COMMUNITY PLANNING ASSISTANCE FOR WILDFIRE

2018

Final Recommendations for the City of Sisters, OR

Prepared by:

Wildfire Planning International, LLC

Wildland Professional Solutions, Inc.

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About the Community Planning Assistance for Wildfire Program

The Community Planning Assistance for Wildfire (CPAW) program works with communities to reduce wildfire risks through improved land use planning. It is supported through grants from the U.S. Forest Service, the LOR Foundation, and other private foundations. It is a program of Headwaters Economics and Wildfire Planning International.

Author Contact Information

CPAW engages consultants with relevant training and expertise in land use planning, forestry, risk modeling, and fire behavior. This report was written by the following CPAW consultants:

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Acknowledgments

CPAW relies on collaboration with local stakeholders to provide meaningful feedback throughout the process. Our team would like to thank everyone who contributed time to our CPAW activities in the City of Sisters, including: Patrick Davenport, Chief Roger Johnson, Doug Green, Gary Marshall, BreAnne McConkie, Chuck Newport, Ben Duda, Larae Guillory, Wanda Broughton, Chris Gracia. Any omissions are solely the responsibility of the authors and are not intended to reflect the value of other participants.

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Cover photos provided by CPAW.

Contents

LIST OF ACRONYMS

CPAW	Community Planning Assistance for Wildfire
CWPP	Community Wildfire Protection Plan
GIS	Geographic Information System
HIZ	Home Ignition Zone
ODF	Oregon Department of Forestry
ORSC	Oregon Residential Specialty Code
RMRS	Rocky Mountain Research Station
SB 360	Senate Bill 360 (Oregon Forestland-Urban Interface Fire Protection Act)
UGB	Urban Growth Boundary
USFS	U.S. Forest Service
WUI	Wildland-Urban Interface

Introduction

Each year, wildfires affect communities across the United States. These wildfires—both human- and lightning-caused—can have a variety of impacts on communities' built and natural environments. Some of these impacts bring positive ecological outcomes, such as improved forest health and habitats. Other wildfires, however, can have devastating social, economic, and environmental consequences to communities' public and first responder safety, homes and businesses, parks, roads, watersheds, forests, hospitals, and more.

Communities have many options to address and reduce their wildfire risk. The Community Planning Assistance for Wildfire (CPAW) program offers a unique approach to help community stakeholders identify what's at risk in the "wildland-urban interface" (WUI, pronounced "WOO-EE") and determine ways to address this risk through improved land use planning strategies.

❖ Community Planning Assistance for Wildfire

CPAW was established by Headwaters Economics and Wildfire Planning International in 2015, and is funded by the U.S. Forest Service (USFS) and other private foundations. Since its inception, CPAW has worked with communities of varying sizes, capacities, and geographical locations across the United States.

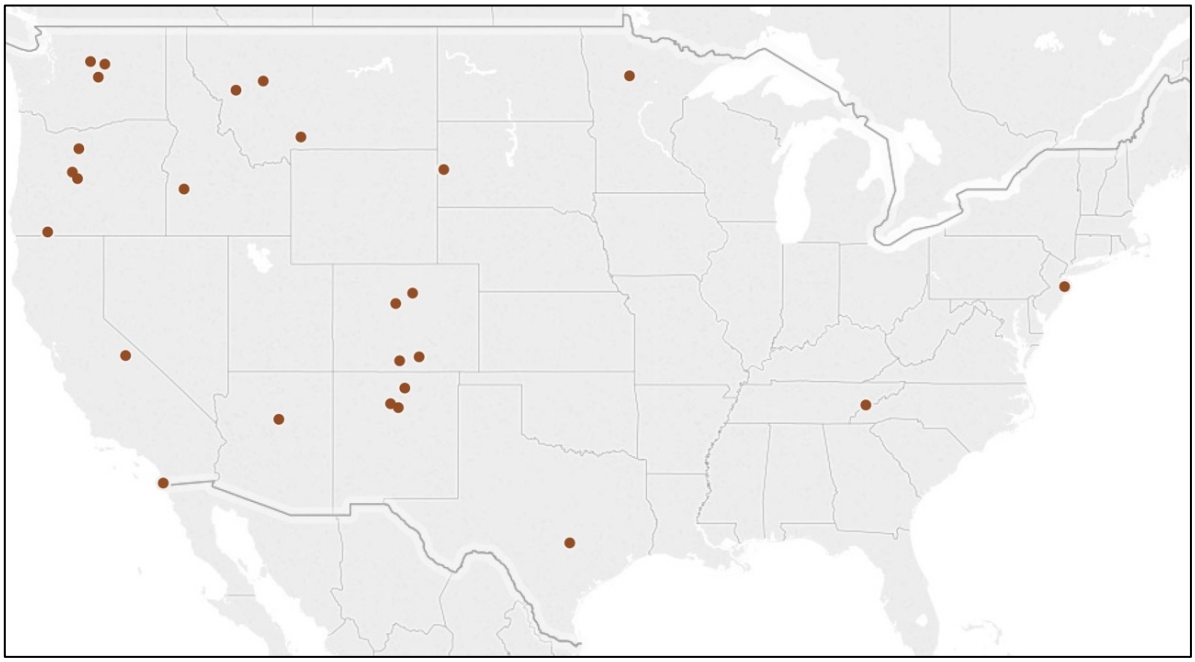

Figure 1. Map of communities that have been engaged in the Community Planning Assistance for Wildfire program.

Community Selection and Services

Each year, communities voluntarily apply and are competitively selected to participate in the program. Communities must show commitment and engagement from both local planning and fire departments to reflect the collaborative nature required for CPAW success. If selected, communities receive customized technical consulting services from CPAW's team of professional land use planners, foresters, risk modelers, and researchers. Specific services vary based on community needs, and may include capacity-building trainings on WUI planning topics, risk modeling and spatial analysis, guidance on wildfire mitigation plans and policies, and other strategies to address local wildfire risk.

Stakeholder Engagement

Community members engaged in the CPAW process play a critical role to project success. While services are provided at no charge to the community, each community signs a Memorandum of Understanding with CPAW to outline its mutual understanding of roles and responsibilities and project commitments. CPAW teams engage with a variety of local stakeholders who may serve as steering group members, local experts, or interested parties. These stakeholders provide valuable input and feedback, represent diverse wildfire and community development interests, and act as communication channels to other local groups.

CPAW Process

The CPAW community planning process typically occurs over the course of one year (Figure 2). During that time, CPAW team members meet with stakeholders to discuss local issues, conduct several field tours to learn about unique wildland-urban interface and wildfire mitigation challenges, and provide presentations to help the community understand CPAW's program goals. Team members also thoroughly review community planning documents to analyze gaps and opportunities for strengthening wildfire policies and regulations. At the end of the process, team members provide the community with a set of voluntary recommendations to more effectively address the WUI through appropriate land use planning strategies. Follow-up implementation assistance may also be available to communities depending on their unique needs and CPAW's program funding.

Figure 2. The CPAW processes engages with stakeholders through meetings, field tours, and other facilitated opportunities. Image credits: CPAW

CPAW Recommendations

There are many planning tools available to communities to help address challenges associated with the wildland-urban interface. These tools include plans and policies (e.g., growth management plans, neighborhood plans, open space management plans), and codes and regulations (e.g., subdivision regulations, landscaping ordinances, steep-slope ordinances, zoning codes, building codes, and wildland-urban interface codes). See Figure 3 for more examples.

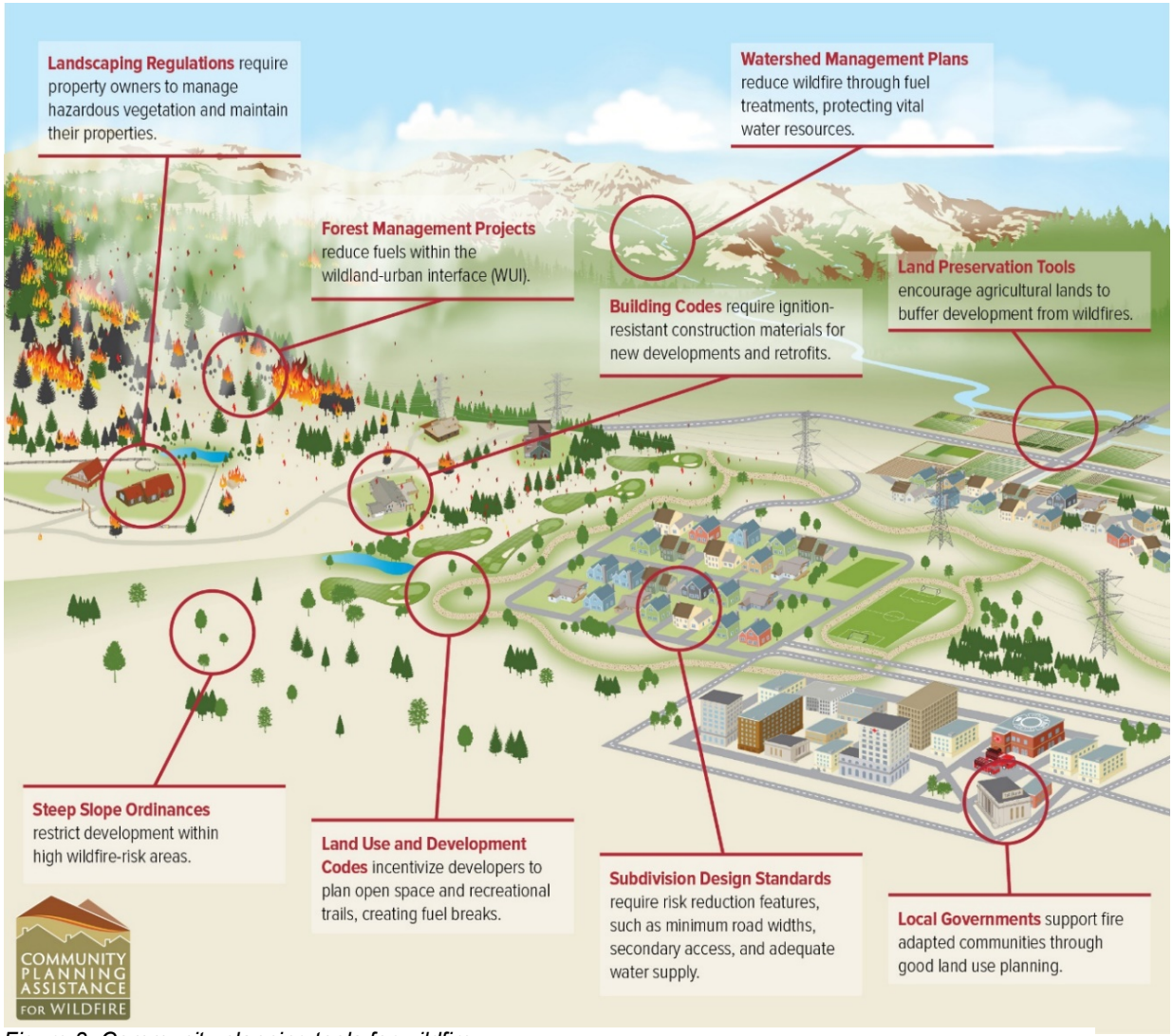

Figure 3. Community planning tools for wildfire.

