. Page --

12 MS. GILBERT: Okay.

13 MR. ROWE: -- Page K-229. And, yes,
14 there is a box with rule language.

15 MS. GILBERT: Right. That rule language
16 is the language from this Union County zoning and
17 petitioning ordinance. So that's what was used by
18 Scott to provide information, from what I can tell.
19 And that's one thing I wanted to clarify --

20 MS. PEASE: And --

21 MS. GILBERT: -- that that is the
22 document that he used to provide the information
23 about what is forest land.

24 MS. PEASE: And, Ms. Gilbert, were you
25 planning to refer to the excerpted sections in

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1 Exhibit K or were you planning to refer to other
2 portions of the Union County zoning --

3 MS. GILBERT: Wasn't going to --

4 MS. PEASE: -- and subdivision --

5 MS. GILBERT: -- other portions of it,
6 just -- just the document that you provided. Yeah.
7 Other than a general question, which -- is this what
8 you used? And the answer that I believe I received
9 was yes. Okay.

10 MR. GILLIS: Shall we proceed with
11 a question?

12 MS. GILBERT: I hope so.

13 MS. PEASE: Okay. I just -- as a point
14 of clarification, I'm not sure that we have an
15 Exhibit 3 then that's a separate -- a separate
16 document unless that's something that you intend to
17 provide or can provide to us.

18 MS. GILBERT: I don't know how to get
19 that --

20 (Whispered discussion, off the record.)

21 MR. BAUM: So --

22 MS. GILBERT: I don't have it here.

23 MR. BAUM: As a --

24 MS. GILBERT: (Indiscernible) --

25 MR. BAUM: As a point of clarification,

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1 what Ms. Gilbert has provided -- and I just sent a
2 link to Ms. Pease that I asked that she forward on to
3 Mr. Rowe. It's just the Union County planning
4 document that sets out Articles 1 through 7 or -- or
5 I guess it's, like, 20-something.

6 But she just has portions of it which
7 are portions of Article 3, 4 and 5 that I think she's
8 going to be referring to. And that's what she's
9 actually handed us, but it -- but it isn't the whole
10 code by any means.

11 So I don't know if it's just -- I don't
12 know if this document has ever been submitted as part
13 of the record for -- for their access to follow along
14 as --

15 MS. GILBERT: Okay.

16 MR. BAUM: -- you're referring to it.
17 But I did send you the link so that you two could
18 access it as we're going through this depending on
19 how formal you want that actually attached because if
20 it's actually just a reference point to Exhibit K, I
21 don't think we need an Exhibit 3.

22 MS. GILBERT: It is a reference point to
23 Exhibit K. It's where the information came from
24 that's in Exhibit K.

25 MR. BAUM: So do you need an Exhibit 3?

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1 MS. PEASE: And -- and as a -- a point
2 of clarification, I assume, if we're looking at the
3 current Union County planning website, then that
4 would be the -- the code that's currently in effect.

5 MS. GILBERT: Right.

6 MS. PEASE: And I -- I don't know if
7 there were any changes, but we -- we do also have
8 the -- the goalpost rule --

9 MS. GILBERT: Okay.

10 MS. PEASE: -- as far as the -- the
11 relevant land-use provisions being those that were in
12 effect at the time the application was submitted.

13 MS. GILBERT: And --

14 MS. PEASE: And so I --

15 MS. GILBERT: I'll ask Scott that
16 question.

17 MS. PEASE: Okay.

18 MS. GILBERT: He did say something about
19 an update that I was not aware of in 2015.

20 BY MS. GILBERT:

21 Q Perhaps, Scott, you could tell us what that
22 update involved.

23 A Well, the update in --

24 MR. BAUM: I would ask that that be
25 more -- I -- I would object to the form of the

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1 question and ask that it be more narrowly tailored to
2 the issue before us today of whether or not the --
3 any amendment to the code has any impact on the
4 application that was filed.

5 MS. GILBERT: Thank you.

6 MR. BAUM: And could you re-set that up?

7 BY MS. GILBERT:

8 Q Okay. Scott, I'm -- you said that there
9 had been some updates to the Union County zoning,
10 subdividing, petitioning ordinance in, I believe you
11 said, 2015. Did any of those updates affect the
12 sections on identification of farmland, agricultural
13 or forest land?

14 A Yes. They would have affected all
15 those areas.

16 Q Can you tell me what those changes were?

17 A No.

18 Q I am not --

19 A I'd be more than happy to share that
20 information with you; but I can't tell you sitting
21 here today, no.

22 Q Okay. So would those changes be -- those
23 changes wouldn't then be reflected in the document
24 that I asked to have submitted as -- as Exhibit 3,
25 right? Is that correct?

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1 MS. PEASE: Objection. What -- what's
2 submitted as Exhibit 3 is -- I mean, we -- we don't
3 have an Exhibit 3 before us. And so I --

4 MS. GILBERT: I don't -- I -- yes, you
5 do. I think you do. You have the --

6 MS. PEASE: I -- I do not --

7 MS. GILBERT: -- (indiscernible) --

8 MS. PEASE: -- Ms. Gilbert. I do not.

9 MS. GILBERT: How can I get this into
10 the record as an exhibit, just the Union County
11 zoning, partitioning and rules? I'm not going to
12 refer to specific sections of it today, but Ms. Pease
13 brought up an issue which is -- and she's correct
14 that with land-use planning, there is a rule that
15 says that the effective date of the -- the use of the
16 land-use planning document is when they filed the
17 application.

18 So her question is legitimate about,
19 have there been any changes that -- in this rule, so
20 that if I'm asking to have Union County planning
21 ordinance in the record, is it going to accurately
22 reflect what they should have been using and what
23 they did use when the application was submitted? I
24 don't know how to do that.

25 MR. GILLIS: You can -- you know, you

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1 can ask a question. They can object, certainly, but
2 you can --

3 MS. GILBERT: Mm-hmm.

4 MR. GILLIS: -- still ask the question.

5 MS. GILBERT: Okay. I -- I would like
6 to get that in as Exhibit 3, this current document,
7 and have Scott provide as a supplemental exhibit his
8 information regarding what changes, if any, occurred
9 during that 2015 amendment.

10 That should bring us up to date as far
11 as the exhibits accurately reflecting the document
12 that Idaho Power should have been using or -- when
13 they did their -- if you look at the goalpost rule.

14 Does that make sense?

15 MR. BAUM: No. You know, I --

16 MS. GILBERT: I want to get this in the
17 record.

18 MR. BAUM: -- I -- I -- I'm going to --
19 I'm going to object to the form of the question and
20 the request of -- of that -- of that of my client to
21 go back and do that for this purpose.

22 You know, my understanding is the
23 deposition today is based on the questions that
24 you've previously submitted and anything that might
25 be based on that. So if we could keep it narrowly

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1 tailored to those issues that were presented before
2 us and keep moving in that direction.

3 MS. GILBERT: And this -- this ordinance
4 does relate because it -- it's -- it's what he used
5 when he provide -- I mean, he must have used it to
6 provide information to Idaho Power because it's what
7 they quote in their application.

8 MR. BAUM: Right. But I think -- and
9 I -- I understand where you're coming from. I think
10 there might be a misunderstanding on how the process
11 works and what -- what Idaho Power can glean
12 from (indiscernible) by themselves versus what
13 Mr. Hartell's affirmatively sending to them, if that
14 makes sense, through the land-use process.

15 So, you know, if there's a request on
16 specifically the soil issues and going back to
17 Exhibit 1 and how that interplays with the land-use
18 code as it exists, I think we can go through that.
19 You know, this -- this request, I guess, to -- to
20 provide additional documentation that could be used
21 as an exhibit for you could be problematic.

22 You know, if you need to postpone so
23 that you can get these documents again and resend
24 them out to everybody, then we'll have them before
25 us. We can do it that way.

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1 MS. GILBERT: No, I don't want to do
2 that.

3 Okay. I will not directly -- okay.
4 Exhibit 3 is out.

5 MR. BAUM: Okay.

6 BY MS. GILBERT:

7 Q Okay. But I will reference -- I would like
8 an answer -- a -- a clear answer that -- whether or
9 not Scott Hartell used the Union County zoning,
10 partitioning, subdivision ordinance as the basis for
11 his recommendations regarding the identification of
12 forest land.

13 A Yes, I did.

14 Q Okay. Did you use any other documents
15 besides that in your recommendations?

16 A Yes. I used the soil -- whatever it was
17 called -- the soil table chart, Exhibit 1.

18 Q Okay. Exhibit 1. And --

19 A And I used the USDA soils information for
20 Union County, Oregon.

21 Q Okay. I would like a copy of that, but we
22 will not make it an exhibit at this point, I guess,
23 okay?

24 A A copy of what?

25 Q Of what you said the -- that you -- the

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1 reference you said you used from the Union County
2 soils -- is it GIS information?

3 MS. ANDREW: USDA.

4 BY MS. GILBERT:

5 Q USDA.

6 A You want a copy of the USDA soils
7 information for Union County?

8 Q Yes.

9 A Okay.

10 Q Okay. All right. So --

11 A There it is.

12 MS. GILBERT: And -- oh, okay.

13 MR. BAUM: We'll provide copies of that
14 to all parties that are participating in this. We --
15 Mr. Scott Hartell did bring a CD with that copy for
16 Ms. Gilbert.

17 BY MS. GILBERT:

18 Q Okay. And the only information that you
19 shared on soil capacity, the cubic feet per acre per
20 year, the only information you shared with Idaho
21 Power, was that contained on this document,
22 Exhibit 1; is that correct?

23 A Well, the only information that I used that
24 I pointed out with Idaho Power in conducting the
25 predominance review of the parcels impacted by their

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1 proposed project were from that chart.

2 However, they also had access to the soils
3 database from the USDA, which has multiple tables
4 with all kinds of different information in them. And
5 I'm unaware of whether they used any of that
6 information or not.

7 Q Okay. And did you, at any time, indicate
8 to Idaho Power a standard for what designation of
9 cubic feet per acre per year should be used to
10 identify forest land in Union County?

11 A No.

12 Q Okay. So, to your knowledge, none of
13 these -- none of the listings for soil on this
14 Exhibit 1 that don't have a soil cubic feet per acre
15 per year, they did not have access to that and there
16 was no information provided from you regarding what
17 those soil classifications would have been; is that
18 correct?

19 A I need you to restate the question.

20 Q Okay.

21 A I'm a little confused by what you're asking
22 of me.

23 Q Okay. That there were no -- no cubic --
24 there was no sharing of information from you
25 regarding the cubic feet per acre per year of any of

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1 the soils that are listed on -- on this document,
2 Exhibit 1, for crop or for range land.

3 And you did not do -- you didn't do an --
4 you didn't establish the cubic feet per acre per year
5 for any of those other soils; is that correct?

6 A That's correct.

7 Q The ones that are blank here.

8 Okay. And you did not tell Idaho Power
9 what the -- the basic -- the basic amount because --
10 well, what I'm -- the -- the question here is, it's
11 been identified that anything 20 cubic feet per acre
12 per year or greater in Eastern Oregon is considered
13 forest land.

14 MS. PEASE: Objection. Foundation.

15 MS. GILBERT: I -- I will -- well, I
16 guess that will appear in my argument. So it is part
17 of the LCDC rule, so I -- you know, I shouldn't have
18 even brought it up, I guess. It is -- all I really
19 need to know is that, no, Scott did not provide any
20 information like that to Idaho Power. And the answer
21 that I got was, no, he didn't.

22 BY MS. GILBERT:

23 Q Now, I'd like to reference the application
24 here, but I guess I'll -- and you said that -- okay.
25 You gave me a date that there had ben some updates to

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1 the Union County zoning, partitioning and subdivision
2 ordinance in 2015.

3 There were -- there were a couple of
4 changes in statute in 2008 and 2011. Are you aware
5 of any updates to the Union County zoning and
6 petitioning and subdivision ordinance reflecting
7 those changes or in the Union County comprehensive
8 state plan?

9 MS. PEASE: Objection. Foundation.

10 MS. GILBERT: Well --

11 MR. GILLIS: You -- you can go ahead.
12 Just keep asking questions.

13 MS. GILBERT: Okay.

14 MR. GILLIS: If they do object, you
15 don't have to --

16 MS. GILBERT: Okay.

17 MR. GILLIS: -- argue with her
18 (indiscernible).

19 BY MS. GILBERT:

20 Q Just please answer the question.

21 A You'd have to be more specific with what
22 the updates were in order for me to address them.

23 Q Well, from what you said, there were no
24 updates other than the 2015 update to -- at least
25 to the -- the Union County petitioning ordinance. I

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1 know there were none to the state plan because that
2 information is available, so -- let's see.

3 You said that -- here that you -- you used
4 this chart to identify forest land based on the soils
5 classification. And in the document that Ms. Pease
6 provided, there's a statement that when you -- when
7 you did the prevailing use to identify forest land
8 that there was no difference; that -- that the -- at
9 least the listing of forest land from this chart,
10 Exhibit 1, was the same as your confirmation with
11 the -- the visual or whatever you use to determine
12 whether or not there was forest on the land; is that
13 true?

14 MR. BAUM: I'm going to object to
15 the foundation and the form of the question
16 (indiscernible).

17 MS. GILBERT: Okay.

18 MR. BAUM: Ms. Gilbert, could you
19 specifically refer in Exhibit K to what
20 section you're --

21 MS. GILBERT: (Indiscernible).

22 MR. BAUM: -- (indiscernible)?

23 MS. GILBERT: I didn't get that. I need
24 the copy that Ms. Pease provided and I didn't give it
25 back, I don't think. Let's see.

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1 Okay. The exhibit that Ms. Pease
2 provided -- I guess it's Exhibit 3. It's hard for me
3 to tell right now. But on --

4 MR. BAUM: I -- I think it's Exhibit K.

5 MS. GILBERT: Okay. Well, it's
6 Exhibit K, but I don't know what we referenced it to
7 here.

8 MR. ROWE: It's -- it's Exhibit K to the
9 application, right? I -- I just want to make sure
10 I -- I'm looking at --

11 MS. GILBERT: K, Page 229.

12 MR. ROWE: Okay. I've got that. And
13 for purposes of the deposition, how are we referring
14 to this? Are we referring to this as Exhibit 2?

15 MS. GILBERT: Well, I understood --

16 MR. BAUM: We can refer to this as
17 Exhibit 3 because Exhibit 2, I believe, would be the
18 127-page planning document.

19 MR. ROWE: I'm sorry. Thank you. Okay.
20 So this is now Exhibit 3 to the -- to the --

21 MR. BAUM: (Indiscernible).

22 MR. ROWE: -- (indiscernible). Thank
23 you.

24 MS. GILBERT: Yeah, it's changed. So --
25 okay. In -- yeah.

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1 BY MS. GILBERT:

2 Q On that Page K-229, it talks about
3 administering through the uses and definitions and it
4 refers to the Union County zoning and petitioning
5 ordinance. And it says here that you did use the
6 NRCS soil conservation service ratings, which -- and
7 you -- you -- you clarified that those were from
8 this -- this document, Exhibit No. 1, that you
9 provided.

10 And then I believe perhaps you can explain
11 to me how you looked at -- or how you determined
12 predominant use when you compared that set of data
13 with the final product. It says here they're the
14 same, but can you describe for me how that was done?

15 A You're going to have to clarify that
16 question. I -- I felt there was multiple questions
17 being asked there and I'm --

18 Q Okay.

19 A -- not clear.

20 Q Okay. Can -- can you describe to me how
21 you determined predominant use?

22 A Yeah. So in doing the predominance, once
23 again, we look at the impact from the proposed land
24 use on the property that is going to be impacting.

25 Q Mm-hmm.

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1 A And then we take those properties
2 individually and identify what the predominant soil
3 type are. And we calculate out whatever 51 percent
4 or greater soil type or -- based from the USDA soil
5 types of that property and -- and then deem it either
6 crop, range or forest --

7 Q Okay.

8 A -- in order to apply a -- a rule for
9 land-use requests to that property.

10 Q Okay. Do you have a chart or anything,
11 a map, something that shows what those -- what you
12 came up with as far as what -- the land that's
13 being crossed, what you called it based on your
14 calculations?

15 A I think, in the -- on --

16 MR. BAUM: It's Exhibit 3.

17 THE DEPONENT: -- Exhibit 3, there's
18 two different maps in here that delineate out the
19 difference between crop high value, forest and
20 range land.

21 BY MS. GILBERT:

22 Q Is that a map? Is that a map --

23 A Yes.

24 Q -- that you're talking about? What --
25 what's the page number?

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1 A It's from Exhibit K in the -- the -- you
2 know, in the record --

3 Q Uh-huh.

4 A -- Page K-227 --

5 Q Okay.

6 A -- and Page K-228.

7 Q Okay. And I can see that -- I can see --
8 okay. I found that. I can see that it talks
9 about -- or it -- it identifies land based on how
10 you -- how you classified it, but it doesn't state
11 whether or not each -- whether or not each of those
12 parcels was agriculture land or -- or range land or
13 forest land.

14 Is there anything that goes to that level
15 of telling you what -- what you actually called each
16 parcel that was crossed?

17 A So if we go back to Page K-227 --

18 Q Uh-huh.

19 A -- and you look at the map, there's a
20 heavy, black outline of a whole bunch of different
21 figures which are the actual parcel ownerships that
22 the proposed line routes run across.

23 Q Okay.

24 A And then when you go down to the index of
25 the map, it's got a solid red-line box with a dash

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1 line through it and it's -- that delineates crop
2 high value.

3 Q Okay.

4 A There's a solid black line with a hashed
5 line through it that indicates it's forest land.
6 There's a black box with a heavy line with dots in it
7 that indicate range land.

8 Q Okay.

9 A When you apply it to this map, you can tell
10 where the forest and the range land parcels are based
11 on our predominance analysis.

12 BY MS. GILBERT:

13 Q Okay. That's helpful. Thank you.

14 All right. So I might have questions on
15 this. So anywhere that there are dots, that's mean
16 it's -- it's going to be considered range land even
17 though it's in a combined -- combined zone.

18 I think that I'm probably done, but -- and
19 so the question -- the -- I did ask this question
20 about areas that were -- that were, by soil type,
21 considered forest land. But based on your
22 predominant use analysis, were there any areas that
23 were left out of that --

24 MS. PEASE: Objection.

25 MS. GILBERT: -- based on predominant

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1 use? Huh?

2 MS. PEASE: Objection. Vague and
3 ambiguous.

4 BY MS. GILBERT:

5 Q Okay. When -- when you described your
6 processes, first looking at soils and figuring out
7 which of these -- which of these areas were -- were
8 poor soils or -- or grazing soils or -- or range
9 soils and then you went and looked at predominant
10 use.

11 And you stated that everything that you
12 considered forest land or range land or -- or grazing
13 land when you did your soils analysis, all of those
14 same areas were confirmed to be forest land when you
15 did your predominant use analysis; that there was
16 nothing that -- based on soils, that you considered
17 forest land that did not have a predominant use of --
18 of growing trees; is that correct -- is that correct?
19 Is that what you said?

20 A I don't -- do not understand your question
21 at all.

22 Q Okay. You described your process as first
23 looking at the soils and deciding which of these
24 parcels were -- were primarily forest land or grazing
25 land or agricultural land based on -- based on this

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1 chart and the soil ratings.

2 You -- according to what I'm -- I'm reading
3 here or what Idaho Power said, you then went back and
4 looked at these same areas using your predominant use
5 evaluation and that there were none of the areas
6 that, based on the soils, the -- the soil
7 classification on this, that you defined as forest
8 land that were not included when you did the
9 predominant use analysis. They were exactly the
10 same. There was nothing that got left out based on
11 predominant use. There was --

12 MS. PEASE: Objection. The question is
13 vague and ambiguous.

14 MS. GILBERT: I think that it's
15 probably -- I think I can get there another way, so
16 I'm -- I'm going to pass on that question.

17 All right. I would say that's enough.

18 MR. GILLIS: Okay. All right. Do the
19 Idaho Power or ODOE have any questions for
20 Mr. Hartell?

21 MS. PEASE: I have just a few questions.
22 And this is Jocelyn Pease for Idaho Power Company.
23 Do -- do folks need a break who are in the room or
24 are we okay to get started?

25 THE WITNESS: I'm doing fine. Thanks

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1 for asking.

2 EXAMINATION

3 BY MS. PEASE:

4 Q Okay. Okay. So this will be to -- the
5 questions that I'm going to ask are to clarify some
6 of what we've heard today. For the record, my name
7 is Jocelyn Pease. I'm with McDowell Rackner Gibson,
8 here today on behalf of Idaho Power Company.

9 Mr. Hartell, are you familiar with the
10 proposed location for the Boardman to Hemingway
11 project in Union County?

12 A Yes, I am.

13 Q And are you familiar with the zoning for
14 the land and the proposed location for the B2H
15 project in Union County?

16 A Yes, I am.

17 Q Would you agree that in -- in Union County,
18 a -- a portion of the B2H project is proposed to be
19 located on land that is zoned as timber grazing in
20 Union County?

21 A Yes, it is.

22 Q And, Mr. Hartell, the timber grazing zone
23 is a hybrid farm and forest zone; is that right?

24 A That is correct.

25 Q And for purposes of a land-use analysis for

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1 a project like B2H, that would mean that some of the
2 parcels may be farmland and some of the parcels may
3 be forest land; is that right?

4 A That's correct.

5 Q And so the purpose for performing the
6 predominant use analysis then is to determine whether
7 the rules governing forest land should be applied to
8 analysis of the transmission line or the rules
9 governing agricultural lands; is that correct?

10 A That is correct.

11 Q Okay. So that -- what that means then is
12 that there's a portion that you would expect would be
13 forest land and a portion that you would expect would
14 be agricultural or range land; is that right?

15 A Correct.

16 Q And you -- would you agree that the soil
17 type for the parcel plays a role in whether it's
18 designated as range or forest land?

19 A Yes, it does.

20 Q And have you reviewed Exhibit K of the B2H
21 application for cite certificate and specifically
22 Pages K-225 to K-230?

23 A Yes, I have.

24 MS. PEASE: And that -- for -- for
25 reference for folks, that's the attachment that I had

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1 circulated earlier.

2 BY MS. PEASE:

3 Q On Page K-229, it states that, "IPC worked
4 closely with Union County to determine the
5 predominant use on each of the 61 parcels that are
6 crossed by the site boundary that are located wholly
7 or partially within the timber grazing zone."

8 Do you see that statement?

9 A Yes, I do.

10 Q Would you agree that that statement is
11 accurate?

12 A Yes, I do.

13 Q And on that same page, K-229, it states
14 that, "In order to determine the predominant use on
15 each parcel, data from the Soil Survey Geographic
16 Database, or SSURGO, was used along with Union County
17 tax lot data -- parcel data."

18 Do you see that passage?

19 A Yes, I do.

20 Q And are you familiar with the
21 SSURGO database?

22 A Yes, I am.

23 Q Would you agree that it is a database
24 containing information about -- about soil types?

25 A Yes, it does.

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1 Q Do -- do you know what the entity is that
2 maintains the SSURGO database?

3 A It's the U.S. Department of Agriculture,
4 I think.

5 Q And is it specifically the Natural
6 Resources Conservation Service?

7 A Yes, it is.

8 Q Or NRCS?

9 A Correct.

10 Q So is it fair to say that the SSURGO
11 database is a compilation of NRCS soil survey data?

12 A Yes.

13 Q At Page K-229 of Exhibit K, it states that,
14 "GIS mapping software was used to determine which
15 SSURGO soil type comprised the most acres within each
16 parcel." Do you see that passage?

17 A Yes, I do.

18 Q And is this consistent with your
19 understanding of how the analysis was performed for
20 the B2H project?

21 A Yes, it is.

22 Q Would you agree that this means that soil
23 data was considered in the predominant use analysis?

24 A Yes, it was.

25 Q At Page K-229, it states that, "Using a

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1 table provided by Union County listing each SSURGO
2 soil type and the corresponding predominant use
3 value, each parcel was then initially given one of
4 the following predominant use values: Crop, high
5 value; crop, high value if irrigated; crop; range;
6 forest; gravel pit; miscellaneous water; or urban/not
7 rated.

8 "This analysis resulted in a preliminary
9 predominant use value for each parcel within the site
10 boundary based on SSURGO soils data." Do you see
11 that passage?

12 A Yes, I do.

13 Q And is this consistent with your
14 understanding of how the analysis was performed?

15 A Yes, it is.

16 Q And, again, would you agree that this means
17 that soil data was considered in the predominant
18 use analysis?

19 A Yes, it was.

20 Q At Page K-229 to 230, it states, "Union
21 County then reviewed each parcel's initial
22 predominant use value against 2011 aerial photography
23 and tax lot records and adjusted the predominant use
24 to reflect current land use.

25 "In the timber grazing zone, none of the

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1 parcels involved in the analysis had their initial
2 predominant use value adjusted through the Union
3 County review process."

4 Do you see that passage?

5 A Yes, I do.

6 Q And is this consistent with your
7 understanding of how the analysis was performed for
8 the B2H project?

9 A Yes, it was.

10 Q And would you agree that this means that
11 soil data was not only considered in the predominant
12 use analysis, but the -- the primary factor driving
13 the predominant use analysis?

14 A Yes, it was.

15 Q Would you also agree that this means that
16 no changes were made to the initial soils-based
17 predominant use values based on your review of aerial
18 photography or current land uses?

19 A Yes. I made no changes based from the
20 initial review of the soils information.

21 Q And just a follow-on question to that one,
22 would it be fair to say then that there were no
23 changes to the initial soils-based predominant use
24 determination that would have resulted in the
25 predominant use being changed from forest to range?

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1 So if the value was initially forest, it stayed as
2 forest; is that right?

3 A That's correct.

4 Q On Page K-230, it states that, "SSURGO data
5 for 18 of the 61 parcels was not available; and,
6 therefore, the above analysis could not be performed.

7 "These 18 parcels are located in the
8 vicinity of the National Forest; and, for these
9 parcels, the predominant use analysis was determined
10 solely by the Union County review process and all
11 18 parcels were determined to have a predominant use
12 of forest."

13 Do you see that passage?

14 A Yes, I do.

15 Q Is this consistent with your understanding
16 of how the analysis was performed?

17 A Yes, it is.

18 Q Would you agree that this means that where
19 no soil data was available, all of the parcels were
20 determined to have a predominant use of forest land?

21 A Yes, it was.

22 Q Would you agree that this is a conservative
23 approach to the analysis?

24 A Yes.

25 Q And a -- a follow-up question, I -- I

Deposition of Scott Hartell

1 believe Ms. Andrew had asked about review of aerial
2 photography and whether -- whether that was
3 appropriate.

4 And to -- to clarify, though, I think, from
5 what you've said, my understanding is that to the
6 extent you had to rely on aerial photography, you had
7 made an assumption that the land would be forest
8 land; is that correct?

9 A Yes.

10 Q And a follow-on from that, then there were
11 no parcels identified as range or other agricultural
12 land exclusively based on aerial photography; is
13 that right?

14 A Correct.

15 MS. PEASE: All right. Thank you. No
16 further questions for me.

17 MR. GILLIS: Mr. Rowe, any questions
18 from Oregon Department of Energy?

19 MR. ROWE: Yes, a few.

20 EXAMINATION

21 BY MR. ROWE:

22 Q Mr. Hartell, I'd just like to get a little
23 background. When did you first go to work for
24 Union County?

25 A In November of 1995.

Deposition of Scott Hartell

1 Q And you're currently the planning director,
2 correct?

3 A Correct.

4 Q When did you become the planning director?

5 A In 2015.

6 Q So between '95 and 2015, what were your
7 positions and responsibilities?

8 A I was the senior planner of -- of a staff
9 of three with a planning director and an
10 administrative person in the office, so I was dealing
11 mostly with current planning issues at the counter
12 with land-use request applications.

13 Q Fair to say then, since 1995, your
14 positions with Union County have always been in the
15 planning arena, correct?

16 A Correct.

17 Q Are you familiar with the -- and I'm sorry.
18 I should have introduced myself. I'm with the
19 Department of Justice and I represent the Department
20 of Energy in this contested case.