CPAW expertise builds on research, science, and national best practices to customize recommendations for each local community. Additional inputs include community observations and stakeholder feedback. Recommendations focus on the nexus between land use planning, forestry, hazard mitigation, and wildfire risk-reduction strategies. Implementation of CPAW recommendations is voluntary; local governments retain sole authority for the decision to move any recommendations forward.

❖ Community Planning Context

Geographic Location and Significant Features

The City of Sisters has an elevation of 3,186 feet.[1] Although local terrain is mostly flat, with the exception of nearby McKinney Butte, the area was shaped by ancient volcanic activity that carved the landscape with calderas, crater lakes, cinder cones, and other geological formations. Significant peaks near the city include the Three Sisters, Mt. Bachelor, and Mt. Washington. The largest waterway that flows through town is Whychus Creek, which also provides irrigation waters to the Three Creeks Irrigation District. The city is surrounded by the Deschutes National Forest and is known as the gateway to the Cascade Mountains and Central Oregon recreational areas.

Land Area and Buildable Lands

Per the Sisters Urban Area Comprehensive Plan, the city has a total land area of 1,211 acres within its Urban Growth Boundary (UGB). Within the UGB, the USFS owns approximately 77 acres of land, 40 acres have been developed, and 23 acres are zoned as an urban reserve area.

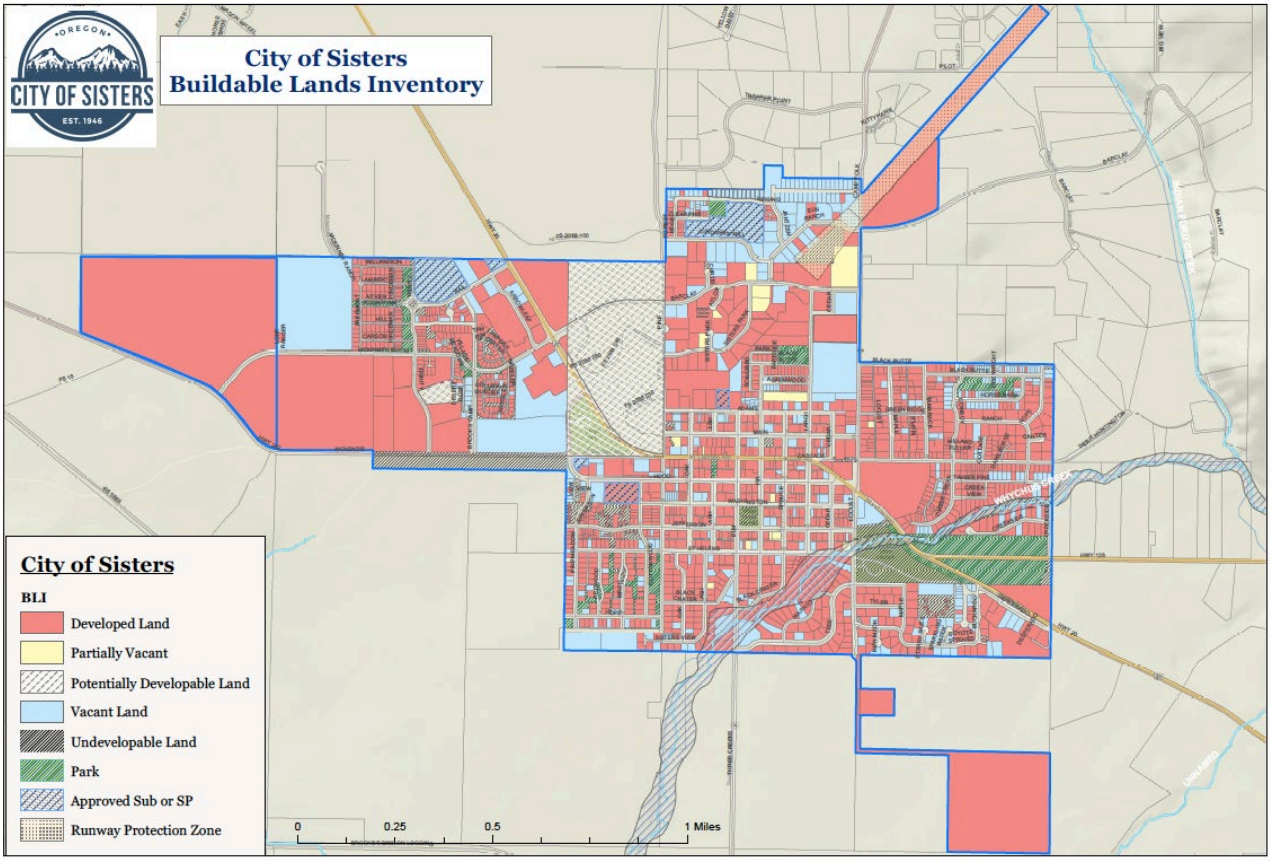

Figure 4. Buildable Lands Inventory for the City of Sisters (October 2018).

[1] Sisters, Oregon. 2014. "Sisters Urban Area Comprehensive Plan." August. (p.17)

There is a limited inventory of buildable lands within city limits (Figure 4), and projected demand shows a shortage of residential units over the next 20 years. Based on available city data, building permits have steadily increased in the last few years: 45 permits in 2015, 76 permits in 2016, and 118 permits in 2017. Future development in the short term will likely occur as infill, such as the parcel of land currently owned by the USFS that is for sale. Long-term growth is anticipated to occur through a UGB expansion. Future expansion of the UGB will be regulated by the "Joint Management of the Urban Growth Boundary and the Sisters Growth Area" agreement and Title 21 of the Deschutes County Code. Areas immediately outside of the city are zoned for forest and farm use, rural residential, and low-density residential by Deschutes County. Nearby communities to Sisters include Bend, Redmond, and Black Butte Ranch.

Key Demographics

In the last several years, the City of Sisters and Deschutes County have been growing at a rapid pace. This trend is expected to continue. Sisters' current population is 2,691.[2] Portland State University projects a population of 3,889 by 2030 and 5,954 by 2050. In other words, the city's population will more than double in the next 30 years. The influx of new residents is changing the local demographic (i.e., average resident age is decreasing) and land uses. The demand for new residential units is currently outpacing housing supply, which has resulted in an increase in housing prices, reduction in the supply of available land for other land uses, and a potential contributing factor to local gentrification.

Table 1: Overview of Demographics in Community

Topic	Key Statistic	Notes
Current population	2,540[c]	County population is 182,930[c]
Population density	1,088.3 ppl/sq. mile[b]	592.2 housing units per square mile of land[b]
Median age	40.4[a]	Decrease from 41.4 2010[b]
Current number of residential units	1,438[c]	75.5% are occupied housing units[a]
Housing units for seasonal, recreational or occasional use	135[b]	51.1% of total vacant housing units[b]
Median home price	$259,500[a]	State median home price is $247,200[a]
Median household income	$54,500[a]	State median household income is $53,270[a]
Workforce employment	1,057[a]	Largest sectors are in service, management, business, science, and arts[a]
Poverty rate	15.4%[a]	Compared to 15.7% in state[a]

Data Sources:

a. U.S. Census Bureau, 2012-2016 American Community Survey 5-Year Estimates.

b. U.S. Census Bureau. 2010.

c. Portland State University, College of Urban and Public Affairs: Population Research Center. Oregon Annual Population Report, 2017. https://www.pdx.edu/prc/file/orannualpopreport2017tablesxlsx

[2] Portland State University College of Urban and Public Affairs: Population Research Center. Accessed November 15, 2018. Available at www.pdx.edu/prc/cycle-2-region-1-documents

Fire Environment and Wildfire History

Wildland fire is a regular and important natural ecosystem disturbance in Sisters Country. All of the large fires in Table 2 (below) have threatened residents and prompted evacuations within multiple neighborhoods. The Cache Fire also resulted in the loss of two homes within Black Butte Ranch.