21 The Department of Energy is staffed to the
22 Energy Facility Siting Council. Are you familiar
23 with the standards that the Energy Facility Siting
24 Council applies when deciding whether to issue a site
25 certificate?

Deposition of Scott Hartell

1 A Sorry. Yes, I am. I'm -- I'm watching the
2 video screen and you're lagging behind, so it's --
3 anyway, yes. I -- to answer your question, I am
4 familiar with the Siting Council rules
5 and regulations.

6 Q Great. Council has a land-use standard. I
7 take it then you're familiar with the Council's
8 land-use standard?

9 A Yes.

10 Q Okay. Under that standard, Council must
11 find that a proposed facility complies with statewide
12 planning goals adopted by the Land Conservation and
13 Development Commission. Is that your understanding?

14 A Yes, it is.

15 Q One way that Council can make that finding
16 is by determining that a proposed facility complies
17 with applicable substantive criteria from an affected
18 local government's acknowledged comprehensive plan
19 and land-use ordinances. Is that your understanding
20 as well?

21 A Yes, it is.

22 Q Council bases, as Ms. Pease referenced
23 earlier, that that determination is based on the
24 acknowledged comp plan and land-use ordinances that
25 are in effect on the date the applicant submits its

Deposition of Scott Hartell

1 application for a site certificate. Do you know when
2 Idaho Power submitted its application for a
3 site certificate?

4 A I believe it was in 2012, but I'm not
5 positive.

6 Q I'll state for the record that it was in
7 late February of 2013. Does that sound consistent
8 with your -- your knowledge?

9 A Yes.

10 Q Was the Union County zoning ordinance that
11 was in effect in February of 2013 based on a
12 comprehensive plan that had been acknowledged by the
13 Oregon Land Conservation and Development Commission?

14 A Yes, it was.

15 Q Do you believe that Idaho Power Company's
16 evaluation of the potential impact of the Boardman to
17 Hemingway transmission line on forest land is
18 consistent with Union County's zoning -- zoning
19 ordinances that were in effect in February of 2013?

20 A Yes.

21 Q Do you believe that the proposed Boardman
22 to Hemingway transmission line is consistent with the
23 Union County comprehensive plan and zoning ordinances
24 in effect in February 2013?

25 A Yes.

Deposition of Scott Hartell

1 MR. ROWE: Thank you. That's all I
2 have.

3 MR. GILLIS: Ms. Gilbert, do you have
4 any follow-up questions?

5 MS. GILBERT: Well, one question I would
6 have is that Scott indicated he had not used the
7 state comprehensive plan in making his decisions
8 regarding forest land, so -- and -- and he also made
9 the statement that it was consistent with that so I'm
10 -- I'm trying to figure out how he knows it's
11 consistent and --

12 MS. PEASE: Object. I -- I -- I don't
13 recall Mr. Hartell saying that. I guess I'm asking,
14 is that Ms. Gilbert --

15 MS. GILBERT: (Indiscernible) --

16 MS. PEASE: -- (indiscernible) for Scott
17 or for Mr. Hartell?

18 MS. GILBERT: I -- Patrick Rowe asked
19 the question if it was consistent with the state
20 comprehensive plan and Mr. Hartell said, yes, it was.

21 MR. ROWE: I --

22 MS. GILBERT: (Indiscernible).

23 MR. ROWE: No. Ms. Gilbert, I asked if
24 it was the -- the Union County comprehensive plan and
25 zoning ordinances.

Deposition of Scott Hartell

1 MS. GILBERT: The Union County
2 comprehensive plan is the plan dated April -- the --
3 the Union County comprehensive plan is the plan dated
4 April of 20 -- of 1978. That is the only official
5 state-accepted comprehensive plan.

6 So I -- I believe that Mr. Hartell
7 only referenced the Union County planning, zoning,
8 subdivision ordinance. That would be the only one
9 that he could respond to one way or the other.

10 EXAMINATION

11 BY MS. GILBERT:

12 Q Is that true, Scott?

13 MR. BAUM: I'm going to object to the
14 form of the question and ask you to restate the
15 question.

16 BY MS. GILBERT:

17 Q Okay. Scott, did you, in any way, use
18 the -- the Union County comprehensive plan accepted
19 by land use -- the -- the LCDC? And that would be
20 the exhibit dated April 1978, Union County State
21 Comprehensive Plan. Did you use that at all in your
22 evaluation of what was forest land?

23 A Well, it -- yes, I did. Because it would
24 have been reflected -- that's a policy document that
25 you're referencing and it would have been reflected

Deposition of Scott Hartell

1 in the regulatory side of it in the zoning ordinance.

2 So, yes, both documents were used.

3 Q Did you reference the document specifically
4 or did you only base your decisions on the local
5 zoning, partitioning ordinance?

6 A Did I -- I guess --

7 Q Did you -- did you read it?

8 A -- I need clarification.

9 Q Did you -- did you reference it in your
10 decisions or did you base your recommendations
11 entirely on the Union County zoning, partitioning,
12 subdivision ordinance? I think you've answered the
13 question, but (indiscernible).

14 A Okay. I'm having trouble. Did I reference
15 what?

16 Q The State Comprehensive Plan. Did you read
17 the plan? Did you reference it? Did you use it
18 directly in your decisions regarding the
19 identification of forest land or did you base your
20 recommendations entirely on the Union County
21 planning, zoning ordinance?

22 MS. PEASE: Objection. Lack of
23 foundation.

24 MS. GILBERT: In the application, Idaho
25 Power made the recommendation that -- that since

Deposition of Scott Hartell

1 Mr. Hartell had not used the State Comprehensive Plan
2 to make his substantive -- identify substantive
3 issues, that they accept the use of the Union County
4 zoning and petitioning subdivision ordinance.

5 MS. PEASE: Objection. Lack of
6 foundation.

7 MS. GILBERT: Okay. I guess I'll
8 address it in my arguments --

9 MR. GILLIS: Well, you --

10 MS. GILBERT: -- but --

11 MR. GILLIS: -- you can ask a question.

12 BY MS. GILBERT:

13 Q Okay. I'm still asking the question. I
14 would like to know if you referenced the state
15 plan -- State Comprehensive Plan in your decisions or
16 if you based it entirely on the Union County
17 ordinance?

18 MR. BAUM: And the -- and the objection
19 I wanted to register is this has been asked and this
20 has been answered already by my client.

21 MS. GILBERT: I think he said that he
22 used the state plan, but --

23 MR. BAUM: Yeah. And my objection is
24 he's been asked and he's already answered this
25 question.

Deposition of Scott Hartell

1 MS. GILBERT: Okay. Well, that's not
2 what the application says, but okay. I guess I'll
3 accept that then. I guess I have to accept it.

4 BY MS. GILBERT:

5 Q And, once again, just to confirm, you are
6 not aware of what the -- the standard is for cubic
7 feet per acre per year for forest land in Eastern
8 Oregon, that there is a standard.

9 So I'm -- I guess I'm -- I'm still confused
10 about why you made the determination that -- that
11 63 cubic feet per acre per year and greater
12 identified forest land per the soils classification
13 because those are the only ones on your -- on your
14 sheet.

15 There's nothing with less than that
16 (indiscernible) cubic feet per acre capacity of the
17 soil. Where did that come from? Where -- where was
18 that decision made, I guess, or how did you make that
19 decision when it was made?

20 A If you're referencing the -- what is it --
21 Exhibit --

22 Q Exhibit 1.

23 A -- 1, soils chart determination, you'll see
24 the date on that is 1993.

25 Q Uh-huh.

Deposition of Scott Hartell

1 A As Mr. Rowe asked me when I became employed
2 with Union County, it was 1995.

3 Q Mm-hmm.

4 A So I have not gone back and looked at the
5 soil study, nor the -- the BLCD involvement in that
6 soil study. So I can't answer those questions
7 for you.

8 Q Yeah, and -- yeah. Right. I can accept
9 that.

10 Okay. I'm just -- I'm just basically
11 confused about -- about what kind of cubic feet per
12 acre per year of capacity of these soils that you're
13 calling range or agricultural since it's not on this
14 chart.

15 And, apparently, there -- you're not aware
16 of there having been any evaluation of that to
17 determine if any -- any of these things that are
18 being called agricultural or range land actually have
19 a -- a capacity that would qualify them as forest
20 land.

21 A Since I wasn't here in 1993, I cannot
22 speak intelligently --

23 Q Okay.

24 A -- to that document and how it was
25 developed and reviewed by the State and accepted

Deposition of Scott Hartell

1 by the State is a part of what we implement in
2 Union County.

3 Q Okay.

4 A I can tell you it is a part of the
5 acknowledgement from the State that Union County is
6 in compliance with operating the statewide
7 planning program.

8 Q Okay. But there were no updates made since
9 then. There are no -- this -- this chart has been
10 just the way it is now since 1993 and you did not do
11 any current evaluation of soil capacity in these
12 combined zones?

13 A No.

14 MS. GILBERT: Okay. Thank you.
15 That's it.

16 MR. GILLIS: All right. I believe,
17 unless there's any other questions or comments, that
18 we're -- Owe can conclude this deposition.

19 MS. PEASE: I have one brief follow-up
20 question for Mr. Hartell if I may.

21 EXAMINATION

22 BY MS. PEASE:

23 Q So as it relates to the Union County
24 Comprehensive Plan, is -- is that the source for
25 the zoning designations: For example, the timber

Deposition of Scott Hartell

1 grazing zone?

2 A Correct. The -- the comp plan is the
3 policy document and then it shifts onto the zoning
4 ordinance, the Union County zoning, partition and
5 subdivision ordinance and the zones that implement
6 the policies from the comprehensive land-use plan.

7 Q So is it accurate to say that the zoning
8 and subdivision, partition ordinance, that those --
9 those ordinances implement the comprehensive plan?

10 A Yes, it is.

11 MS. PEASE: Thank you. No further
12 questions.

13 MR. GILLIS: Nothing else?

14 All set. Thank you. So that concludes
15 our deposition today. I thank all participants
16 and --

17 MR. ROWE: Just a -- a point of
18 (indiscernible) question. How will the transcript
19 for this deposition and our prior deposition --
20 are -- are those going to be circulated to all the
21 participants?

22 MS. ANDREW: They -- they will be
23 circulated when they are transcribed. The
24 transcription that we had for the rural fire chief,
25 Patrick, the woman cut her hand with the -- with the

Deposition of Scott Hartell

1 knife peeling an avocado and taking the pit out, so
2 she had to go to surgery, so that got delayed.

3 And then we had to find another one and
4 that MP3 just went to her a couple days ago, the new
5 one. And that's the one we'll be using for this one
6 as well, so sorry if that was not communicated to
7 you. But there's a delay in that, the fire chief
8 one. This one should be whatever they do, ten days
9 or two weeks.

10 MR. ROWE: Okay.

11 MS. ANDREW: Okay. So as soon as we
12 have them, you'll get them.

13 MR. ROWE: Great. Thank you.

14 MS. PEASE: Okay. And a question, too.
15 If -- if we could get a copy of the audio when that's
16 available, we would appreciate it, too.

17 MS. ANDREW: Oh, okay. Yeah. Jim will
18 take care of that, I think, if he's in the --

19 MS. PEASE: Thank you.

20 MS. ANDREW: Okay.

21 MS. PEASE: And -- and -- and also for
22 the Kretschmer deposition.

23 MS. ANDREW: And the what?

24 MS. PEASE: Thank you. For the -- for
25 the prior deposition as well, we would appreciate --

Deposition of Scott Hartell

1 MS. ANDREW: Yeah, I'll -- yeah. Okay.

2 MS. PEASE: -- (indiscernible).

3 MS. ANDREW: Mm-hmm, yes.

4 MR. GILLIS: Great.

5 MS. ANDREW: All right.

6 JIM KREIDER: I -- I just have a quick
7 question. Since those files are fairly large, do you
8 have a Dropbox or a Google drive or something like
9 that that I could drop it into? Or I --

10 MS. PEASE: I don't -- I -- is that
11 Jim speaking?

12 JIM KREIDER: Yes, that -- that is Jim.

13 MS. ANDREW: And, Jim,
14 (indiscernible) --

15 MS. PEASE: I will connect with our
16 legal assistant and -- and figure out the best way to
17 receive that. And I'll follow back up with you
18 by e-mail --

19 JIM KREIDER: Okay.

20 MS. PEASE: -- if that's okay.

21 JIM KREIDER: That would be good. If --
22 if not, I could potentially put it on our Google
23 Drive. But it is a less secure environment.

24 MR. ROWE: Would you -- would you mind
25 sending an e-mail to me and to Kellen Tardaewether

Deposition of Scott Hartell

1 making that request? And then I suspect that Kellen
2 will be in the best position to respond on behalf of
3 the Department.

4 JIM KREIDER: Okay. Will do. Will do.

5 MR. ROWE: Thank you.

6 JIM KREIDER: Okay. Okay. With that, I
7 guess we will conclude this deposition. Thank you,
8 everybody, for attending today.

9 MR. ROWE: Thank you.

10 JIM KREIDER: Have a good rest of the
11 day. Bye-bye.

12 MS. ANDREW: Thank you.

13 MS. PEASE: Bye-bye.

14 * * *

15 (Conclusion of Deposition, 6-10-21 at 11:55 a.m.)
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Reporter's Certificate

1 STATE OF OREGON)
) ss.
2 County of Union)

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I, Katie Bradford, Certified Shorthand Reporter for Oregon, hereby certify that I transcribed a recorded deposition of **SCOTT HARTELL**, taken on June 4, 2021, scheduled at 10:00 a.m.; that at said time and place set forth in the caption, the testimony of said witness was recorded on an MP3 recorder and transcribed in stenotype and reduced to computer-aided transcription under my direction; and that the foregoing transcript, *Pages 1 through 88*, both inclusive, constitutes a full, true and accurate record of the testimony given by said witness, and of all other oral proceedings had during the taking of said deposition and so reported by me in stenotype as aforesaid.

Witness my hand and CSR Seal at
Portland, Oregon, this 19th day of June, 2021.

Katie Bradford, CSR 90-0148
Court Reporter
(503) 267-5112

Pilot Program Soil Ratings for Union County

March 16, 1993

T: Grande Ronde Terrace

M: Mountain

B: Bottom

CFT: Cricket Flat Terrace

NPT: North Powder Terrace

F: Foothill

Symbol	Map Unit Name	Crop	Forest	Range	Land	AC/ AUM	Cubic Feet
1B	Alicel Fine Sandy Loam	X			T		
2B	Alicel Loam	X			T		
3C	Alicel Silt Loam	X			T		
4E	Anatone Extremely Stony Loam			X	M	3.0	
5E	Anatone-Rocker Complex			X	M	4.2	
6F	Anatone-Klicker Complex			X	M	4.4	63
7	Catherine Silt Loam	X			B/T		
8	Catherine Silty Clay Loam	X			B/T		
9A	Conley Silty Clay Loam	X			B		
9B	Conley Silty Clay Loam	X			B		
10A	Coughanour Silt Loam	X			NPT		
10B	Coughanour Silt Loam	X			NPT		
10C	Coughanour Silt Loam	X			T		
11C	Cowsly Silt Loam	X			CFT	3.0	99
11D	Cowsly Silt Loam		X		M	3.0	99
12D	Cowsly Very Stony Silt Loam		X		M	3.0	99
13C	Emily Silt Loam		X		M	2.7	106
14C	Emily Cobbly Silt Loam		X		M	2.7	106
15C	Encina Silt Loam			X	NPT	2.3	

3A	ԴՊՇԻՅԱՊԵ ՉԻՂԱ ԸՅԱԿ ԼՕՅԱՄ	X				B		
3B	ԴՊՇԻՅԱՊԵ ՉԻՂԱ ԼՕՅԱՄ	X				B		
32E	ՔՐԻՏԿԵԼ -ՎՅԱԳՈՒՇ ԸՕՄԻԵԼՅԱԶ		X			Մ	ՏՑ	03
34E	ՔՐԻՏԿԵԼ ՉԻՈՒԿ ՉԻՂԱ ԼՕՅԱՄ		X			Մ	ՎԻ	03
33E	ՔՐԻՏԿԵԼ ՉԻՈՒԿ ՉԻՂԱ ԼՕՅԱՄ		X			Մ		00
33E	ՔՐԻՏԿԵԼ ՉԻՈՒԿ ՉԻՂԱ ԼՕՅԱՄ		X			Մ	ՏՆ	03
35E	ՔՅԱՄԵՅԱ ՎԵԼԱ ՉԻՈՒԿ ՉԻՂԱ ԼՕՅԱՄ		X			Մ	ՅՐ	80
3I	ԼԵԴ ՉԻՂԱ ԼՕՅԱՄ	X				B		
30B	ԽԱՐԻՇԵԼ ԲԻՇԵ ՉԻՂԱԿ ԼՕՅԱՄ	X				L		
ձ0B	ԽԱՐԻՇԵԼ ԸՕՄԻՆԵ ՉԻՂԱԿ ԼՕՅԱՄ	X				L		
ձ8E	ՄԱՐՇԻՄԱՅՈՒՆ ՎՅԱԳՈՒՇ ՉԻՂԱ ԼՕՅԱՄ		X			ՄԲԼ	ՏՆ	82
ձ8C	ՄԱՐՇԻՄԱՅՈՒՆ ՎՅԱԳՈՒՇ ՉԻՂԱ ԼՕՅԱՄ		X			ՄԲԼ	ՏՆ	82
ձՆD	ՄԱՐՇԻՄԱՅՈՒՆ ԸՐՅԱԿԻԿ ԸՅԱԿ ԼՕՅԱՄ			X		ՄԲԼ		
ձ0C	ՄԱՐՇԻՄԱՅՈՒՆ ՉԻՂԱ ԼՕՅԱՄ	X				ՄԲԼ		
ձ0B	ՄԱՐՇԻՄԱՅՈՒՆ ՉԻՂԱ ԼՕՅԱՄ	X				ՄԲԼ		
ձ2	ՈՐԻՇԵԼ ՉԻՂԱ ԼՕՅԱՄ	X				B	ՕՐ	
ձ4	ՈՐԻՇԵԼ ՎՅԱԳՈՒՇ ՉԻՂԱ ԼՕՅԱՄ	X				B	ՕՐ	
ձ3	ՈՐԻՇԵԼ ԲԻՇԵ ՉԻՂԱԿ ԼՕՅԱՄ	X				B	ՕՐ	
ձ5	ՈՐԻՇԵԼ ՉԻՂԱ ԼՕՅԱՄ	X				B	ՕՐ	
ձ1E	ՈՐԻՇԵԼ ՉԻՂԱ ԼՕՅԱՄ		X			Մ		132
ձ1E	ՈՐԻՇԵԼ ՉԻՂԱ ԼՕՅԱՄ		X			Մ		132
ձ0E	ՈՐԻՇԵԼ ԲՅԱԿԻ ՉԻՂԱ ԼՕՅԱՄ		X			Մ	ՎԻ	02
10E	ՈՐԻՇԵԼ ԲՅԱԿԻ ՉԻՂԱ ԼՕՅԱՄ		X			Մ		02
10E	ՈՐԻՇԵԼ ԲՅԱԿԻ ՉԻՂԱ ԼՕՅԱՄ		X			Մ	ՏՆ	02
18E	ՇԱՄԻԿԱ-ԲՕՏԿԻԿ ԸՕՄԻԵԼՅԱԶ			X		ԷՄ	03	
18E	ՇԱՄԻԿԱ-ԲՕՏԿԻԿ ԸՕՄԻԵԼՅԱԶ			X		ԷՄ	ՎՅ	
12E	ՇԱՄԻԿԱ ՎԵԼԱ ԸՕՐԻԿ ԸՅԱԿ ԼՕՅԱՄ			X		ԷՄ	ՅՐ	
12D	ՇԱՄԻԿԱ ՎԵԼԱ ԸՕՐԻԿ ԸՅԱԿ ԼՕՅԱՄ			X		ԷՄ	ՏՐ	
10E	ԲՅԱԿԻ ՉԻՂԱ ԼՕՅԱՄ			X		ՄԲԼ	ՅՐ	
12E	ԲՅԱԿԻ ՉԻՂԱ ԼՕՅԱՄ			X		ՄԲԼ	ՏՐ	
ՁԽԻՐՈՂ	ՄԱՅՐ ԸՄԻՆ ՄՅԱՄԵ	ՇՐՈՒՅ	ԲՕՐՇԵԼ	ԲՅԱԿԵ	ԼՅԱԿ	ՄԲԼ ՎՇ	ԲԵԵԼ ՇՐԻԿ	

28E	ԼՕԵԶ ԶԻՒ ԴՕՅԱՄ		X		Մ		105
28E	ՉԻՏԻԿԵՆ ԱՇԼԱ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ			X	Է	ՏՂ	
22E	ԽԱՐԿԻՔՆ ԱՇԼԱ ՉԻՕՆԱ ՇԻՒ ԴՕՅԱՄ			X	Է	ՎՅ	
22E	ԽԱՐԿԻՔՆ ԱՇԼԱ ՉԻՕՆԱ ՇԻՒ ԴՕՅԱՄ			X	Մ	ՎՅ	
22C	ԽԱՐԿԻՔՆ ԱՇԼԱ ՉԻՕՆԱ ՇԻՒ ԴՕՅԱՄ			X	Մ	ՎՅ	
20E	ԽՕԼՁԻ ԱՇԼԱ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ			X	Մ	ԻՅ	
20E	ԽՕԼՁԻ ԱՇԼԱ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ			X	Մ	ԻՅ	
22D	ԽՕՏԻԿԱ ԸՄԽԱՑԱՆԵԿԱ ՉԻՕՆԱ ԴՕՅԱՄ			X	Մ	ՉՊ	
24C	ԽՅԱՄՈ ԱՅԻՅԱՆԻ ՉԻՒ ԴՕՅԱՄ	X			Է		
23C	ԽՅԱՄՈ-ՇՈՒՄԵԿ ԸՈՒՄԻՅԵՔ			X	Է		
25C	ԽՅԱՄՈ-ՇՈՒՄԵԿ ՉԻՒ ԸՄԽԱՑԱՆԵԿ ԴՕՅԱՄ	X			Է	ԴԻ	
21D	ԽՅԱՄՈ ԱՇԼԱ ՉԻՕՆԱ ՉԻՒ ԸՄԽԱՑԱՆԵԿ ԴՕՅԱՄ			X	Է	ԴՊ	
20D	ԽՅԱՄՈ ՉԻՒ ԸՄԽԱՑԱՆԵԿ ԴՕՅԱՄ	X			Է		
20C	ԽՅԱՄՈ ՉԻՒ ԸՄԽԱՑԱՆԵԿ ԴՕՅԱՄ	X			Է		
ՎԹ	ԽԻՏ՝ ՇԻՏԱԿԵԼ						
Վ8B	ԽԻՏ ՇԻՏԱԿԵԼ ԶԻՒ ԴՕՅԱՄ			X	Է	ԴՅ	
Վ2B	ԽԻՏ ԶԻՒ ԴՕՅԱՄ	X			Է	ԴՅ	
ՎՊE	ԽՅՈՒՄՆԵՔ ԶԻՒ ԴՕՅԱՄ			X	ՇԷԼ	ԴՂ	
ՎՊD	ԽՅՈՒՄՆԵՔ ԶԻՒ ԴՕՅԱՄ	X			ՇԷԼ		
ՎՊB	ԽՅՈՒՄՆԵՔ ԶԻՒ ԴՕՅԱՄ	X			ՇԷԼ		
Վ2E	ՕԵՐ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ		X		Մ		
Վ2E	ՕԵՐ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ		X		Մ		105
Վ4C	ՕԵՐ ՉԻՒ ԴՕՅԱՄ		X		Մ		105
Վ3C	ՆՕՒՄԻ ԲՈՒՂՁԻ ԴՕՅԱՄ			X	Մ		105
Վ5D	ՄՇՄԱՐԿԵ ՉԻՒ ԴՕՅԱՄ՝ ԲԵՏԻՈՒՔ ՉԻՒ	X			Է	ՏՎ	
Վ5C	ՄՇՄԱՐԿԵ ՉԻՒ ԴՕՅԱՄ՝ ԲԵՏԻՈՒՔ ՉԻՒ	X			Է	ԴՊ	
Վ1D	ԼՕՕԿՈՒՄ ԱՇԼԱ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ			X	Է	ՏՅ	
Վ0C	ԼՕՕԿԱՆՆԵՐՆԵՐ ԱՇԼԱ ՉԻՕՆԱ ՉԻՒ ԴՕՅԱՄ		X		Է	ՏՂ	82
32C	ԼՕՕԿԱՆՆԵՐՆԵՐ ՉԻՒ ԴՕՅԱՄ		X		Է	ՏՂ	82
38E	ԼՕՈՒՄԻՆԵՐՆԵՐ ՉԻՒ ԴՕՅԱՄ		X		Մ		151
ՁԻՄԻՐԻ	ՄՅՐ ՄԱՐԻ ՆԻՅԱՆԵ	ՇՐՈՒՄ	ԲՕՐԵՁԻ	ԽՅԱՆՁԵ	ԼՅԱՐԿ	ՎՄՄ ՎՇ	ԲԵՇԻ ՇՄԻՐԻ

115							
ՆՏԸ	Մոլոր ջիլ Լօսոս	X			Է		115
ՆԴ	Մաղալի ջիլ Լօսոս	X					
ՆՕԲ	Մալիկոս ջիլ Լօսոս			X	Մ	ՕՆ	
ՅԹԸ	Մարտոս-Շամլի Ըօմբլեք			X	Է/Մ	Դ՛	
ՅՏԸ	Մարտոս ջիլ Լօսոս՝ Մօլօր	X			Է	Դ՛	
ԵՆ	Վեռնի-Վօրն Ըօմբլեք	X			Բ		
ԵԹ	Վեռնի-Վօրն Ըօմբլեք	X			Բ		
ԵՂ	Ուրան Լանդ-Վեռնի Ըօմբլեք						
ԵՊԸ	Ուրան Լանդ-Բանո Ըօմբլեք						
ԵՂ	Ուրան Լանդ-ԼաՇիսուր Ըօմբլեք						
ԵՏ	Ունայրու ջիլ Լօսոս			X	ԲՎ	Օ՛	
ԵԴԵ	Ուրան-Ջեռնիկ Ըօմբլեք			X	Է	Տ՛	
ԵՕԸ	Ուրան ջիլ Ըլայ Լօսոս			X	Է	Դ՛	
ՅԹԷ	Դօլօ ջիլ Լօսոս		X		Մ		105
Ջարթ	Մայ Ուրի Մարու	Շոթ	Բօլեթ	Բարց	Լանդ	ՎԱՄ ՎԸ	ԲԵԷ Շիլի

Valuation Guidelines for Properties with Electric Transmission Lines

By: Kurt C. Kielisch, ASA, IFAS, SR/WA, R/W-AC

Before a discussion can be entered about the perception of electric transmission lines and their effect on property value, it is important to understand what a transmission line is and how it differs from a distribution line.

An electric *transmission* line is an electric line that transports electrical power from one substation to another. These lines are typically 100kV (kilovolts) or larger exceeding one mile in length¹, have large wood or steel support towers over 45ft in height, and often have more than one set of wires (3 wires per circuit plus the static wire). Electric transmission lines do not directly serve electric utility customers: their power is distributed from distribution point to distribution point. Transmission line wires are not insulated and are "bare". Typically, they constructed to have at least 20ft of clearance between the ground elevation and wire at low sag.

An electric *distribution* line is a power line that transports electricity from the substation to the electric utility customers. These lines are of less voltage, typically under 65kV, carried on wood poles of 45ft in height or less and hold one pair of wires. The voltages of these lines are downgraded before the electricity is brought to the customer's residence or commercial building. The focus of this report is on "transmission" lines, not "distribution" lines

Perception = Value

The valuation of properties that have an electric transmission line requires an understanding of the basic principles of Market Value. Market Value is defined, in layman's terms, as the value a property would sell for at a given date considering an open market. (A complete definition of this term is included in the body of the appraisal report.) An open market assumes that the property is available for purchase by the public, being properly marketed for maximum exposure, and that the buyer is well informed, fully knowledgeable and acting in their best interest. Included in this definition is that the buyer has full knowledge of the pros and cons of the property, and then acts with that knowledge in a way that will benefit them. In other words, the value of the property is based on the perception of the buyer. Understanding that perception drives value is the foundation in analyzing the effect that electric transmission lines have on property value.