Table 2: Overview of Community Fire History

Fire Name	Year	Size (acres)	Evacuations	Significant effects
Cache Mountain	2002	3,888	Yes	2 structures destroyed
Eyerly	2002	23,573	Yes	Evacuations, 18 homes destroyed, natural resource loss.
B and B	2003	90,692	Yes	Evacuations, smoke impacts, sociopolitical, economic, natural resource impacts.
Link	2003	3,591		Natural resource loss, pre- evacuations.
Lake George	2006	5,537		Natural resource loss, pre- evacuations.
Black Crater	2006	9,395	Yes	Evacuations, smoke impacts sociopolitical, economic, natural resource impacts. Private timber land impact.
GW	2007	7,357	Yes	Evacuations, hazardous smoke conditions, sociopolitical, economic, natural resource impacts. Private land impact.
Summit Springs	2008	1,745	Yes	Evacuations, natural resource loss, private land impact.
Wizard	2008	1,847		Natural resource loss, sociopolitical concerns.
Black Butte 2	2009	711		Natural resource loss, sociopolitical concerns.
Rooster Rock	2010	6,119	Yes	Evacuations (30-plus homes), smoke impacts, sociopolitical, economic, natural resource impacts.
Alder Springs	2011	1,449		Natural resource loss.
Shadow Lake	2011	10,025	Yes	Evacuations, smoke impacts, sociopolitical, economic, natural resource impacts.
Pole Creek	2012	26,578	Yes	Evacuations, smoke impacts, sociopolitical, economic, natural resource impacts. Private land affected.
Green Ridge	2013	1,509		Natural resource loss.
Two Bulls	2014		Yes	22 homes destroyed; 254 homes evacuated
Bridge 99	2014	5,080		Natural resource loss.
Milli	2017	24,025	Yes	Evacuations, smoke impacts, sociopolitical, economic, natural resource impacts, Private land affected.
Cloverdale	2018	74	Yes	Two homes and six outbuildings destroyed

Data Sources: 2014 Sisters Country Community Wildfire Protection Plan; Deschutes County Wildfire History Map; USDA Forest Service

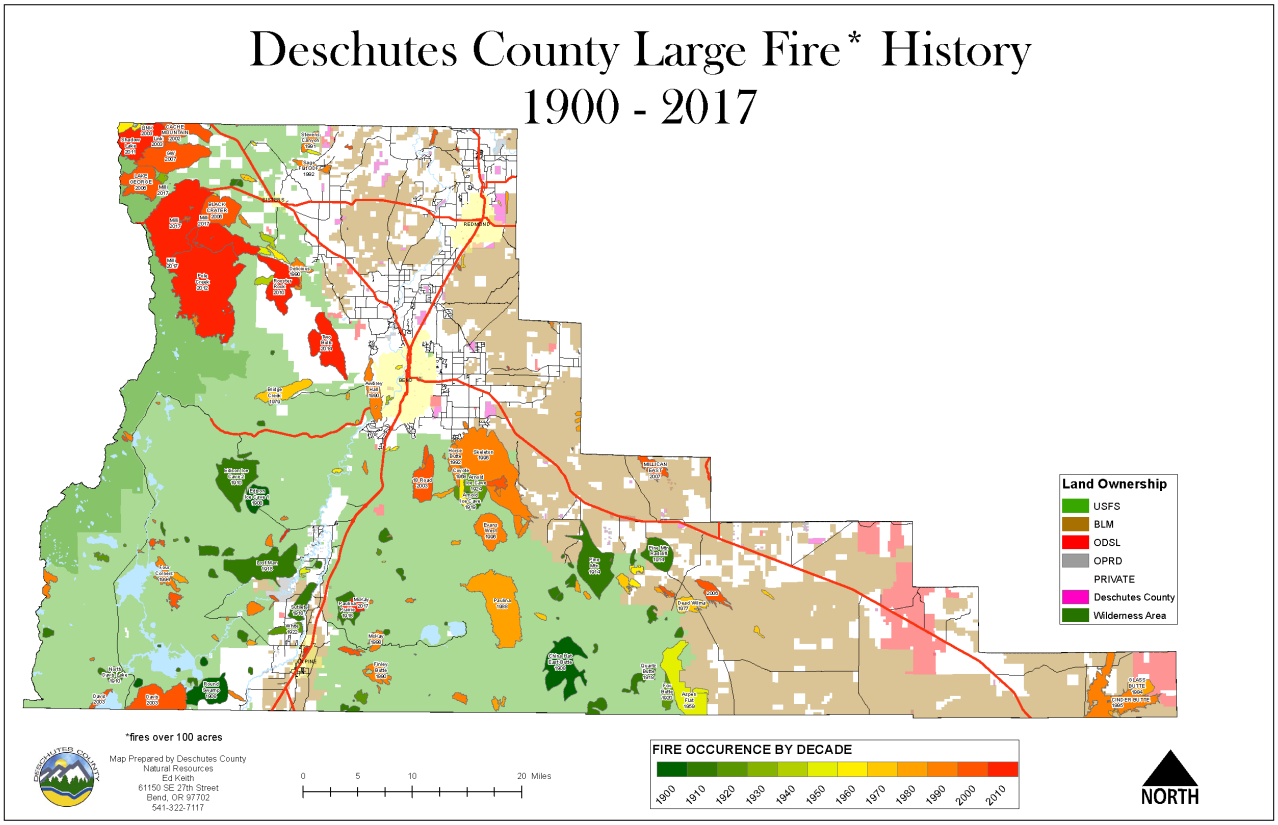

Figure 5. Deschutes County Large Fire History Map.

❖ Community Analysis

In addition to understanding the local planning context, CPAW team members gather information through facilitated conversations and meetings with stakeholders, field tours, and internal research. CPAW team members also review and analyze community plans, policies, and regulations to determine their level of effectiveness for community wildfire mitigation. This information is compiled into an internal audit and reviewed with the local steering group. This section highlights planning challenges and opportunities that emerged during that process.

Local Planning Challenges

- **Existing housing and commercial stock.** Sisters contains many homes and businesses that were not built to building standards for wildfire risk reduction. A few have been retrofitted voluntarily or were subject to the fire district's ordinance which bans wood roofs; however, the majority of existing stock has not been updated. In more recent years, new homes have also been built with wood features and landscaping features that have not incorporated wildfire mitigation as part of their development.
- **Critical infrastructure.** The city relies on critical infrastructure, including roads and water supplies, some of which have been mitigated for wildfire threat. However, specific mitigation is needed to reduce wildfire risk to several wells, the reservoir, and access to

these areas—such as roadside vegetation and structural improvements. Due to a previous development process with the county (e.g., a quick claim), there may also be existing challenges for the city to make structural improvements to one of the wells.

- **Spatial Risk Assessment.** The current Wildland-Urban Interface definition is not spatially represented and the current hazard assessment is at a scale that is misaligned for supporting land use planning policy and regulation at the city scale.
- **Wildfire-prone landscape.** Sisters is surrounded by National Forest. The county has an active fire history in terms of frequency, size, and severity. Wildland fires have always been an important natural disturbance in these ecosystems. Local, state, and federal land managers have been doing an excellent job of fuel treatments in the forest for the past several decades; however, as climate change brings uncertainty to the area, land managers and residents should be prepared for continued wildfires in the ecosystem.
- **Pace of regional growth.** Despite challenges with limited land, the city continues to grow through infill and any remaining vacant parcels. Growth and development bring many local economic benefits. It also requires additional planning for busy summer months that overlap with wildfire concerns, such as notification systems, tourist evacuation procedures, and business recovery plans.

Local Planning Opportunities

- **Plan updates.** In addition to its engagement in the CPAW program, the city is undergoing an update to the Sisters Country Community Vision. The city will also be working with Project Wildfire and county partners to update the 2014 Greater Sisters Country CWPP next year. Sisters also anticipates an update to its Comprehensive Plan in the next several years. These plans provide an opportunity for the city to coordinate and support wildfire resilience actions at the local and regional scales.
- **Potential changes to Oregon Building Code.** Stakeholders across the state are currently meeting to discuss changes to the building code that would allow local jurisdictions to adopt a WUI appendix. If this moves forward it would close a significant gap in the current system that makes it difficult for municipalities to require additional structural mitigation for wildfire.
- **Coordination with local, state, and regional partners.** Sisters has a positive history of working closely with the Sisters-Camp Sherman Rural Fire Protection District, county planners, and state and federal land managers. These groups are key to successfully addressing concerns in the WUI. An established culture of collaboration will support implementation of CPAW and future plans.
- **Updated resources.** The Oregon Department of Forestry (ODF) and the USFS recently launched the Oregon Explorer, which includes a comprehensive collection of wildfire data for residents, mitigation specialists, planners, and other professionals. This information can support implementation of the city's CPAW recommendations and other future planning needs related to wildfire.

Summary of Recommendations

Table 3. Overview of Recommendations		
Recommendation	**Summary**	**Key Points**
Recommendation 1: Spatially Define the Wildland-Urban Interface and Adopt the Advanced Oregon Wildfire Risk Explorer	The City of Sisters WUI is defined through the CWPP, but lacks the type of spatial reference information for land use planners to apply to development decisions. In addition, an updated and consolidated wildfire risk assessment would further provide a decision support tool for the city to analyze local wildfire risk across the community. An updated and consolidated wildfire risk assessment will support land use and regulatory decisions.	• Provide an updated spatial definition of the WUI based on the CWPP definitions and modified with SILVIS lab data. • Utilize a comprehensive assessment available in Advanced Oregon Wildfire Risk Explorer that provides a delineated wildfire risk assessment tool without requiring additional local capacity. • Conduct parcel-level assessments for the Home Ignition Zone (HIZ) to further enhance the city's understanding of wildfire risk at a detailed scale.
Recommendation 2: Update Defensible Space Requirements and Adopt New Building Code Requirements	Current wildfire regulations for defensible space and building requirements have multiple challenges associated with implementation, including gaps in applicability, limited staff capacity for enforcement, lack of technical knowledge to administer regulations, standards that do not reflect the most current science, and other conflicts. Revisions and an improved process for implementation will help the city effectively use regulations to address wildfire risk to development.	• Expand the defensible space requirements beyond the high and extreme hazard class to include the entire WUI area. • Update defensible space requirements to align with current science and best practices. • Adopt the future Oregon State Building Code Appendix W to address new construction. • Reconcile conflicts with other policies and codes.

Table 3. Overview of Recommendations

Recommendation	Summary	Key Points
Recommendation 3: Update Wildfire Planning Goals and Policies	The Sisters Comprehensive Plan is anticipated to be updated next year. The city is also engaging in other plan updates, including the Sisters Country Community Vision, Greater Sisters Country Community Wildfire Protection Plan, and the Deschutes County Multi-Jurisdictional Natural Hazards Mitigation Plan. These plan updates provide opportunities to link land use decisions with wildfire mitigation activities.	• Update the Comprehensive Plan's Goal 7 to elevate the significance of wildfire hazard and include more recent findings. • Adopt new wildfire policies that address current and future wildfire planning concerns, such as existing development, air and water quality, critical infrastructure, and future growth. • Participate in other plan updates, such as the CWPP update, to ensure land use discussions are factored into wildfire mitigation priorities.
Recommendation 4: Implement Mitigation Measures on Critical Infrastructure	The city relies on critical infrastructure to provide routine and emergency services to local residents and businesses. However, no comprehensive inventory of critical infrastructure is available to identify, assess, and guide mitigation activities to protect critical infrastructure from wildfire threat.	• Conduct an inventory and assessment of the city's critical infrastructure. Use the Potential Impact to Infrastructure layer of the Advanced Oregon Wildfire Risk Explorer, with the assistance of a qualified professional, to guide appropriate mitigation decisions. • Coordinate with other agencies and landowners where vegetation management is required on adjacent public and private properties. • Prioritize actions on known critical infrastructure needs, including Well #1 and the reservoir, using a combination of structural improvements and defensible space mitigation strategies.