The key point of the Market Value definition, which gives guidance to answer the "impact" question, is the "willing buyer" part of the equation. In appraising a property the appraiser attempts to reflect the potential buyer of the subject property and estimate their action as to the subject property with all its advantages and disadvantages (knowledgeable buyer). To accurately reflect this buyer, the appraiser must determine the typical profile of such a buyer of the property in question. An example of this

¹ Wis. Stat. 196.491(1)(f)

would be a one bedroom condominium along a lake may indicate a typical buyer to be a retired couple who is looking for a recreational retreat for themselves and their guests. Another example would be a parcel with the best use being a dairy farm; the typical buyer would be a person either currently engaged in dairy farming looking to expand or relocate, or one who desires to enter into this field – in either case a "dairy farmer." Such an analysis should be obvious, yet often overlooked when appraising properties.

For rural properties that are utilized for agricultural purposes, the most likely buyer would be one who: (1) prefers the rural lifestyle over the urban lifestyle; (2) typically generates their income from working in the agricultural field; (3) would be sensitive to environmental issues that affect the uses of the land and the view shed of the land; and (4) would be sensitive to health and safety issues relating to the land and its use.

It is most likely that such a person, when confronted with an electric transmission line traversing the property, would view such an improvement as aesthetically "ugly," potentially hazardous to their health, disruptive to rural lifestyle and potentially harmful to the use of the land for agricultural purposes.

Research Format

Our research into the impact of electric transmission lines followed several stages. The first was a "literature" study. This study involved investigating, collecting, indexing and reading many of the published articles, news stories and published transcripts relating to the topics of EMFs and stray voltage. Stray voltage was included in this research due to the concern dairy farmers have relating to its presence from high voltage power lines. This research resulted in over 2,500 pages of information collected and analyzed. The purpose of this study was to discover "what is the public's perception of high voltage transmission lines." Overall, the majority of the articles indicated a "fear" of these power lines, citing health concerns as the primary factor. Other concerns included stray voltage issues (mainly with rural publications) and aesthetics. It was clear that most of the information the public receives about these matters is negative. The literature study will follow these "guidelines."

The second part of our study involved researching studies completed on the effects on property value due to the presence of electric transmission lines. This included collecting many of the published research studies on this topic found in the public domain. Additionally, the study reviewed trade journals not available to the public, but available only to real estate professionals. Again, to be fair, some of the studies indicated that there was no measurable effect. However, there were a number of studies (mostly recent) that indicated there was a measurable effect and that effect ranged from a loss of 10% to over 30% of the overall property value. These studies included both improved and vacant land.

Empirical Studies

Below is a sampling of some studies we have reviewed regarding the impact that electric transmission lines have on land value and were utilized to formulate our opinion of value when a property is impacted by a high voltage transmission line.

- *Study of the Impact of a 345kV Electric Transmission Line in Clark County, Town of Hendren.*

(Appraisal Group One, Kurt C. Kielisch, 2006, revised 2009) This study was limited to Hendren Township, Clark County, and covered a five year time period from January 1st, 2002 to June 1st, 2006. This study included 22 land sales of agricultural and recreation land, of which 4 were encumbered with a 345kV electric transmission line having wood H-pole design, 60ft height and 150ft wide easement. The other 18 land sales were considered comparable to the power line encumbered sales. The conclusion of this study was that: (a) the land sales with an electric transmission line sold for 23% less than comparable land sales without a transmission line; and, (b) the more severe the location of the power line the greater was the loss of value.

- *An Impact Study of a 345kV Electric Transmission Line on Rural Property Value in Marathon County - Wisconsin.* (Appraisal Group One, Kurt C. Kielisch, 2006) This study focused on the impact a 345kV line, known as the Arrowhead-Weston line, had on property value. This power line was a 345kV electric transmission line, having steel single poles ranging in height from 110ft to 150ft, single and double circuit lines, having a 120ft wide easement. The study compared sales within a 2 year time period (January 1st, 2004 to December 31st, 2005) in Marathon County, Wisconsin, focusing the area to the Townships of Cassel and Mosinee. This study used 14 land sales, of which 5 were encumbered with the power line and 9 were not. A simple regression technique and matched pair analysis was used to extract the value impact. The study concluded with a finding that when the power line traversed the property along the edge, such as a back fence line, the loss was as low as -15%, and when it bisected a large parcel the loss was as high as -34%. The properties were all raw land sales with either agricultural or residential land use.
- *Transmission Lines and Property Values State of the Science* (Electric Power Research Institute [EPRI], 2003). This study completed by EPRI for the benefit of its electric utility clients reviewed the issue of property values being impacted by electric transmission lines by summarizing research they had on the subject. Essentially they concluded that the results are mixed, some cases showing a loss in value ranging from 7-15% with appraisers who had experience with valuing such properties, to having no effect. Interestingly, it appeared in their survey that appraisers who did not have experience valuing such properties tended to overrate the negative effects.
- *American Transmission Company, Zone 4, Northeast Wisconsin - High Voltage Transmission Line Sales Study* (Rolling & Company, 2005). This study researched the impact that high voltage electrical transmission lines have on property value in the northeast Wisconsin area. They collected information on 682 land sales of which 78 involved lots near a transmission line corridor, but not directly encumbered by the transmission line. Their conclusions were: (a) easement lots sold at about 12% less than lots located over 200ft from the transmission lines; and (b) no clear impact on "proximity" lots those that lie within 200ft from the easement area but are not directly subject to the easement.

- *Properties Near Power Lines and Valuation Issues: Condemnation or Inverse Condemnation* (David Bolton, MAI. Southwestern Legal Foundation. 1993). This study cites a number of studies that prove a loss of property value due to proximity to an electric transmission line and then cites his own study. His own study found that in the Houston area assessed values of properties that adjoined a power line easement had a 12.8% to 30.7% lower assessment than the average homes not on the line, but in the same area. He also found that: (1) many buyers refused to even look at such properties; (2) such properties took at least twice as long to sell; (3) some brokers said such properties can take three times longer and finally sell at a 25% loss of value; and (4) overall homes adjoining transmission line easements took six times longer to sell and experienced a 10% to 30% loss in value.
- *Power Line Perceptions: Their Impact on Value and Market Time* (Cheryl Mitteness and Dr Steve Mooney. ARES Annual Meeting paper. 1998) The authors interviewed homeowners on or near electric transmission lines and found: (1) that in relation to the average impact of overall property value, 33% said 2-3% loss and 50% said a 5% loss or greater; (2) nearly 66% said the power line negatively affected their property value; (3) 83% of real estate appraisers surveyed said the presence of the power lines negatively affected the property values, most saying the loss was 5% or greater.
- *Analysis of Severance Damages* (James Sanders, SRA, 2007) This study completed an analysis of the impact of a transmission line through the middle of the Continental Ranch subdivision outside of the Tucson, Arizona area. This subdivision had a wood H-pole high voltage electric transmission line running through a portion of the subdivision. The author compared the residential lots abutting the easement to ones that were not. All lots abutting the easement were much bigger than the non-easement abutting lots. The author used improved properties for his study and by the use of regression analysis isolated many variables of value for an improved property to remove them from the analysis. In conclusion, through extensive use of the regression technique, the author finds an overall loss to the improved properties abutting the power line easement at -12%. This loss is attributed to both the land and improvements. However, the author notes that the lots are typically twice the size of the non-easement lots. When the size of lots was factored the overall loss to the land only was factored at -40%. It should be noted that the residences were at a distance from the power line.
- *The Peggy Tierney property: A Comparative Study of the Impact of a 69kV Transmission Line v. 345kV/69kV Transmission Line* (Kurt C. Kielisch). This was a brief study on the impact difference, if any, between an existing 69kV transmission line and a new proposed 345kV and 69kV transmission line on the same property. The property was a 3.70 acre residential lake front improved property that had an existing 69kV transmission line crossing the west half of the parcel along the road and required the property owner to cross under the power line to enter the parcel. The 69kV line had an easement width of approximately 100ft, wood H-poles at 50-60ft in height. The new 345kV line was to be placed within the existing easement, more or less, would have 140ft monopoles and carries both a 345kV and 69kV line. The seller attempted to sell the property at its full list price after an experienced lake front home Realtor established the list price from a comparative sales analysis. The home eventually sold for 27% less than the list price and took longer to sell in a relatively strong lake front home market. The buyer cited the pending 345kV line as the principle reason for their low offer.
- A comparative sales analysis to isolate the percentage of loss a residential and/or agricultural

land use property suffers due to the presence of a high voltage electric transmission line (HVTL). This study was found in an appraisal completed by Aari K. Roberts for American Transmission Corporation (ATC) on the Herbert Bolz property located in the Town of Rubicon, Dodge County, Wisconsin. Mr. Roberts compared the sale of a rural agricultural 24 acre land parcel that had an HVTL crossing the property, to three comparable agricultural land sales of comparability that did not have a HVTL. His sales comparison study concluded that the property with a HVTL suffered a 29% loss of value due to the presence of the HVTL. This study was completed in September 2007.

- A sales analysis of the property located at: N8602 CTH D, Town of Deer Creek, Outagamie County, Wisconsin. This is a single family home located on 3.19 acres in the rural area of Outagamie County. The home was a ranch style residence with 1,500sf GLA, attached 2-car garage, 8/3/2 room count, full basement and was in average condition overall. The property also had a 104ft x 52ft pole barn and two other outbuildings. There were two appraisals completed on this property, one by the condemner (ATC) and one by the property owner. The average Before taking value of the two appraisals was \$221,000. The property was then improved with a 345kV & 138kV electric transmission line having 126ft pole height and was placed along the roadside reaching 68ft into the property. The edge of the easement was in less than 20ft to the residence, however the placement of the pole was as close to the roadway right-of-way as possible. The condemner American Transmission Company (ATC) purchased the property and installed the transmission line. Then they upgraded the property with new paint, doors, sinks, dishwasher and flooring, plus cleaned the premises and outbuildings. ATC put the property on the market asking \$179,900 a number established by the appraiser for ATC as the After value. It was sold for \$128,500 10 months after ATC purchased it.

The Before taking average value was \$221,000. The property was then improved and upgraded at an expense estimated to be \$8,000-\$10,000, then resold 10 months later with the transmission lines in place for \$92,500 less or 42% less. The only differences between the Before taking market value and After taking sale price were the transmission line and time. A review of the Outagamie County market between November 2008 and September 2009 shows only a small downward trend in rural residential property value, therefore the biggest part of the loss is attributed to the presence and near proximity of the transmission line that being 38%-40%.

- *The Gene Laajafa property: A Comparative Study of the Impact of a 161kV Transmission Line v 345kV/161kV Transmission Line (Kurt C. Kielisch).* This was a brief sales study on the impact difference, between an existing 161kV transmission line and a new 345kV/161kV transmission line on the same property. The property was a 20 acre rural agricultural and residential property that had an existing 161kV transmission line bisecting the parcel along the east side. The 161kV line had an easement width of approximately 120ft, wood H-poles at 50ft± in height. This line was replaced with an upgraded easement comprised of 345kV/161kV line which was to be placed within the existing easement, more or less, and had (2) 110ft and (3) 120ft steel H-poles. The property was appraised in January 2007 with a Before condition value of \$204,500 using the Cost approach and \$185,500 using the Comparable Sale approach, by Ted Morgan, MAI. (The whole property appraised was 40 acres and the 20 acre parcel was portion out of this whole). The ATC appraiser did not appraise the home in the Before condition, but did conclude the Before taking land value was \$44,000 for 20 acres (using his \$2,200/acre conclusion for 40 acres) and the assessed value of the improvements were \$107,600, indicating a \$151,600 Before

value. The property sold and closed in October 2007 for \$120,000. The seller attributes the loss to the new power line, it being larger and more lines. The loss indicated was \$65,500 (using Morgan's Comparable Sales value) or \$31,600 (using ATC's land plus assessed improvement value), indicating a loss range of 35% to 21%.

- *An Impact Study of the Effect of High Voltage Power Lines on Rural Property Value in Southwestern Indiana (Kurt C. Kielisch, Appraisal Group One, 2010).* This study was based in southwest Indiana in Gibson County. It was focused on large agricultural land and the impact of a high voltage transmission lines (HVTL) varying in size from monopole to large steel lattice towers. The study included 32 land sales of which 10 were HVTL sales. The time period was January 1st, 2006 to December 31st, 2009. Adjustments were made for time, location and other utility easements (if any) and the results were graphed to compare the non-HVTL land sales to the HVTL land sales. The study concluded that the power lines negatively impacted the property with an impact range from -5% to -36% with the average impact being -20%.

Other Value Issues

Another issue relating to the presence of the transmission line is potential for the creation of an "utility" corridor. Such a corridor is a where several utility transmission lines are placed, such as gas transmission pipelines and communication lines. Indeed, the State of Wisconsin made it a legislative rule that future placement of such utilities are to be given preference to "existing utility corridors."² An electric transmission line meets the definition in this statute as an existing corridor. This "corridor" concept continues to grow in the perception of the public as such rules become more commonly known. The reality of such an event happening is the placement of the Arrowhead-Weston Power line, which was often placed within an existing utility corridor such as an oil transmission pipeline, smaller electrical transmission lines or abandoned electric transmission line easements. The very power line that is the focus of this analysis is further proof of the corridor effect for it has been expanded, enlarged and added circuits within the existing easement.

Other factors to consider regarding the valuation of HVTL impacted rural properties are agricultural equipment concerns operating under and near the line, health issues of workers in close proximity of the lines, health concerns of farm animals in close proximity of the lines, stray voltage, the concerns of public in relation to electro-magnetic fields, safety issues regarding bare wires of the transmission line and other concerns addressed in the literature study to follow.

In conclusion, it can be stated with a high degree of certainty that there is a significant negative effect ranging from -10% to -30% of property value due to the presence of the high voltage electric transmission line. The actual loss depends on factors of land use, location of the power line and its size.

² Wis. Stats 1.12(6)(a).

Literature Study

HVTL Impacts on Rural and Agricultural Properties

Throughout the nation's rural communities, literature research suggests that the presence of an HVTL easement can have a noticeable impact on both the use and appeal of rural properties and farms. Common concerns include stray voltage, health risks to livestock and cattle, diminished livelihoods and heritage, limited land use, and lessened aesthetic appeal. As the following literature survey will show, many different issues play a role in shaping one's perception of the impact of HVTLs on rural property values.

Stray Voltage

To understand the potential impact of HVTLs on rural land, it's important to discuss a key component in many farmers' apprehension about HVTLs: stray voltage.

Stray voltage is the rural equivalent of the high-profile residential Electromagnetic Field (EMF) factor, but instead of fearing leukemia or brain cancer, farmers fear their animals will become unproductive, ill, and even die.

Whenever energy is transferred, some is lost along the way. If metal buildings are near leaking energy, they can act as a conduit for voltage to find its way to feeding systems, milking systems and stalls.

In their 1995 presentation, "Stray Voltage: The Wisconsin Experience," a team of researchers led by Mark Cook and Daniel Dascho stated that farmers most worry that stray voltage will increase somatic cell count in their animals, make cows nervous, reduce milk production, and increase clinical mastitis.³

"Few issues are more upsetting to dairymen than fighting case after case of clinical mastitis with more and more cows in the sick pen," writes Dr. Winston Ingalls. "It represents extra time to properly handle such cows, lost production, vet calls, treatment products, concern about contaminated milk and an occasional dead or culled cow."⁴

In Cook & Dascho's presentation, they discuss their findings from a non-random sampling study of farms with stray voltage complaints stemming from a nearby substation. Their research team found no significant relationship between cow contact current and distance from the substation or contact currents. However, they also noted that cow contact current depends on many physical factors from on-farm and off-farm electrical power systems. They say, "There are many confounding factors that may outweigh the impacts of stray voltage which makes it difficult to draw conclusions from field studies about its effects on production and animal health."⁵

³ **Stray Voltage: The Wisconsin Experience.** Written for presentation at the 1995 International Meeting by Mark A Cook, Daniel M Dascho, Richard Reines and Dr. Douglas J Reinemann.

⁴ **Clinical Mastitis.** Winston Ingalls, Ph.D. GoatConnection.com. August 2, 2003.

http://goatconnection.com/articles/publish/article_173.shtml

⁵ **Stray Voltage: The Wisconsin Experience.** Written for presentation at the 1995 International Meeting by Mark A Cook, Daniel M Dascho, Richard Reines and Dr. Douglas J Reinemann.

In a 2003 study prepared for the NRAES Stray Voltage and Dairy Farms Conference, a research team conducted by the University of Wisconsin-Madison and led by Dr. Douglas J Reinemann studied the effects of stray voltage on cows at four dairy farms over a two-week time period. He and his team found that after the first few days of exposure, cows quickly acclimated to the presence of stray voltage. They also found that stray voltage of 1mA had little effect on the immune system of a cow.⁶

Concerning EMF levels, they noted that "even though man-made signals were larger than the naturally occurring currents, levels are significantly lower than what is considered sufficient earth current strength to develop step potential anywhere near the Public Service Commission 'level of concern.'"⁷

Stray voltage is usually undetectable by humans, and some researchers believe it occurs when electricity escapes a power line or wiring system and emits a secondary current. The problem intensifies with older barns that add automated electrical equipment, "raising ambient levels of current. Soon the cumulative effect of these secondary currents becomes harmful to cows." Though stray voltage can be measured, experts don't know how and why it happens or what conclusive effect (if any) it has on animals.⁸

Despite little concrete evidence, courts have compensated farmers for their losses due to stray voltage when all other factors are eliminated. In 1999 a jury awarded Peterson Bros. Dairy \$700,000 after deciding that stray voltage from an automated feeding system from Maddalena's Dairy Equipment of Petaluma, California slashed the herd's milk output and increased the cow's death rate.⁹

The company's defense attorney called stray voltage "junk science," the Petersons' claim of stray voltage in the milk barn a "harebrained theory" unsupported by electrical engineers, and blamed the herd's health problems on the Petersons' own mismanagement.¹⁰

In a similar case in Wisconsin in 2004, a dairy operation owned by George and Kathy Muth successfully sued Wisconsin Electric Power Co. (now We Energies) for negligence in the maintenance and operation of a distribution system on their farm. They claimed that the system led to stray voltage that injured and killed several of their dairy cows and damaged their milk production. The utility said that the levels of stray voltage were "extremely low" and were levels you could find anywhere.¹¹

6 Dairy Cow Response to the Electrical Environment: A Summary of Research conducted at the University of Wisconsin-Madison. Paper presented at the NRAES Stray Voltage and Dairy Farms Conference. Dr. Douglas J. Reinemann. April 2003.

7 Results of the University of Wisconsin Stray Voltage Earth-Current Measurement Experiment. A revised version of a report submitted to the State of Wisconsin Legislature on June 25, 2003. Written by David L. Alumbaugh and Dr. Louise Pellerin.

8 Jury gives \$700,000 to dairy farmers for losses blamed on "stray voltage." Author Unknown. The Associated Press. April 21, 1999.

9 Ibid.

10 Ibid.

11 Power company negligent in dairy suit; Jury awards \$850,000 to couple over effect of stray voltage on cows. Lauria Lynch-German. Milwaukee Journal Sentinel. February 27, 2004.

The farmers said that shortly after moving to their new location, they faced low milk production, excessive illnesses, and deaths of cows.¹² The cows didn't walk right or act normal. They didn't want to go into the barn, inside, or into the stalls. The Muths examined everything from the animals' food to their bedding until consultants told them it could be stray voltage. In one year, they lost 15-18 cows and calves. Autopsies were inconclusive.¹³

After reviewing herd management and nutrition, they hired a consultant who detected stray voltage. Later that year the utility found no stray voltage problems. The farmers further consulted with veterinarians and tested and ruled out all the other factors except for stray voltage.¹⁴

The farmers hired an electrician to upgrade the farm's wiring, but it didn't decrease the stray voltage. After being asked, the utility made some other changes, but this also had no effect. Further consultants still found stray voltage from a conductor on the utility's distribution lines. A couple years later the utility removed a piece of underground electrical equipment and the herd immediately recovered ...though the level of stray voltage remained the same.¹⁵

The utility's attorney stated that being able to measure something doesn't make it harmful. He cited several federal and state studies that say the current must be 2 milliamps or higher to adversely affect cattle and said no reading on their farm reached that level.¹⁶

The jury awarded the dairy farm \$850,000 in damages.¹⁷

Stray voltage fears aren't limited to dairy or cattle operations. Max Hempt, a horse farm owner in Pennsylvania, tried to oppose a proposed 9-mile 138kV HVTL because he feared that the line's EMFs caused by stray voltage could cause sterility and death among his horses.¹⁸

Though it's difficult to prove a significant presence of stray voltage, and even more difficult to prove a direct correlation between stray voltage and poor health, courts have awarded farmers sizable judgments to compensate them for damaging stray voltage from nearby power lines.

In 2002, one such case in Iowa made it to the state supreme court where the court upheld a \$700,000 judgment to a dairy farmer who argued that stray voltage from nearby power lines injured his herd. A substation sits less than a quarter mile from his farm. He said he often got electric shocks from the metal buildings on the farm. Also, he said his herd acted oddly, appearing frightened and refusing to enter barns. Milk production also suffered.¹⁹

12 Jury must decide in voltage complaint; Farm family says stray power harmed dairy herd. Lauria Lynch-German. Milwaukee Journal Sentinel. February 5, 2004.

13 Dairy farm owner testifies that stray voltage killed cows in his herd. Lauria Lynch-German. Milwaukee Journal Sentinel. February 10, 2004.

14 Jury must decide in voltage complaint; Farm family says stray power harmed dairy herd. Lauria Lynch-German. Milwaukee Journal Sentinel. February 5, 2004.

15 Ibid.

16 Ibid.

17 Power company negligent in dairy suit; Jury awards \$850,000 to couple over effect of stray voltage on cows. Lauria Lynch-German. Milwaukee Journal Sentinel. February 27, 2004.

18 Farmer Fears Stray Voltage From PP&L 138 kV Line Could Harm His Horses. Author Unknown. Northeast Power Report. June 24, 1994.

19 Court upholds stray voltage judgment. Mike Glover. The Associated Press. October 10, 2002.

The defendant, Interstate Power Co., said that "there's an inherent risk to transmitting electricity" and it shouldn't be vulnerable to such lawsuits unless they were negligent. The court ruled in favor of the dairy farmer, citing the lack of a statute exempting electric utilities from nuisance claims.²⁰

One year later the Wisconsin Supreme Court similarly found "that a utility can be held responsible for harming the health of a dairy herd with stray voltage even though state-recommended voltage tests did not find potentially damaging levels where the animals congregated."²¹

As the preceding case studies show, courts have acknowledged stray voltage and its possible effects. However, to fully understand the apprehension surrounding power lines, one must examine the EMF debate and its fear factor.

EMFs and Fear

In 1990, the EMF debate was so prevalent that members of Congress passed a bill that would limit the public's exposure to EMFs.²² A couple years later, in response to public concern about EMFs, Congress established the EMF-RAPID program in 1992. Its purpose was to coordinate and execute a limited research program to fill information gaps concerning the potential health effects of exposure to EMFs, to achieve credibility with the public that previous research has not earned, and to coordinate and unify federal agencies' public messages about possible EMF effects.²³ The program originally was to receive \$65 million in funding, but total funding is expected to be \$46 million.²⁴

Several years later in 1999, the National Institute of Environmental Health Sciences studied the health effects of EMF exposure and found conflicting results. Though they concluded that the evidence is weak linking EMFs to health risks, they also found that the most common health risk was leukemia (mostly appearing in children). They also found a fairly consistent pattern of a small, increased risk of childhood leukemia with increasing exposure. The majority of the panel's voting members voted to acknowledge EMFs as a possible human carcinogen. They concluded that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence.²⁵

In 2005, UK scientists conducted a case-control study on childhood cancer in relation to distance from high voltage power lines in England and Wales. They found an association between childhood leukemia and proximity of home address at birth to HVTLs. "The apparent risk extends to a greater distance than

²⁰ **Ibid.**

²¹ **Utility liable for stray voltage, high court says.** Don Behm. Milwaukee Journal-Sentinel. June 26, 2003.

²² **Electric Powerlines: Health and Public Policy Implications** - Oversight Hearing before the Subcommittee on General Oversight and Investigations of the Committee on Interior and Insular Affairs House of Representatives, 101st Congress, second session on electric powerlines: health and public policy implications. March 8, 1990.

²³ **Electric and Magnetic Fields Research Program** by Mr. Mukowski from the Committee on Energy and Natural Resources. 105th Congress, first session. June 12, 1997.

²⁴ **Ibid.**

²⁵ **NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields.** Released by the National Institute of Environmental Health Sciences on May 4, 1999.

would have been expected from previous studies" although they have yet to discover an "accepted biological mechanism" to explain their results.²⁶

Though an accepted biological mechanism remains elusive, an early nineties case made it possible to link loss of property value to a fear of EMFs. In the 1993 case, *Criscuola v. Power Authority of the State of New York*, the court found that, "there should be no requirement that the claimant must establish the reasonableness of a fear or perception of danger or of health risks from exposure to high voltage power lines" and "Whether the danger is a scientifically genuine or verifiable fact should be irrelevant to the central issue of its market value impact."²⁷

Utilities say that landowners should not be able to recover damages or injunctive relief "based on myth, superstition or fear about an alleged health risk that is not supported by substantial scientific or medical evidence."²⁸

With the EMF debate unresolved, and evidence for both sides of the argument, some communities are reluctant to approve new HVTLs...and may even legally oppose them.

In an effort to preempt public opposition, Public Service Enterprise Group offered hundreds of thousands of dollars to New Jersey towns opposing its proposed HVTL project if the towns dropped all opposition and didn't comment on the payments. Opponents called them "bribes."²⁹ The utility called them "settlements" to help minimize impacts of the project on towns and residents.

Some towns accepted payment, but the majority did not. Either they said they didn't have enough time to respond to the offer, or they rejected them as payoffs. One of the opposing mayors, Mayor James Sandham of Montville, said it's not about the money; "It's about safety and property values."³⁰

HVTLs and Property Values

Fear can impact the public's buying habits. Residential homeowners' resistance to abutting HVTLs is well documented. Though homeowners may fear negative effects on their community and environment,³¹ their first point of opposition is usually safety, especially if there are many children in the neighborhood. Though the 1979 Wertheimer study linking EMFs to childhood leukemia has long been contested, supported, and contested again, the very existence of a debate about the safety of EMFs sows enough doubt in residents' minds to justify the fear.³² And that fear can influence the values of nearby homes.^{33 34 35 36}

²⁶ **Childhood cancer in relation to distance from high voltage power lines in England and Wales: a case-control study.** Gerald Draper, Tim Vincent, Mary E Kroll, John Swanson. *British Medical Journal (bmj.com)*. June 3, 2005.

²⁷ **'Criscuola' - The Sparks Are Still Flying.** Michael Rikon. *New York Law Journal*. April 24, 1996.

²⁸ **High Court Hears Arguments Today on EMF Claims.** Todd Woody. *The Recorder*. June 6, 1996.

²⁹ **Opponents of \$750M N.J. power line project argue towns were paid to drop opposition.** Lawrence Ragonese. *The Star-Ledger*. January 31, 2010.

³⁰ *Ibid.*

³¹ **NY Power Line Opponents Win Court Fight.** Associated Press. *New York Post*. February 20, 2009.

³² **Lines in Sand and Sky.** B.Z. Khasru. *Fairfield County Business Journal*. September 3, 2001. Vol. 40 Issue 36, p3, 2p.

³³ **Power line plan concerns metro residents.** Melissa Maynarich. *News 9 (Oklahoma)*. July 22, 2008.