RECOMMENDATION 1: Spatially Define the Wildland-Urban Interface and Adopt the Advanced Oregon Wildfire Risk Explorer

❖ Why This Recommendation Matters

Overview

An updated and consolidated wildfire risk assessment should be adopted to support land use and regulatory decisions. This assessment should include a map of appropriate scale and resolution that defines the wildland-urban interface and spatially delineated risk classes across the city.

Defining the Wildland-Urban Interface

The City of Sisters defines Wildland-Urban Interface[3] using the criteria outlined in the 2001 Federal Register and includes the following categories:

- **Category 1. Interface Community**
  The Interface Community exists where structures directly abut wildland fuels. There is a clear line of demarcation between residential, business, and public structures and wildland fuels. Wildland fuels do not generally continue into the developed area. The development density for an Interface Community is usually three or more structures per acre, with shared municipal services. Fire protection is generally provided by a local government fire department with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. An alternative definition of the Interface Community emphasizes a population density of 250 or more people per square mile.
- **Category 2. Intermix Community**
  The Intermix Community exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. The development density in the Intermix ranges from structures very close together to one structure per 40 acres. Fire districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of Intermix Community emphasizes a population density of between 28-250 people per square mile.
- **Category 3. Occluded Community**
  The Occluded Community generally exists in a situation, often within a city, where structures abut an island of wildland fuels (e.g., park or open space). There is a clear line of demarcation between structures and wildland fuels. The development density for an Occluded Community is usually similar to those found in the Interface Community, but

[3] 2014 Greater Sisters Country Community Wildfire Protection Plan

the occluded area is usually less than 1,000 acres in size. Fire protection is normally provided by local government fire departments.

The 2018 Oregon Wildfire Risk Explorer provides a spatially represented definition of the WUI using the Federal Register definitions; however, the resulting map appears to misrepresent a number of obvious areas of concern; and specifically excludes infrastructure.

The 2014 Greater Sisters Country CWPP defines the WUI boundary to include all three categories. This definition and approach provides an excellent standard; however, for the purposes of developing and implementing land use planning policies and regulations, the current mapping is not in a format that can be easily referenced. The development of a map that shows the spatial delineation of the WUI categories would provide a valuable decision support tool.

Determining the Wildfire Risk

Currently, all private lands across the entire City of Sisters land base is defined as "High Wildfire Hazard" based on the Oregon Forestland-Urban Interface Fire Protection Act (SB 360)[4] criteria used in the CWPP (Figure 6).

This results in one standard hazard class being applied to all individual parcels within the city boundary, regardless of the varying building and landscaping conditions of the individual lots and structures. At this scale, it is difficult to measure changes, or provide decision support at the city's scale of operation.

For a more appropriate application to land use planning decision support, the *hazard* assessment should be updated to assess the wildfire *risk* based on the most current science and at a scale that can provide decision support and a measure of success with regards to land use planning policy and regulation implemented by the city.

[4] Forestland-Urban Interface Fire Protection Act http://www.oregon.gov/ODF/Fire/Pages/UrbanInterface.aspx

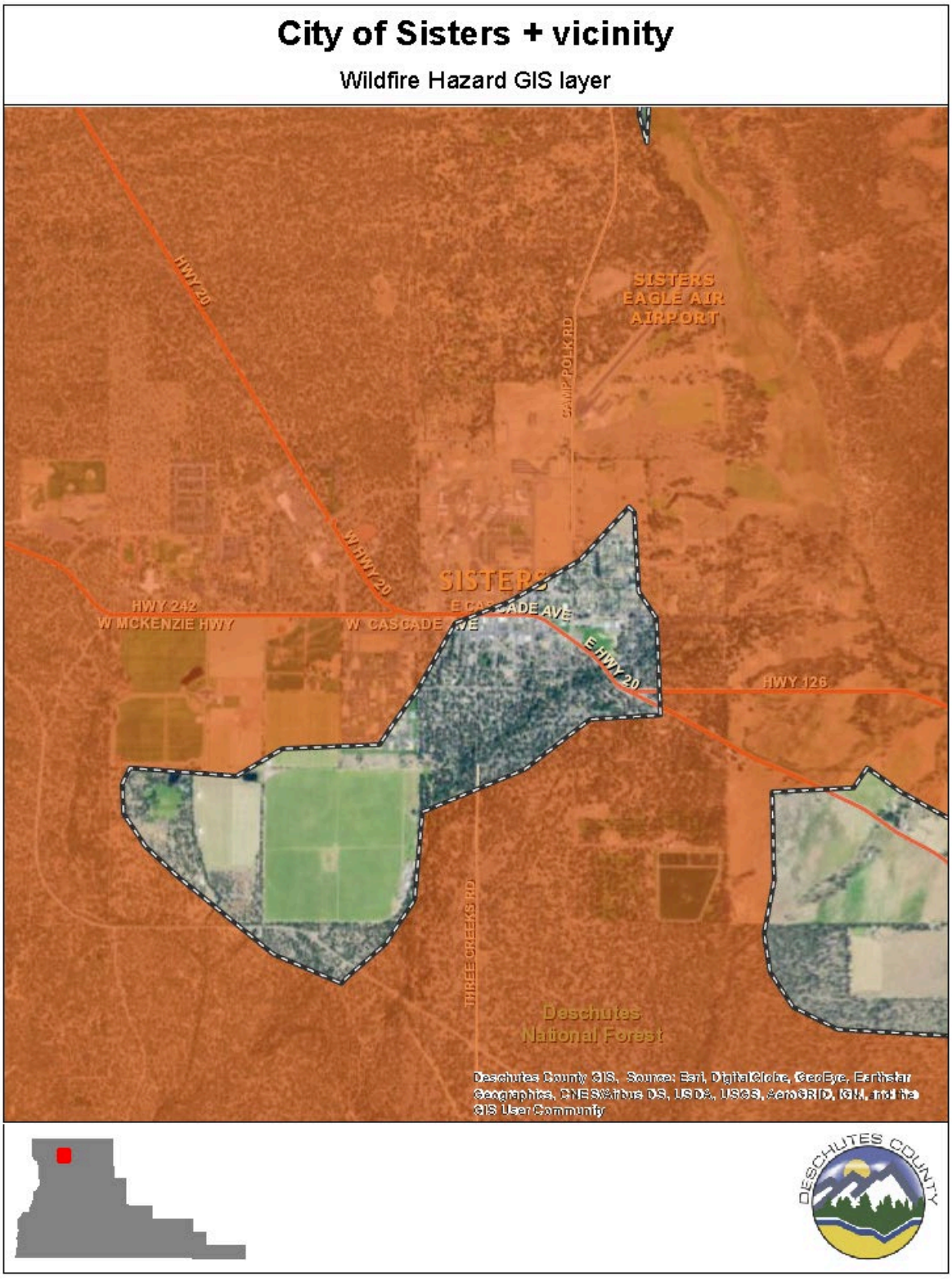

Figure 6. City of Sisters Oregon Forestland- Urban Interface (SB 360) Wildfire Hazard Classification Map.

What is Wildfire Risk?

A better understanding of wildfire risk and how it is related to land use planning can help the reader understand the need for a local wildfire risk assessment. Wildfire risk can be visualized as a triangle consisting of three components:

1. Likelihood of a wildfire occurring based on topography, weather, and ignition patterns; this can also include ignition sources from hazardous land uses (e.g., sawmills or propane storage facilities);
2. Predicted intensity of a wildfire (usually measured in flame length) based on vegetation type and weather conditions;
3. Susceptibility of values (for land use planning purposes, values consist of communities, structures and infrastructure).

Together, these components complete the wildfire risk triangle (Figure 7).

Figure 7. Components of the wildfire risk triangle.

Land use planning largely focuses on mitigating the susceptibility portion of the wildfire risk triangle. There are two important susceptibility inputs that should be evaluated to appropriately determine wildfire risk in the context of land use planning:

- The location and density of structures and infrastructure;
- The ignition potential of individual structures and infrastructure.

Current science indicates that the condition of each individual structure (construction materials and design) and area within 100 feet (plus) of each structure (vegetation, landscaping, distance to other structures, slope and the presence of combustibles) are the primary determining factors of a

structure's susceptibility to wildfire. This area that includes the structure and the immediate surrounding 100 feet (plus) is most often described as the "Home Ignition Zone (HIZ)." Within the City of Sisters, many of the developments consist of overlapping HIZs (Figure 8).

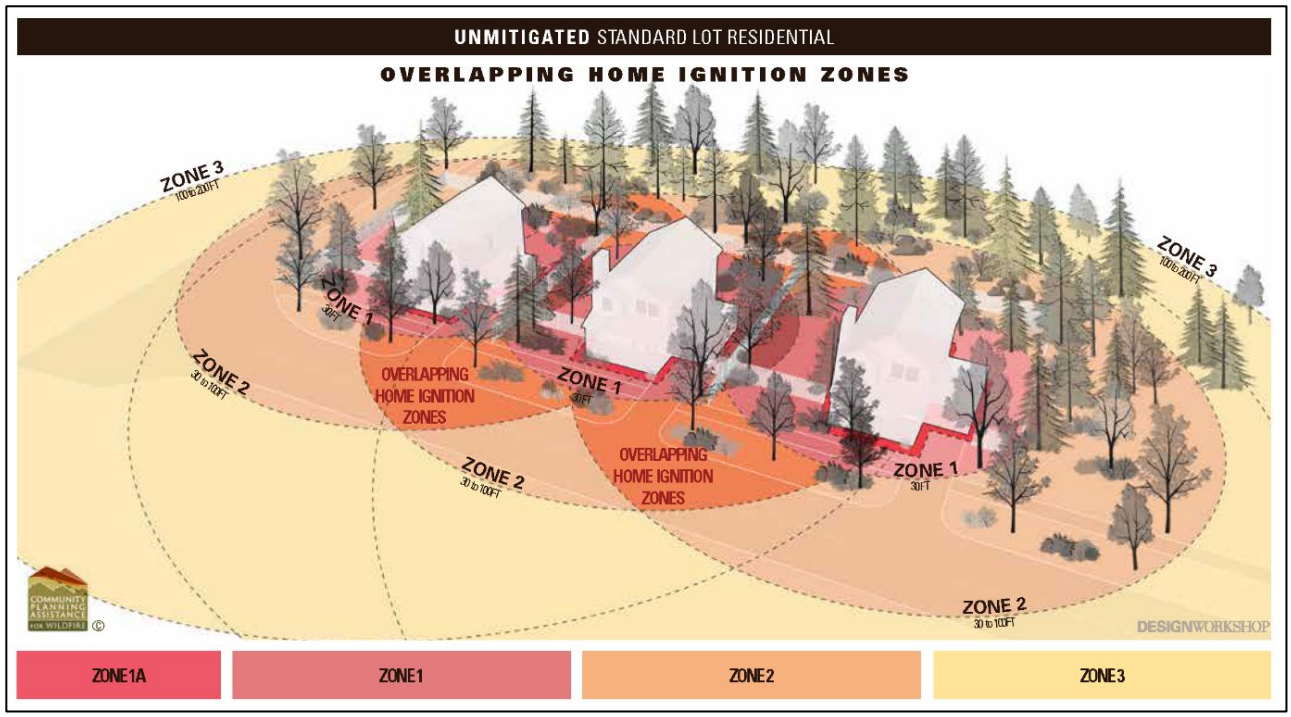

Figure 8. Individual Home Ignition Zones (HIZ) in an "overlapping" scenario, typical of suburban development found in the City of Sisters.

The relationship between each individual HIZ and the larger landscape conditions (likelihood and intensity) determines its potential exposure to wildfire.

The Advanced Oregon Wildfire Risk Explorer

Developing and maintaining an appropriate local wildfire risk assessment requires capacity and a specialized skill-set in risk analysis and geographic information systems (GIS). These resources are often unavailable to a community undertaking a comprehensive local wildfire risk assessment. However, the new Advanced Oregon Wildfire Explorer map viewer platform[5] provides a reasonable alternative. This platform includes a variety of wildfire risk assessment tools that are based on the most up-to-date science and data. Although the Advanced Oregon Wildfire Explorer will not reflect local conditions as well as a locally driven assessment, it is a vast improvement on the current hazard assessment. The use of this platform should be adopted to provide a defendable and delineated wildfire risk assessment for the City of Sisters.

[5] http://tools.oregonexplorer.info/OE_HtmlViewer/index.html?viewer=wildfireplanning

❖ Implementation Guidance

The City of Sisters should take several steps to address the current shortcomings related to its WUI and hazard identification:

1. develop a spatially defined WUI map;
2. adopt the Oregon Wildfire Risk Explorer as the new wildfire risk assessment; and
3. enhance this assessment over time with individual HIZ assessments.

This will provide a clear definition of the City of Sister's WUI and integrate a defendable risk assessment map as a component of the decision support tool and measure of success for land use policies and regulations. Guidance for each step is outlined below.

Spatially Define the WUI

To provide a spatial reference in defining the WUI, the SILVIS lab's approach should be used. The SILVIS lab approach originated in the Federal Register report on WUI communities at risk from fire, and Tie and Weatherford's 2000 report to the Council of Western State Foresters on WUI fire risk. This approach further expands on the Federal Register definitions and focuses on the following inputs:

1. Housing density
2. Landcover[6]
    a) **WUI Intermix**: Areas with ≥16 houses per square mile and ≥50 percent cover of wildland vegetation
    b) **WUI Interface:** Areas with ≥16 houses per square mile and <50 percent cover of vegetation located <1.5 miles of an area ≥2 square miles in size that is ≥75 percent vegetated
    c) **Non- WUI Vegetated (no housing):** Areas with ≥50 percent cover of wildland vegetation and no houses (e.g., protected areas, steep slopes, mountain tops)
    d) **Non-WUI (very low housing density):** Areas with ≥50 percent cover of wildland vegetation and <16 houses per square mile (e.g., dispersed rural housing outside neighborhoods)
    e) **Non-Vegetated or Agriculture (low and very low housing density):** Areas with <50 percent cover of wildland vegetation and <128 houses per square mile (e.g., agricultural lands and pasturelands)
    f) **Non-Vegetated or Agriculture (medium and high housing density):** Areas with <50 percent cover of wildland vegetation and ≥128 houses density per square mile (e.g., urban and suburban areas, which may have vegetation, but not dense vegetation**)**

[6] Schlosser, W.E. 2012. Defining the Wildland-Urban Interface: A Logic-Graphical Interpretation of Population Density. Kamiak Ridge, LLC.

Within the City of Sisters, it is likely that ember impacts from wildfires can occur throughout the city. To account for this and to align with the definitions in the CWPP, the above Landcover definitions can be simplified to the following:

- **WUI Intermix**: Areas with houses (or other structures) present and ≥50 percent cover of wildland vegetation
- **WUI Interface:** Areas with houses (or other structures) present and <50 percent cover of vegetation

The resulting product would provide a map that shows both the extent of the WUI (where policy and regulation should be focused) and the general delineation of the stringency of the policies and requirements from most stringent (WUI Intermix) to least stringent (WUI Interface) for all structure values of concern (structures and infrastructure).

Adopt the Oregon Wildfire Risk Explorer and Undertake HIZ Assessments

The Advanced Oregon Wildfire Risk Explorer includes a variety of wildfire risk assessment tools that can be useful in land use planning.

Overall Wildfire Risk Layer

The overall wildfire risk is the product of the likelihood and consequence of wildfire on all mapped highly valued resources and assets combined (e.g., critical infrastructure, developed recreation, housing unit density, seed orchards, sawmills, historic structures, timber, municipal watersheds, vegetation condition, and terrestrial and aquatic wildlife habitat.)

This dataset considers the likelihood of wildfire >250 acres (likelihood of burning), the combined susceptibility of resources and assets to wildfire of different intensities, and the likelihood of those intensities. The data values reflect a range of impacts from a very high negative value where wildfire is detrimental to one or more resources or assets (e.g., structures, infrastructure, early seral stage and/or sensitive forests) to a very high positive value where wildfire will produce an overall benefit (e.g., vegetation condition/forest health, wildlife habitat).

This layer may not be directly useful in connecting to land use policy or regulation, but it provides an excellent summarized view of the wildfire risk faced by the City of Sisters.

Hazard to Potential Structures Layer

The Hazard to Potential Structures shows impact levels to structures within 150 meters of a burnable fuel type, as if structures were present, and if a wildfire occurs. This data is based on modeled vegetation and *not* on building construction materials, which actually provides a measure of wildfire exposure (likelihood and intensity) as opposed to the complete wildfire risk. Building construction material and building design conditions, or conditions within the HIZ of individual structures, have the greatest influence on the susceptibility of a structure and are not

accounted for in this layer. Therefore, this data can be further refined through the undertaking of individual parcel-level wildfire assessments.

The impact levels are as follows:

Very low: The potential impact to structures when wildfire occurs is expected to be very low. Fuel in the area is largely non-burnable or very sparse. If a fire ignites near a home there is low potential for loss.

Low: The potential impact to structures when wildfire occurs is expected to be low. If a fire ignites near a home there is potential for loss. Low represents up to the 50th percentile of values across the landscape.

Moderate: The potential impact to structures when wildfire occurs is moderate. If a fire ignites near a home there is high potential for loss. High represents the 50th to 80th percentile of values across the landscape.

High: The potential impact to structures when wildfire occurs is high. If a fire ignites near a home there is high potential for loss. High represents the 80th to 95th percentile of values across the landscape.

Very High: The potential impact to structures when wildfire occurs is very high. If a fire ignites near a home there is high potential for loss. High represents the 95th to 100th percentile of values across the landscape.

This layer can be used to determine the potential hazard (exposure) for future development or the potential hazard (exposure) for existing development (Figure 9).

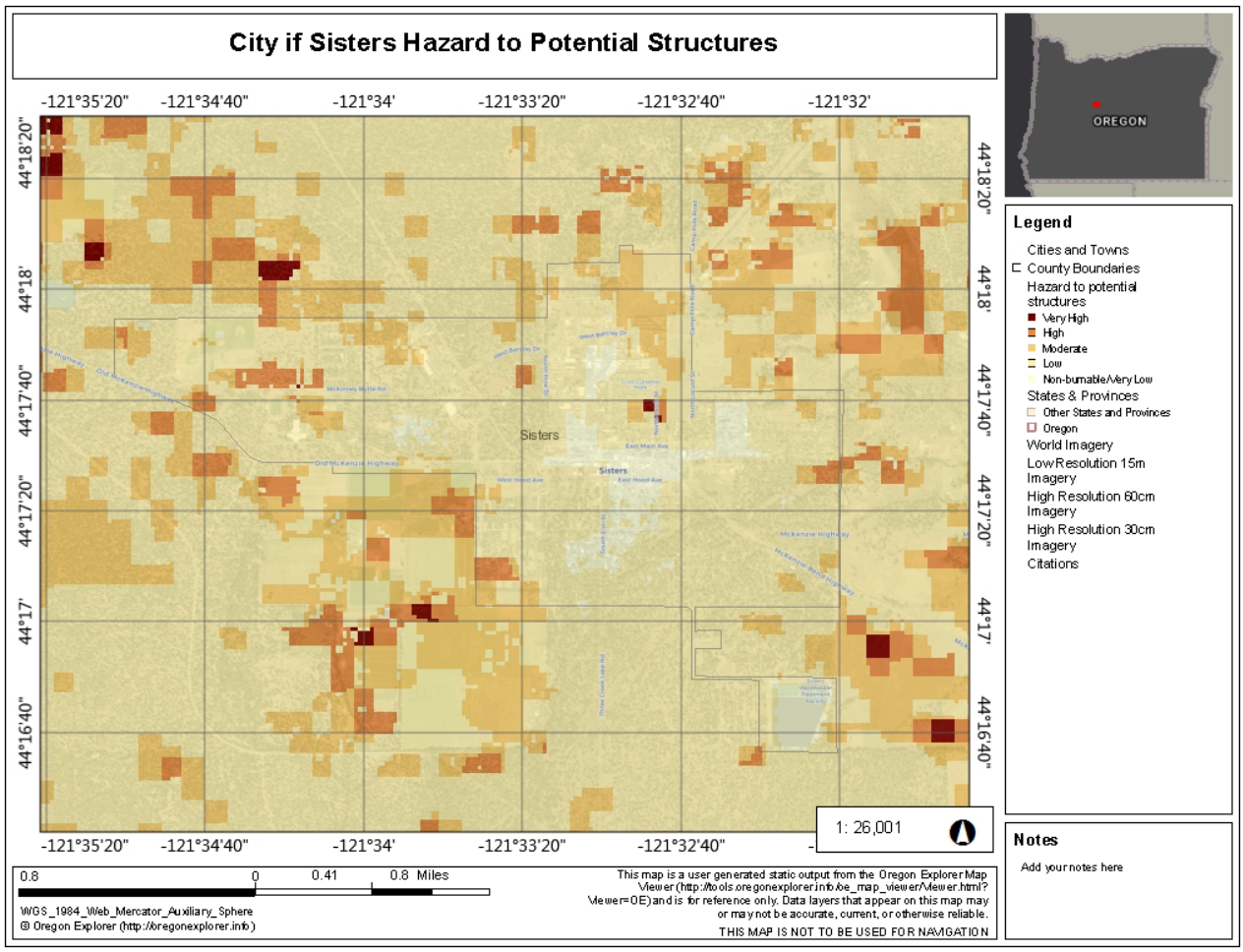

Figure 9. Potential Impact to Structures Map.