When given the choice to purchase two identical homes, one with such health concerns and the other without, most buyers will choose the home without the concern,³⁷ forcing the homeowner to lower their price. Aesthetic impact can also influence a property's value. Many residents don't want to look at HVTLs,³⁸ something they consider to be an "eyesore."³⁹

One of the hardest properties to sell can be one encumbered by an HVTL. Unlike roadway proximity, its effect isn't readily noticeable or measurable. Though homes near HVTLs typically have larger lots (and that can be a benefit), the biggest disadvantage is the fear factor surrounding EMFs.⁴⁰

In the early nineties, when EMFs were just entering the public consciousness, it was difficult to find a measurable price difference between homes close to an HVTL and those that were not.⁴¹ However, two researchers (Hsiang-te Kung & Charles F Seagle) conducted a case study on the impact of power transmission lines on property values and found that such negligible results depended almost entirely on the public's ignorance of EMFs and their related issues. They also found that the amount of potential property loss increased dramatically the more homeowners were aware of the potential health impacts of EMFs.⁴²

The effect of HVTLs on property values has long been a matter of contention with many studies either proving a diminutive effect or none at all. Methodologies differ and different areas of the country register different results. Some markets (ex. high-end homes) are very sensitive to HVTLs whereas others (ex. low-end homes) hardly notice them. The size of the line and the pylons are also a factor. A 69kV power line will have less effect than will a 1,200kV power line. Distance from the easement also matters. Some studies combine homes thousands of feet from HVTLs with those directly encumbered. Research sponsors also may play a factor with many being funded by the utilities themselves.

For example, in a 2007 study funded by a utility, researchers Jennifer Pitts and Thomas Jackson conducted market interviews, literature research and empirical research and reported little (if any) impact of power lines on property values. However, they did note that there is an increasing recent opinion that proximity to power lines has a slight negative effect on property values.⁴³

34 **Power Line Worries Landowners.** Ben Fischer. The Wisconsin State Journal. June 3, 2006.

35 **Lines in Sand and Sky.** B.Z. Khasru. Fairfield County Business Journal. September 3, 2001. Vol. 40 Issue 36, p3, 2p.

36 **Commissioners voice opposition to transmission lines.** David Rupkalvis. The Graham Leader. February 9, 2010.

37 **Real Estate Agents on Property Value Declines.** 4 Realtor opinion letters submitted to residents in the Sunfish, MN area whose properties are being affected by an HVTL.

38 **Ibid.**

39 **Power line plan concerns metro residents.** Melissa Maynarich. News 9 (Oklahoma). July 22, 2008.

40 **High Voltage Transmission Lines, Electric and Magnetic Fields (EMF's) And How They Affect Real Estate Prices.** David Blockhus. January 3rd, 2008. <http://siliconvalleyrealestateinfo.com/electric-and-magnetic-fields-emfs-and-how-they-affect-real-estate-prices.htm>

41 **Impact of power transmission lines on property values: A case study.** Hsiang-te Kung & Charles F Seagle. Appraisal Journal. Vol. 60, Issue 3, p.413, 6p. July 1992.

42 **Ibid.**

43 **Power lines and property values revisited.** Jennifer M Pitts & Thomas O. Jackson. Appraisal Journal. Fall, 2007.

Two California appraisers, David Harding and Arthur Gimmy, published a rebuttal to the Pitts-Jackson study that disagreed with their methodology, took issue with their sponsor, addressed omitted information, and failure to conduct before-and-after cost comparisons.⁴⁴

Pitts and Jackson responded to the rebuttal and defended their methodology, saying they purposely limited their literature research to only include empirical, peer-reviewed articles from *The Appraisal Journal* and the *American Real Estate Society* journals. They acknowledged they conducted the research for "a litigation matter" but did not elaborate on their sponsor.⁴⁵

In a similar case, researchers James A Chalmers and Frank A Voorvaart published a large study spanning nearly 10 years and over 1,200 properties in which they found that an encumbering HVTL had only a small negative effect on the sale price of a residential home. In half of their samples they found consistent negative property values mostly limited to less than 10%, with most between 3%-6%.⁴⁶

They summarized their findings as showing "no evidence of systematic effects of either proximity or visibility of 345-kV (kilovolt) transmission lines on residential real estate values."⁴⁷

They did, however, say that "An opinion supporting HVTLs effects would have to be based on market data particular to the situation in question and could not be presumed or based on casual, anecdotal observation. It is fair to presume that the direction of the effect would in most circumstances be negative, but the existence of a measureable effect and the magnitude of such an effect can only be determined by empirical analysis of actual market transactions."⁴⁸

Appraiser Kerry M. Jorgensen disagreed with the authors' views that paired data analysis and retroactive appraisal were "too unrefined and too subjective to be of much value," and that only through objective statistics could the effect of HVTLs on property value be truly understood. He argued that relying too much on statistics can be dangerous as there could be problems with how the data is compiled and interpreted. For example, he points out that out of their set of 1,286 qualifying sales, only 78 (6%) are directly encumbered by a power line easement, and only 33 (2.6%) more are within 246 feet of a power line easement.⁴⁹

44 **Comments on "Property Lines and Property Values Revisited."**(Letter to the editor) David M Harding & Arthur E Gimmy & Thomas O. Jackson & Jennifer M Pitts. *Appraisal Journal*. Winter, 2008.

<http://www.entrepreneur.com/tradejournals/article/176131510.html>

45 Ibid.

46 **High-Voltage Transmission Lines: Proximity, Visibility, and Encumbrance Effects.** James A Chalmers and Frank A Voorvaart. *The Appraisal Journal* via the Appraisal Institute website. Volume 77, Issue 3; Summer, 2009; pages 227-246. Reposted by CostBenefit of the Environmental Valuation and Cost-Benefit News blog -

<http://www.envirovaluation.org/index.php/2009/11/09/high-voltage-transmission-lines-proximity-visibility-and-encumbrance-effects>

47 **Power Lines Don't Affect Property Values.** *The Appraisal Journal*. July 30, 2009.

http://www.appraisalinstitute.org/about/news/2009/073009_TAJ.aspx

48 **High-Voltage Transmission Lines: Proximity, Visibility, and Encumbrance Effects.** James A. Chalmers, PhD and Frank A. Voorvaart, PhD. *The Appraisal Journal*. Summer 2009. Pgs. 227-245.

49 **Letters to the Editor.** Kerry M Jorgensen. *Appraisal Journal*. January 1, 2010.

<http://www.thefreelibrary.com/Comments+on+high-voltage+transmission+lines:+proximity,+visibility,+...+a0220765052>

The Chalmers-Voorvaart study also attracted the interest of Washington Post Real Estate writer Elizabeth Razzi who wrote that the study was paid for by Northeast Utilities and completed before they proposed a high-voltage transmission grid in New England. She also wrote that both Chalmers and Voorvaart are appraisers and expert witnesses for the power industry.⁵⁰

Several studies have found that, over time, property value damages from nearby HVTLs diminish though properties near the pylons stay permanently damaged no matter the elapsed time.⁵¹ In the first case, though the property owner may grow accustomed to HVTLs and thus think less of them, new potential buyers aren't as sensitized and the diminutive impact is fresh to them.

Realtors usually oppose HVTLs. Nearly all surveyed realtors and appraisers in the Roanoke and New River valleys of Virginia said that close proximity to HVTLs would diminish property values by as much as \$25,000, but mostly for high-end homes. Lower-end homes see little impact.⁵²

Diminished property values can also impact communities. In one case, Delaware residents were worried that a proposed 1,200 megawatt HVTL would depress local property values, thus weakening the local tax base and leading to higher taxes to offset the losses. Kent Sick, author of a 1999 paper on power lines and property values, projects losses from a few percentage points to 53%.⁵³

In Atlanta, a local realty group named Bankston Realty ranked power lines as the number one item that damages resale value, followed closely by busy roads and inferior lot topography. They advise buyers to pay 15% less of the asking price if power lines are present, and they advise sellers to accept it as a logical perception of value.⁵⁴

Evidence suggests that HVTLs affect the health of residents in close proximity to lines 345kV and higher. Evidence also suggests that the power lines have little to no impact on property values because encumbered lots are often larger and more private than unencumbered lots, resulting in no diminution of purchase price. However, most studies did observe longer time on the market for encumbered properties.⁵⁵

Rural Impact

Now that the reader is aware of stray voltage, EMFs, and property values, the reader will have a deeper understanding of the potential effects of HVTLs on rural land throughout the United States.

⁵⁰ **Do High-Voltage Lines Zap Property Values?** Elizabeth Rassi. Local Address. August 4, 2009.
http://voices.washingtonpost.com/local-address/2009/08/do_high-voltage_lines_zap_prop.html

⁵¹ **The Effect of Public Perception on Residential Property Values in Close Proximity to Electricity Distribution Equipment.** Sally Sims, B.Sc. Paper presented to the Ph.D. Forum at the Pacific Rim Real Estate Society Conference. January 2002. This is the first part to the study.

⁵² **A Question of Power: Part III - Realtors: High voltage lines lower property values.** Leslie Brown. Roanoke Times. 1998. <http://www.vaproperyrights.org/artic1es/98lineslowervalues.html>

⁵³ **Expert: Power lines hurt property value, market research shows sellers lose up to 53 percent.** Elizabeth Cooper. Gannett News Service. May 20th, 2006.

⁵⁴ **Atlanta Homes and Resale Value ... Power lines are a definite NO.** The Bankston Group. July 17, 2008.
<http://atlantaintelnews.com/2008/07/17/atlanta-homes-and-resale-value-power-lines-are-a-definite-no/>

⁵⁵ **High Voltage Power Lines Impact On Nearby Property Values.** Ben Beasley. Right of Way Magazine. February 1991.

In Goodhue County, Minnesota, an area locally known for protecting agriculture, CapX2020 (a utility consortium) is proposing to build a 345kV HVTL through the county that may be doubled to 690kV. Local landowner Linda Grovender voiced her concern in a 2010 letter to the editor of the Cannon Falls Beacon. She worries that the line, proposed to traverse residential and agricultural lands instead of following existing utility right-of-way, will have an adverse effect on her family's health (due to EMFs), jeopardize agricultural interests, result in lost agricultural productivity, and damage property values.⁵⁶ She wrote that if the proposed 345kV HVTL is doubled to 690kV (as it legally could be) it could have an adverse effect on her family's health, jeopardize agricultural interests, result in lost agricultural productivity, and damage property values.⁵⁷

Elsewhere in Minnesota, Dairyland Power Cooperative (one of the chief members of CapX2020) surveyed rural landowners for their opinion regarding the proposed HVTL in their area. Whether they were crop or dairy farmers, each had several reasons why the proposed line would impact their business. The unnamed respondents shared Grovender's views and said they prefer to use highway corridors and woodlands to avoid impacts to productive agricultural land; protect livestock; avoid interference with large farm equipment, GPS, and navigation systems used in farm machinery; preserve open channels for crop-dusting; protect farm buildings; protect pasture land, tree farms, and timber production.⁵⁸

The Dairyland survey also found that livestock operations are concerned that the HVTL will generate stray voltage, impacting livestock and feedlots. Cattle, horses, and other livestock will not go near transmission lines due to stray voltage. And stray voltage can impact the health of beef cattle and hogs. Farmers also fear potential impacts on dairy operations, poultry, livestock mortality, horse boarding facilities, and herd reproduction.⁵⁹

HVTLs also pose potential technological obstacles. For example, The GPS equipment used in the farm equipment may not be able to steer around transmission poles, potentially making farming around the towers extremely difficult.⁶⁰

One major concern was the routing the HVTLs through the middle of properties or fields. The surveyed farmers quoted many repercussions for bisecting a property. They include: Interrupted irrigation and tile drainage equipment and practices; decreased food production; fragmented existing cropland and dairy operations; diminished lease value: the addition of transmission lines would make it difficult to lease farm land for the top rental price; compacted soil from construction of the HVTLs and access roads: it would take 3-5 years to restore.⁶¹

Across the border in Wisconsin, the state's Department of Agriculture validated many of the Minnesota respondents' concerns when it found that HVTL construction could compact soil, making it difficult to

⁵⁶ **No CAPX2020.** Letter to the Editor by Linda Grovender. The Cannon Falls Beacon. March 23, 2010.

⁵⁷ **Ibid.**

⁵⁸ **SE Twin Cities-Rochester-La Crosse Transmission System Improvement Project Macro-Corridor Study, Appendix A: Summary of Public Comments regarding a proposed HVTL.** Dairyland Farm Cooperative. September 2007.

⁵⁹ **SE Twin Cities-Rochester-La Crosse Transmission System Improvement Project Macro-Corridor Study, Appendix A: Summary of Public Comments regarding a proposed HVTL.** Dairyland Farm Cooperative. September 2007.

⁶⁰ **Ibid.**

⁶¹ **Ibid.**

plow and plant those areas, naturally resulting in reduced crop yields. The HVTLs force farmers to change planting patterns to avoid support structures. Since farm land is only as valuable as its ability to yield good crops, rural property values suffer from the limitations and effects of HVTLs on their land.⁶²

Potential compaction, forced building changes, and lower property values equally threaten dairy operations as much as agricultural farmers. Susan and Robert Herckendorf, dairy farmers in the path of the proposed A-W HVTL, are worried that the line could put local dairies out of business.⁶³

In researching the possible negative factors of the then-proposed Arrowhead-Weston HVTL in Wisconsin in 2000, the state's Public Service Commission found that rural property values may decrease from "concern or fear of possible health effects from electric or magnetic fields; The potential noise and visual unattractiveness of the transmission line; Potential interference with farming operations or foreclosure of present or future land uses."⁶⁴ They also found that the value of agricultural property will likely decrease if the pylons inhibit farm operations."⁶⁵ However, they also found that adverse effects appear to diminish over time.⁶⁶

The impact report further states that, on farmland, HVTL installation can remove land from production, interfere with operation of equipment, create safety hazards, and deprive landowners the opportunity to consolidate farmlands or develop the land for another use. The greatest impact on farm property values is likely to occur on intensively managed agricultural lands.⁶⁷

Nearly a decade later in 2009, the Wisconsin Public Service Commission conducted another study on the environmental impacts of transmission lines and found that "in agricultural areas, the number of poles crossing a field may be the most significant measure of impact," and "agricultural values are likely to decrease if the transmission line poles are in a location that inhibits farm operations."⁶⁸ Beyond the impact of pole placement, the PSC found that "the overall aesthetic effect of a transmission line is likely to be negative to most people, especially where proposed lines would cross natural landscapes. The tall steel or wide 'H-frame' structures may seem out of proportion and not compatible with agricultural landscapes or wetlands."⁶⁹ They further explained that "Transmission lines can affect farm operations and increase costs for the farm operator. Potential impacts depend on the transmission line design and the type of farming. Transmission lines can affect field operations, irrigation, aerial spraying, wind breaks, and future land development."⁷⁰

The study further examines how rural HVTL pole placements can affect agricultural land values: They can create problems for turning field machinery and maintaining efficient fieldwork patterns; expose

⁶² Line could affect farms, property values. Author Unknown. Oshkosh Northwestern. June 26, 2000.