Potential Impact to People and Property Layer

This layer represents the consequence of wildfire, if it occurs on mapped housing unit density and USFS private inholdings (Figure 10). The potential impact is delineated from very low to very high. This layer can be used to determine the potential exposure of existing structures and people, based on the mapped presence of structure (address) points. Again, this data can be further refined through the undertaking of individual parcel-level wildfire assessments.

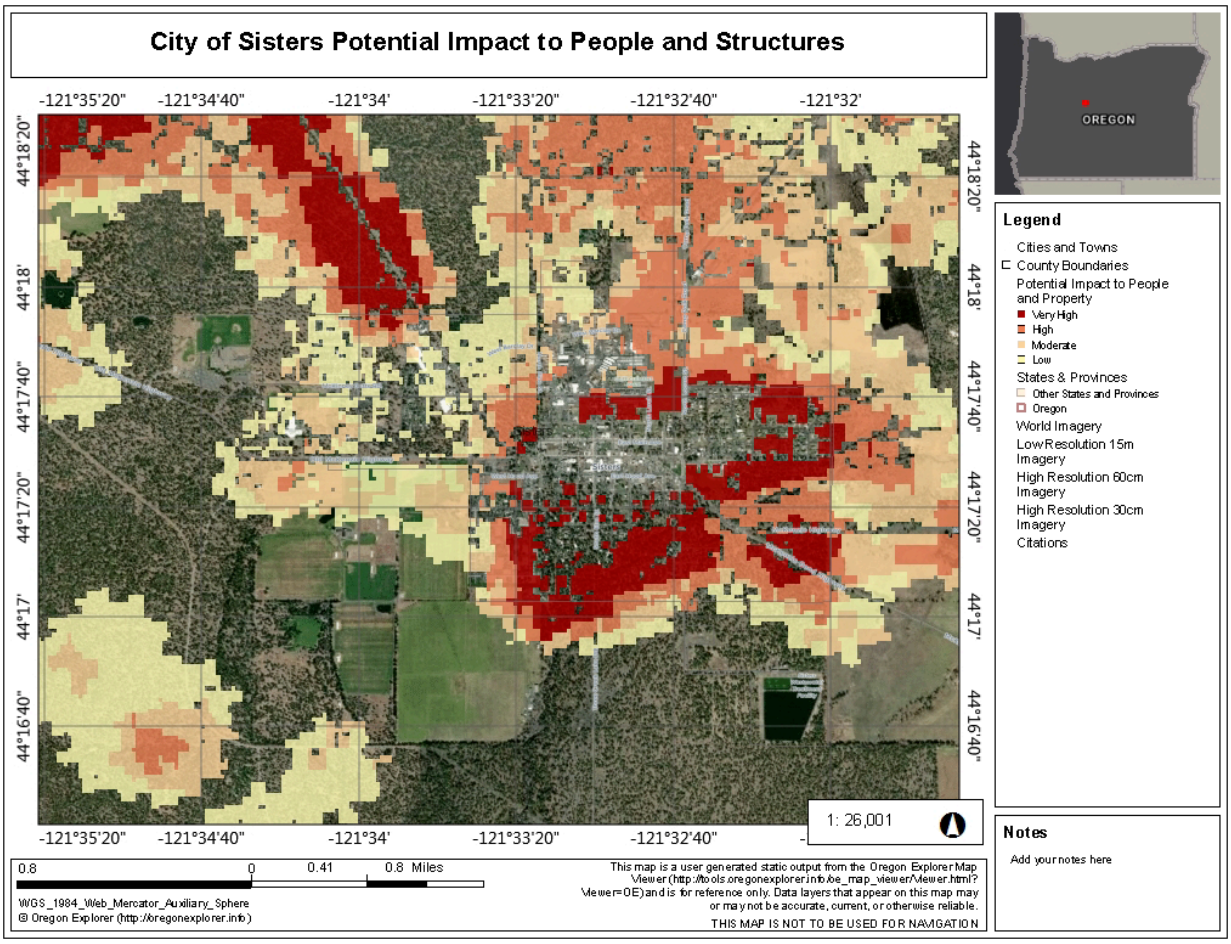

Figure 10. Potential Impact to People and Property Map.

Potential Impact to Infrastructure Layer

This layer represents the consequences of wildfire to mapped critical infrastructure, recreation values, seed orchards, etc. The potential impact is also delineated from very low to very high (Figure 11).

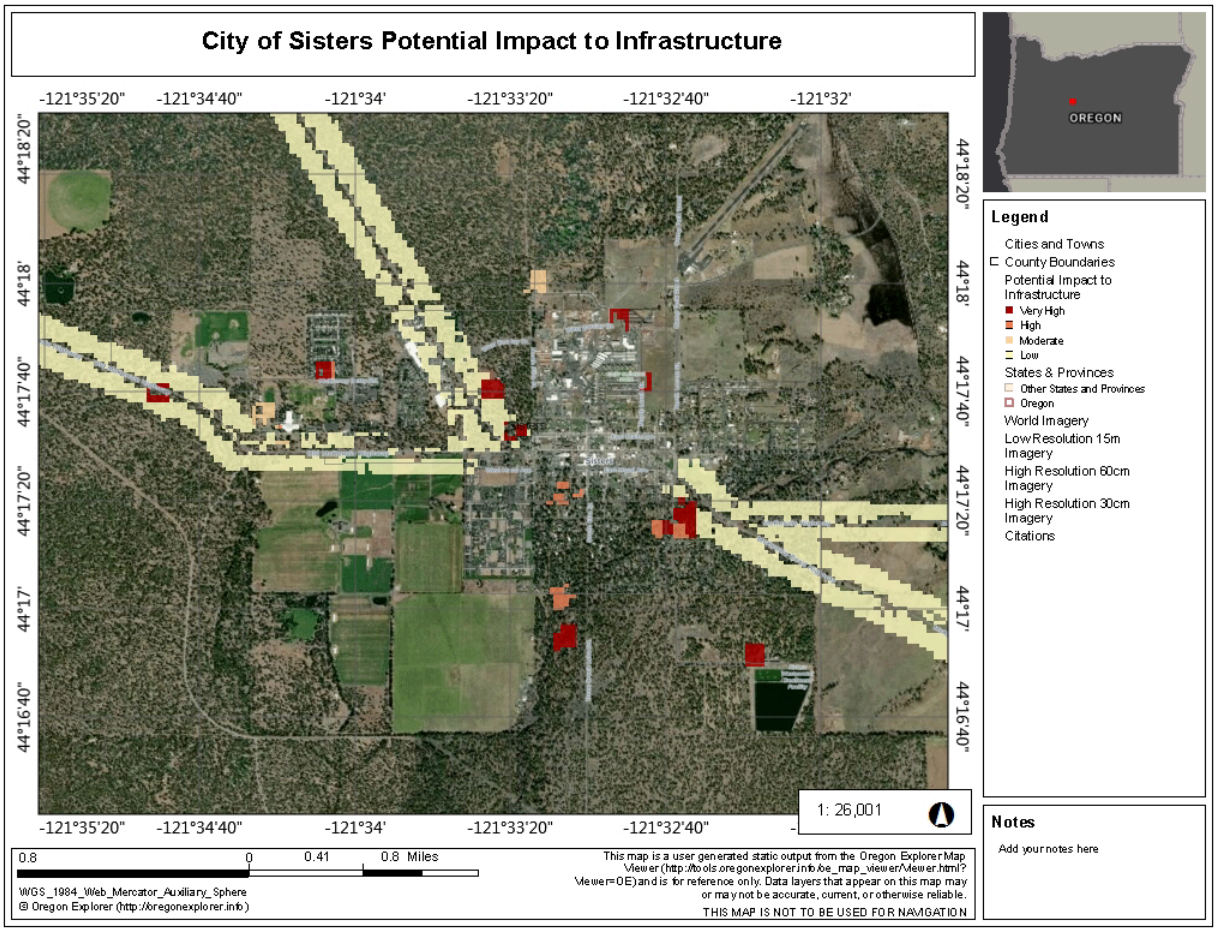

Figure 11. Potential Impact to Infrastructure Map.

Other Layers

Additional layers, such as the Impact to Wildlife, Impact to Timber Resources, and Impact to Forest Vegetation, are also available.

Recommended Risk Assessment Approach

The combined layers of Hazard Potential to Structures, Potential Impact to People and Property, and the Potential Impact to Infrastructure have the most useful wildfire risk assessment application with regards to assessing the potential exposure (likelihood and intensity) to development planning (Figure 12). The additional layers can also be useful to support open space and natural resource planning.

CPAW recommends that the City of Sisters adopt the Oregon Wildfire Risk Explorer platform as the wildfire risk decision support tool for land use planning. CPAW further recommends that the city and Sisters-Camp Sherman Rural Fire Protection District coordinate on the implementation of an individual parcel-level hazard assessment program for existing structures. This additional

parcel-level information provides the susceptibility component and will result in a comprehensive risk assessment.