⁶³ Ibid.

⁶⁴ **Property Values (pages 212-215) from Final Environmental Impact Statement, Arrowhead-Weston Electric Transmission Line Project, Volume 1.** Public Service Commission of Wisconsin. Docket 05-CE-113. Date issued, October 2000.

⁶⁵ Ibid.

⁶⁶ Ibid.

⁶⁷ **Property Values (pages 212-215) from Final Environmental Impact Statement, Arrowhead-Weston Electric Transmission Line Project, Volume 1.** Public Service Commission of Wisconsin. Docket 05-CE-113. Date issued, October 2000.

⁶⁸ **Environmental Impacts of Transmission Lines.** Public Service Commission of Wisconsin. March 2009.

⁶⁹ Ibid.

⁷⁰ Ibid.

properties to weed encroachment; compact soils and damage drain tiles; result in safety hazards due to pole and guy wire placement; hinder or prevent aerial activities by planes or helicopters; interfere with moving irrigation equipment; hinder future consolidation of farm fields or subdividing land for residential development.⁷¹

To oppose these potentially diminutive effects on their land, landowners sometimes organize against them. In Ohio, a group of concerned citizens formed the group, Citizens Advocating Responsible Energy (CARE), to oppose FirstEnergy's proposed Geauga County power line. On their website they state the reasons for their opposition. They fear the HVTL will devalue the properties it crosses, force affected property owners to continue paying taxes on damaged property, damage natural beauty and local ecology, lessen agricultural productivity of impacted land, thus reducing farm income and local purchasing power, and create a thorough-fare for snowmobiles and off-road vehicles.⁷²

Other times, concerned landowners are united in voice, but not in form. In 2010, Idaho property owners in Bonneville County are nervously following the progress of Idaho Falls Power's proposed 161kV HVTL that would pass close to their homes.⁷³

Lynn Pack, a Bonneville County dairy farmer, has educated himself on HVTLs and said he's most concerned with stray voltage. "It causes so many problems with cow's production. They won't feed, they won't drink water, they dry up and when they dry up they just don't give any milk."⁷⁴ Another property owner, Sharon Nixon, fears the HVTL could harm her husband's health after his recent victory over bone cancer. She also fears the value of her home will fall. "It is not something we want in our backyard. We worked all our lives. This is our dream home."⁷⁵

Idaho Falls Power General Manager Jackie Flowers said the HVTL is a necessary step to meet new federal energy reliability standards and that the utility is open to the public's input.⁷⁶

A year earlier in Idaho, a coalition of Rockland County farmers tried to convince Idaho Power Company to avoid routing a new HVTL through their land, citing environmental and development concerns.⁷⁷ Doug Dokter, Idaho Power project leader, said the new lines are required because the existing lines are at their capacity.⁷⁸ Because of their concerns, utility representatives say they're looking at other options and hope for a compromise to avoid invoking eminent domain to take the land.⁷⁹

Sometimes opposition to a proposed HVTL route can alter its course. In 1994, Public Service Company of New Mexico abandoned plans to take new right-of-way through the Jemez Mountains for a 50-mile long HVTL extension that Indian groups and environmentalists argued would cut through several miles

71 Ibid.

72 We oppose FirstEnergy's proposed Geauga County power line. Website posting by Citizens Advocating Responsible Energy (CARE). Date unknown but website copyright suggests sometime from 2008-2009.

73 Transmission Lines Worry Property Owners. [Brett Crandall](#). Local News 8. March 5, 2010.

74 Ibid.

75 Ibid.

76 Ibid.

77 Headway being made on proposed route for power transmission line. Author Unknown. The Power County Press and Aberdeen Times. April 8, 2009.

78 Ibid.

79 Ibid.

of pristine vistas and Native American ruins.⁸⁰ The utility instead re-routed the extension to follow an existing utility corridor, bringing the decade-long dispute to a close.⁸¹

In 2008, California farmers and ranchers found themselves in a similar situation. San Diego Gas & Electric proposed a 150-mile long, 500kV HVTL (in conjunction with several 230kV HVTLs) across San Diego and surrounding counties to meet increasing energy needs and transport required renewable energy.⁸²

Affected landowners are worried the line will have "huge" impacts on their properties. Katie Moretti, an affected cattle rancher, and other farmers worry that building construction access roads across untouched land will limit their land's future use. She also worries that the utility won't compensate her for the loss of use.⁸³

Another rancher, Glen Drown, also worries about the impact the line will have on land-use and property values since the proposed route bisects several of his parcels subdivided for future development.⁸⁴

Local dairy producer, Richard Van Leeuwen, is worried that stray voltage from the line would damage the health of his calves and milking cows. To protect his herd's health he said he would have to relocate the calf farm to another part of his property, costing millions.⁸⁵

San Diego County Farm Bureau Executive Director Eric Larson acknowledges that the farming community won't be able to stop the project, but he's trying to make it compatible with the area's farming interests by recommending burying the line underground in some areas, going around some areas, and utilizing existing right-of-way.⁸⁶

Elsewhere in the state, the City of Brentwood researched the potential impact of HVTLs on agricultural land values by interviewing several of their local and experienced Real Estate brokers. All the brokers said that "Agricultural land with power lines above ground is worth less than properties with below-ground utilities."⁸⁷

However, in a 2007 report, the California Department of Conservation's Farmland Mapping and Monitoring Program reported that HVTLs installed on agricultural land for a wind farm will result in a temporary disturbance of 10 acres of farmland and permanently affect 1 acre. Since the affected areas are mainly grazing land, the report concluded that the HVTL would not significantly impair productivity. Though the impact to agricultural productivity during construction would be negative, they claimed it would be mostly insignificant.⁸⁸

80 **PNM Scraps Jemez Power Line Plan.** Keith Easthouse. Sante Fe New Mexican. December 16, 1994.

81 **Ibid.**

82 Proposed power line would impact farms. Christine Souza. California Farm Bureau Federation. May 28, 2008.

83 Proposed power line would impact farms. Christine Souza. California Farm Bureau Federation. May 28, 2008.

84 **Ibid.**

85 **Ibid.**

86 **Ibid.**

87 **City of Brentwood, California.** Website page explaining their approaches to valuing agricultural land. Date and author unknown.

88 **3.3 Agricultural Resources.** Part of the public draft by The California Department of Conservation's Farmland Mapping and Monitoring Program. July 2007.

Across the country in Leesburg, Virginia, 26 landowners opposed Dominion Energy's proposed 230kV HVTL, saying it will damage their property values, thus decreasing their tax base and thus affect the county as a whole. They also fear its impact on Blue Ridge tourism.⁸⁹

Bill Hatch, owner of a 400-acre farm was upset to learn the line would run through his farm. He said the proposed line would so affect his farm that he could only afford to keep it by direct marketing or agrotourism, but he admitted that few people would want to visit a farm with power lines.⁹⁰

Landowners want the utility to bury the lines, but the utility says it will cost 10 times more than traditional overhead lines. However, Harry Orton, an underground power line expert, testified that while the initial costs of burying the lines are higher, the lower cost of maintenance over the years evens the cost along the lines' lifecycle.⁹¹

A year later in 2006, Dominion proposed an additional 500kV HVTL to meet growing demand and routed it through northern Virginia because it was the most efficient route. However, the area is also one of the state's most pristine, and the proposal met with fierce resistance from landowners, environmentalists, Congressman Frank Wolf, and actor Robert Duvall.⁹²

In the path of the HVTL are landowners of some of the most valuable land in Virginia, and they were bothered that the utility plans to erect the 40-mile, 15-story HVTL in their back yards.⁹³

One landowner, Cameron Eaton, fears the line will bring financial ruin and "sink" her investment into her 100-acre Fauquier County property and horse business. "No one will buy that land if some ugly power line could run right over their house. I'm broken off at the knees."⁹⁴

Real estate agents consider the area's picturesque countryside to be its most valuable quality. Matt Sheedy, a land developer and president of Virginians for Sensible Energy Policy, said that the very proposal that the line will soon dominate the countryside has already "sent land values plummeting." Brokers confirmed that the market froze. People backed out of real estate contracts, unwilling to live anywhere under the line. Sheedy's groups estimated that land immediately affected could lose as much as 75% of its value.⁹⁵

"When you're out in the country and you're selling property, what you're selling is the open space and the bucolic views and the history," Sheedy said. "Running power lines through an area like this is just devastating." To landowners Gene and Deborah Bedell, who were trying to sell their 223-acre farm to pay for their retirement, it was a hard blow. Their agent told them no one would buy their property if they knew "that it could have a power line looming over it."⁹⁶

⁸⁹ **Committee Hears Debate Over Underground, Overhead Power Lines.** Megan Kuhn. Leesburg Today. May 20, 2005.

⁹⁰ **Ibid.**

⁹¹ **Committee Hears Debate Over Underground, Overhead Power Lines.** Megan Kuhn. Leesburg Today. May 20, 2005.

⁹² **Landowners Fear Ruin from Power Line Route.** Sandhya Somashekhar. Washington Post Staff Writer. December 11, 2006.

⁹³ **Ibid.**

⁹⁴ **Ibid.**

⁹⁵ **Ibid.**

⁹⁶ **Ibid.**

Further north in New York, over 50 landowners and local officials spoke before the state's Public Service Commission in opposition to Upstate NY Power Corp's proposed construction of a 230kV HVTL in their community.⁹⁷

Sharon B. Rossiter, co-owner of Doubledale Farms in Ellisburg, said the HVTL will damage their crop cycle, remove 100 acres from use, and make planting difficult by having to navigate around the poles. Also worried is Roberta F. French, owner of Farnham Farms in Sandy Creek. The proposed line will bisect her blueberry farm, eliminating two-thirds of it.⁹⁸

Jay M. Matteson, Jefferson County agricultural coordinator, advocated routing the HVTL through public land to avoid damaging productive, private land. "The burden should be on New York state and the developer to prove to local landowners why their land is less valuable than public land," he said.⁹⁹

The Town of Henderson opposed it because the town's foundation is tourism and agriculture, and the community is "very concerned about the visual impacts of this project."¹⁰⁰

Robert E. Ashodian, chairman of the Henderson Harbor Area Chamber of Commerce's Economic Development Committee, agreed. "The scenic resources of the community and the natural resources are at the heart of the value of the community."¹⁰¹

In an effort to appease worried or angry landowners, agricultural property owners in Montana with HVTLs encumbering their land will be exempt from paying taxes on land within 600 feet on either side of the HVTL Right-of-Way.¹⁰²

In the 2002 study, "The Impact of Transmission Lines on Property Values: Coming to Terms with Stigma," authors Peter Elliott and David Wadley cite a 1978 Canadian study that, according to one commentary, found "the per acre values from more than 1,000 agricultural property sales in Eastern Canada were 16-29% lower for properties with easements for transmission lines than for similar properties without easements." The impact was greater on smaller properties. The 1978 study found little difference in impact from 230kV or 500kV HVTLs. The study also found that the impacts didn't seem influenced by time.¹⁰³

Three more Canadian studies on the impact of HVTLs on agricultural land values found different results.¹⁰⁴ Brown 1976 studied the effect of low-voltage power lines on agricultural land in Saskatchewan and found no measurable impact on property values. The Woods Gordon 1981 study focused on the effects of 230kV to 500kV HVTLs on Ontario farmland and found some areas had an average of a 16.9% negative impact, two areas had a positive effect, and others showed no statistically

97 **Transmission line gets no support.** Nancy Madsen. Watertown Daily Times. November 17, 2009.

98 **Transmission line gets no support.** Nancy Madsen. Watertown Daily Times. November 17, 2009.

99 **Ibid.**

100 **Ibid.**

101 **Ibid.**

102 **Tax facts on proposed power line.** The Montana Standard Staff. The Montana Standard. July 11, 2009.

103 **The Impact of Transmission Lines on Property Values: Coming to Terms with Stigma.** Peter Elliott & David Wadley. Property Management, pgs.137-152. 2002.

104 **The Effects of Overhead Transmission Lines On Property Values: A Review And Analysis Of The Literature.** Edison Electric Institute Siting & Environmental Planning Task Force. 1992.

significant effect. The third study, a master's thesis referred to as Thompson 1982 found sales prices lower for properties crossed by HVTs but only where the land has potential for irrigation.(pgs. 56-57)¹⁰⁵

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105 **Ibid.**

OREGON DEPARTMENT OF TRANSPORTATION MONTHLY ASPHALT CEMENT MATERIAL PRICE (MACMP)		
	PRICE PER TON	
MONTH	PORTLAND, OREGON AREA	BOISE, IDAHO AREA
January 2021	\$348.00	\$409.00
February 2021	\$361.00	\$416.00
March 2021	\$387.00	\$441.00
April 2021	\$438.00	\$465.00
May 2021	\$488.00	\$495.00
June 2021	\$494.00	\$515.00
July 2021	\$535.00	\$532.00
August 2021	\$538.00	\$538.00
September 2021	\$538.00	\$555.00
October 2021	\$538.00	\$559.00
November 2021	\$538.00	\$568.00
December 2021	\$538.00	\$568.00
January 2022	\$538.00	\$568.00
February 2022	\$563.00	\$590.00
March 2022	\$605.00	\$668.00
April 2022	\$668.00	\$702.00
May 2022	\$728.00	\$720.00
June 2022	\$741.00	\$774.00
July 2022	\$766.00	\$810.00
August 2022	\$783.00	\$825.00
September 2022	\$764.00	\$813.00
October 2022	\$725.00	\$744.00
November 2022	\$713.00	\$663.00
December 2022	\$693.00	\$603.00

The MACMP values are used in conjunction with Special Provisions subsection 00195.10 Asphalt Cement Material Price Escalation/De-escalation .