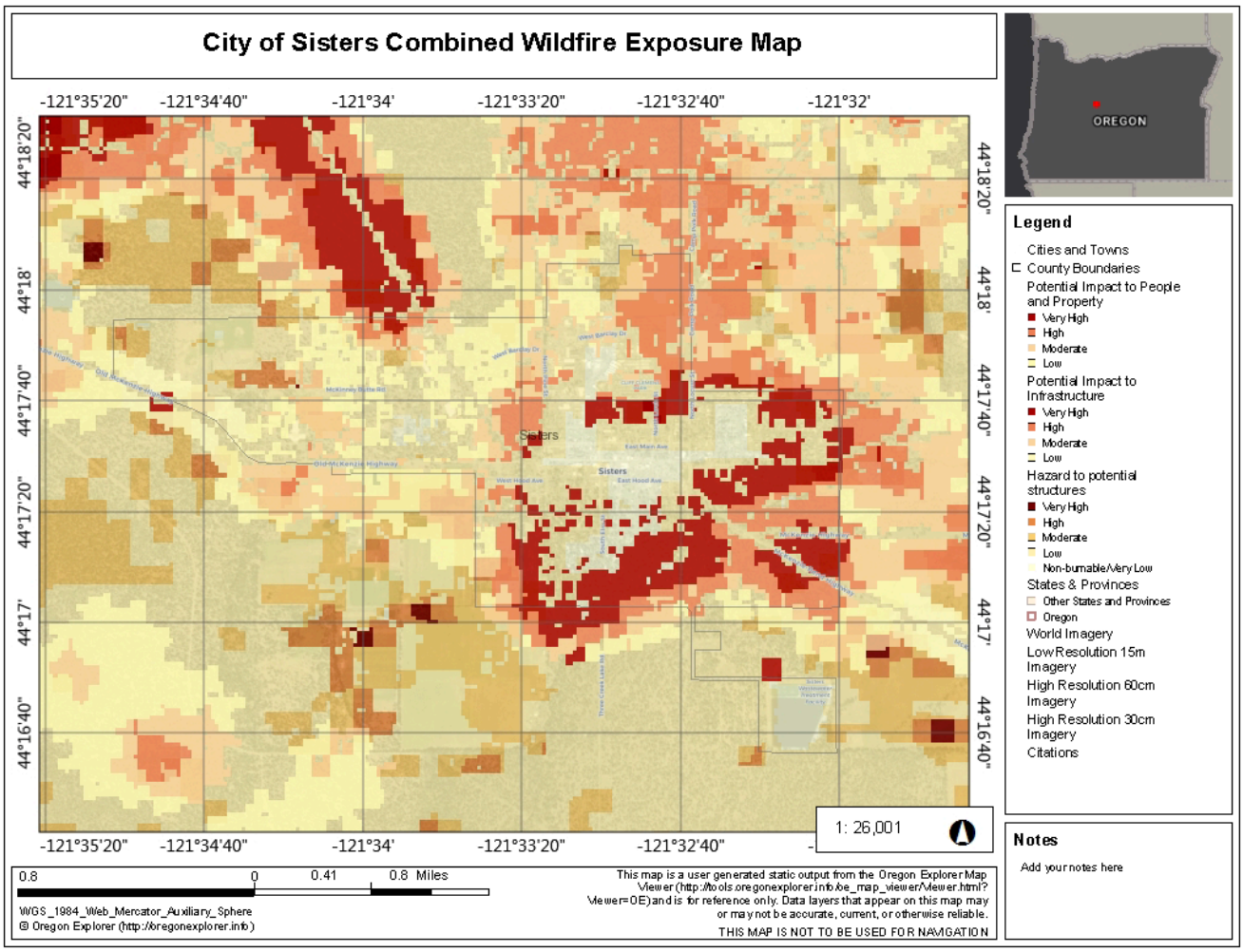

Figure 12. Combined Potential Hazard to Structures/ Potential Impact to People and Property/ Potential Impact to Infrastructure Map.

❖ Tips and Additional Resources

Many communities seek to develop a comprehensive risk assessment with parcel-level information about the HIZ. Two Colorado counties serve as examples: the REALFire® program (Eagle County, CO) and the Wildfire Partners program (Boulder County, CO). Both counties have implemented regulations for future development in concert with voluntary programs that incentivize risk reduction practices and provide valuable homeowner education. Programs partner with fire departments, fire districts, and other local stakeholders and private organizations to offer property assessments. Each program utilizes the HIZ concept, introduced by Dr. Jack Cohen (USFS), and further incorporates science from the Insurance Institute for Business and Home Safety (IBHS) to provide the following:

- An in-depth assessment of a home, property, and accessory structures and other attachments performed by a trained mitigation specialist;
- Landscaping guidance based on the Colorado State Forestry Service Firewise Guidelines;
- A detailed and customized report, including a mitigation checklist to guide the homeowner's mitigation actions;
- A follow-up site visit to verify completion of work;
- A certificate to acknowledge successful completion, which may also be shared with insurance providers to secure or renew coverage.

Eagle County, CO – REALFire® Program

The REALFire® program was established by the Vail Board of Realtors® and Eagle County, Colorado. It uniquely involves Realtors in local wildfire risk reduction efforts by engaging their support and expertise in marketing and outreach with local members and other Realtors' associations. Eagle County provides assessment data, program coordination and outreach with local fire districts. A home assessment app has also been generated based on HIZ best practices, which automatically generates a full property assessment report. Each completed assessment is automatically stored in a database for easy access and management of collected information.

The program is funded through Eagle County, Vail Board of Realtors, several Homeowner Associations, and state and federal grants. Assessments were initially offered at $50 and will be offered at no cost during the 2017 calendar year. Homeowners who successfully complete their wildfire mitigation activities can obtain a wildfire certificate for their individual properties. This certification can be used to enhance real estate transactions by reassuring prospective buyers that wildfire risk reduction has been achieved. More information is available on the REALFire® website (www.realfire.net).

Boulder County, CO – Wildfire Partners Program

Boulder County's Wildfire Partners program has been active for four years and has become a template for communities to engage homeowners in the WUI. The program is run completely by Boulder County. Program funding is through the county, a $1.5 million grant from the Colorado Department of Natural Resources, and a $1.25 million grant from the Federal Emergency Management Agency. These major funding sources have allowed the program to offer reduced assessment rates and financial awards to subsidize work being done by designated contractors or homeowner material costs. Through the partnerships with the insurance companies in the area, receiving a certificate can translate into reductions in insurance premiums and the renewal of insurance policies in wildfire risk areas. More information is available on the Wildfire Partners website (www.wildfirepartners.org)

RECOMMENDATION 2: Update Defensible Space Requirements and Adopt New State Building Code Requirements

❖ Why This Recommendation Matters

Overview

The City of Sisters currently has wildfire regulations for defensible space and building requirements. However, there are multiple challenges associated with effectively implementing these regulations, including gaps in applicability, limited staff capacity for enforcement, lack of technical knowledge to administer regulations, standards that do not reflect the most current science, and potential conflicts between references to hazard classes. With proper revisions and an improved process for implementation, the city can effectively use these regulations to address wildfire risk to development.

Defensible Space Requirements

The City of Sisters Development Code (§3.2.200.B.C.1, Landscaping and Screening Development Standards) requires that "all landscaping within the City shall comply with the Oregon Forestland-Urban Interface Fire Protection Act" (SB 360). Based on the current hazard assessment, this requires all properties to comply with the "High Hazard" requirements of SB 360 (Figure 6). The "High Hazard" requirements include[7]:

- A 30-foot primary fuel break, or to the roadside, or to the property line.
- Nonflammable ground cover includes, but is not limited to, green grass, clover, wildflowers, succulent ground cover, ivy, mulches, rock, concrete or asphalt.
- Dry grass mowed to 4 inches high.
- A fuel break such as a raked path a few inches wide, a gravel walkway, or a patch of green grass (lawn).
- Trees and shrubs that are healthy and well-watered.

[7] Evaluation Form For Forestland Urban Interface Properties Located In Areas Classified As High https://www.oregon.gov/ODF/Fire/FirePreventionDocuments/Certification%20High.pdf and Oregon State Department of Forestry Chapter 629 Division 44 WILDFIRE HAZARD ZONES; WILDLAND-URBAN INTERFACE https://secure.sos.state.or.us/oard/displayDivisionRules.action;JSESSIONID_OARD=jfUeVv9n8bZo6IY83yX4eyWULH8fOziaZf_SaEBdwnVgiZTAM4rS!143575988?selectedDivision=2845

- Removal of dead plant material (dead branches, dead tops, and clumps of dead leaves or needles trapped in foliage)
- Removing ladder fuels by pruning a tree's lower branches or removing the fuels beneath the branches so the vertical distance between ladder fuels is three times the height of the shrub or vegetation beneath the tree.
- Thinning trees and shrubs by removing trees and shrubs of poor vigor, and their removal should benefit the favored individuals.
- A secondary fuel break that must extend to 20 feet beyond the primary fuel break (non-flammable roof) or 70 feet beyond the end of the primary fuel break (structure with a flammable roof).
- A nonflammable roof that is rated Class A, B or C by Underwriters Laboratory, or is metal, and has been installed and maintained to the roofing material manufacturer's specifications.
- A driveway fuel break that is not less than 20 feet in width, or to the property boundary, and a 13½-foot vertical clearance standard must be maintained throughout the 12-foot horizontal clearance standard's distance.
- Tree branches or other vegetation within 10 feet of a chimney or stovepipe need to be cleared away.
- Removal of dead plant material includes, but is not limited to, branches, foliage, tops and boles.
- Removal of flammables include, but are not limited to, piles or stacks of firewood or lumber, dry needles and leaves, cans of gasoline or paint, bottles of propane, charcoal briquettes and lighter fluid within 20 feet of the structure.
- Firewood or lumber can be stored within 20 feet of a structure if it is within a nonflammable structure that completely protects the firewood or lumber from radiant heat and firebrands.

In the Sisters Municipal Code, Title 8 Health and Safety, §8.20 Urban/Rural Interface requires properties rated as extreme fire risk to maintain defensible space and fuel breaks on their properties and along driveways. This requirement creates confusion for two reasons:

1. It sets a different standard than that described above in the Development Code; and,
2. There are no areas in the city that are currently rated in the "Extreme Hazard" class.

Municipal code and development code requirements focus both on initial mitigation and maintenance but are rarely enforced by the city due to limited staff capacity and lack of technical knowledge on the wildfire mitigation requirements. The fire district does not currently have the authority to enforce these city standards. Additionally, these requirements do not reflect the most current science and best practices, which have been updated since adoption of these standards.

Building Requirements

The City of Sisters Ordinance 346 and the Oregon State Building Code also require a minimum Class C rated roof and do not allow for treated or untreated wood shingles or shake roofs. This is the *only* requirement for structures. Current research and best practices have identified a number of additional critical factors that contribute to structure wildfire susceptibility; however, the Oregon State Building Code currently restricts the city from imposing any additional requirements on the building envelope.

Access Requirements

The City also requires fire access and turnarounds, which is enforced through the Oregon Fire Code.

❖ Implementation Guidance

The City of Sisters has a strong base for effectively improving mitigation of wildfire risk. There are opportunities to improve defensible space requirements, building construction requirements, and the enforcement of all these requirements, as provided by the guidance below.

Expand and Update Defensible Space Requirements

Spatially defining the WUI and adopting the Advanced Oregon Wildfire Risk Explorer tool (Recommendation 1) will provide a scientifically sound decision support tool for applying policy and enforcing regulations. This spatial delineation can provide justification to apply the city's current defensible space requirements (SB 360) to *all* properties identified within the defined WUI. Additionally, the current defensible space requirements within the City of Sisters Municipal Code should be updated to align with current science and best practices.

CPAW recommends requiring and enforcing defensible space mitigation standards appropriate to wildfire exposure to include all new development properties, in all hazard classes in the WUI, as one component of effectively addressing the impacts of wildfire on structures and infrastructure. This can be primarily achieved by updating the city's defensible space requirements to align with the Oregon Wildfire Risk Explorer spatial outputs. Specifically, aligning new development requirements with the combined Hazard Potential Structure/ Potential Impact to People and Property layers and the hazard class rating requirements in Table 4 (below).

Table 4. Recommended Development Requirements for Wildfire Hazard Class	
Hazard Class	**Requirements**
Very Low/ Low/ Moderate	• Five-foot non-combustible (or to property line; whichever is less) horizontal surface perimeter extending from the outer extents of the structure, including projections. • Non-combustible surface under all decks and overhanging projections. • Fences or gates within 5 feet of the structure constructed of ignition-resistant or non-combustible material. • 30 feet (slope adjusted) of primary defensible space extending from the structure (or to property line; whichever is less) with: o low-flammability, low-growing and discontinuous vegetation; o no piled firewood, lumber or combustible debris present outside of a non-combustible and ember-resistant structure; o minimum distance of 1 x tree crown width, or 10 feet, whichever is more, between tree crowns; o tree crowns pruned 6 to 10 feet or 1/3 of the tree crown height; o no shrubs within the drip line of trees, where the distance between the tree crown base and the shrub is less than 3 times the height of the shrub.
High/ Very High	• All of the requirements for Very Low/Low/Moderate, and: • 70 feet (slope adjusted) of additional secondary defensible space (or to property line, whichever is less) with: o tree crowns pruned 6 to 10 feet or 1/3 of the tree crown height; o minimum 1 x tree crown width, or 10 feet between tree crowns, whichever is more; o no shrubs within the drip line of trees, where the distance between the tree crown base and the shrub is less than 3 times the height of the shrub. • 30 feet of defensible space (or to property line, whichever is less), meeting the above secondary defensible space requirements on both sides of driveways. • 12-foot-wide driveway, clear of vegetation within the 12 feet to 13.5 feet vertical. • Minimum turn-around on driveways 150 feet or longer.

Oregon State Building Code Opportunity

The City of Ashland has been spearheading an initiative to adopt a Wildfire Hazard Mitigation Appendix (Appendix W) to the Oregon State Building Code. This initiative was reviewed by the Oregon Residential Specialty Code (ORSC) committee with a recommendation to proceed to rulemaking with the provisions inserted in Section R327 within the body of the code. It is yet to be determined whether this code will apply to every home built in wildfire hazard zones, or only to subdivisions of five or more homes. Once adopted by the state, Section R327 will become optional for local adoption by jurisdictions that will apply within their identified wildfire hazard areas.

When the Oregon Building Code Section R327 becomes available, CPAW recommends that the city coordinate with Deschutes County to adopt it. This will effectively address the second component of wildfire mitigation for individual structures in all new construction (possibly restricted to subdivisions of five homes or more). The city's spatial identification of the WUI (Recommendation 1) can provide the delineation of the wildfire hazard area.

Address Possible Code and Policy

There are some policies and codes that either currently conflict with existing defensible space requirements or may conflict with future revisions to defensible space and building requirements (based on Table 4 recommendations). It is important that these policies and requirements align to minimize conflict. Some examples of required conflict resolution include:

- Update the city's comprehensive plan and city code to allow for ignition-resistant and non-combustible materials for use in meeting the Western/Frontier architectural requirements while aligning with the proposed Oregon State Building Code amendment.
- Review and update the city's comprehensive plan to allow for appropriate wildfire mitigation of vegetation within the HIZ while retaining and respecting the natural vegetation of a site as much as possible.
- Review the city's urban forestry development code requirements to resolve conflicts between defensible space requirements and the tree preservation. Recommendation 3 also contains additional recommendations on policy conflicts.

Coordinate Administration and Enforcement with Fire District

During conversations throughout the CPAW process, fire district and planning staff members both recognized that the planning department currently has limited technical expertise and capacity to review and enforce mitigation requirements. To address these challenges, CPAW proposes the following solutions:

1) **Expand the role of the fire district.** Forward all development applications to the Sisters-Camp Sherman Rural Fire Protection District, similar to the current process set up for special events permits and business license applications. The fire district will review applications for compliance with the appropriate mitigation requirements (Table 4) based

on their professional judgment and perform final inspections. This may require a nominal application fee to account for increased staff time, but would have multiple benefits, including increasing face time between fire district staff and the public to discuss local fire concerns from residents and increase public education on wildfire risk.

2) **Educate planning department on mitigation techniques.** During the CPAW process, team members provided a training to educate local planners from the city and county on wildfire hazard, risk, and mitigation concepts. The fire district should continue to work with planning staff to educate them on the local application of these concepts. This will empower planning staff to field questions from the public and provide any supplemental information for development applications.
3) **Increase mitigation opportunities to existing property owners.** Much of Sisters is already developed and will therefore not be subject to mitigation requirements. Under the direction of the fire district, utilize the fire corps as a resource to provide voluntary mitigation guidance to existing properties. Additional staffing resources may be available through grant opportunities currently being pursued by the city and county.

RECOMMENDATION 3: Update Wildfire Planning Goals and Policies

❖ Why This Recommendation Matters

The City of Sisters Urban Area Comprehensive Plan dates back to 1970 when the city undertook a joint planning effort with Deschutes County and other communities to develop its first comprehensive plan. A subsequent update to that joint plan occurred, and in 1979 the city adopted its own Sisters Urban Area Comprehensive Plan. Since then, the city has revised its plan several times, as described in more detail in its most recent plan update (August 2014).

The Sisters Comprehensive Plan is due for another full update, which is anticipated to start in 2019 and has a target adoption date of 2021. In addition, the city is currently engaged or will be participating in other plan updates, including:

- **Sisters Country Community Vision** (Sister Country Horizons)—a visioning project sponsored by the City of Sisters in partnership with Deschutes County and the Central Oregon Intergovernmental Council. Sisters Country Horizons is currently underway and scheduled for release in late 2018 or early 2019.
- **Greater Sisters Country Community Wildfire Protection Plan**—a plan for Camp-Sherman, Black Butte Ranch, and Cloverdale Fire Districts, and Sisters-area residents. This plan was last updated in 2014 by Project Wildfire and is scheduled for an update in 2019.
- **Deschutes County Multi-Jurisdictional Natural Hazards Mitigation Plan**—a mitigation plan that addresses local hazards across the county and local communities, including Sisters. This plan was last updated in 2015 and typical update cycles occur every five years.

The timing of the scheduled Comprehensive Plan update, on the heels of other efforts either wrapping up or underway, provides the city with an opportunity to link wildfire goals and policies with other plans. This also paves the way for a more coordinated approach to wildfire mitigation activities and implementation. To help guide these efforts, CPAW recommends the following implementation guidance.

❖ Implementation Guidance

1. Update Goal 7 to Elevate Significance of Wildfire Hazard

Goal 7: Natural Disasters and Hazards, in the current Comprehensive Plan, is dedicated to natural disasters and hazards. The goal of Chapter 7 is to provide policies that protect people and property from natural hazards. "Forest fires" is listed as one of the natural disasters and hazards that threaten the city. However, there is limited background information provided on forest fires as compared to other hazards, leaving the impression that this hazard warrants less attention. In addition, the background information on forest fires is dated and does not relate to recent fires or current fire planning information that would be useful for land use planning.

Re-Organize Goal by Hazard Type

Future updates to Goal 7 should consider an organization by hazard type or a different logical theme. The current structure makes it difficult to determine which findings, policies, and tasks relate to specific hazards or whether they are multi-hazard. Organizing either by hazard type or some other grouping will help stakeholders easily identify which policies are most applicable to their efforts, and how to best link policies with other plans.

Update Findings

Update findings to reflect the following:

- Acknowledgment of fire hazard across the city, as opposed to the current finding which only ties wildfire risk to portions of the city that are contiguous to the national forest. This finding can reference an updated WUI and wildfire risk assessment (Recommendation 1).
- Fire protection and other operational matters should refer to the CWPP and/or hazard mitigation for more details.
- In addition to the local fire district, findings should acknowledge other state and federal agencies that support, assist, or collaborate with the city to implement wildfire risk reduction and mitigation activities.

Adopt New Wildfire Policies

Goal 7 contains three policies that directly relate to wildfire (Section 7.4). Based on discussions with local stakeholders, these policies have either been fully or partially implemented:

> 2. An emergency response program shall be developed to respond to natural or man-caused disasters. *(fully implemented)*
>
> 3. The city shall promote development of an ordinance requiring fire-resistant building materials and landscaping for all new construction. (*partially implemented through roof ordinance*)

5. During preliminary subdivision review, the planning staff, in coordination with the Sisters-Camp Sherman Rural Fire Protection District, shall indicate whether the developers' plan has adequately provided for fire protection. *(fully implemented)*

Future plan updates will require new policies to address current and future wildfire planning concerns. CPAW recommends the following topics to be addressed by new policies:

Table 5. Recommended New Policies

Policy	Applicable Goals
1. Work with applicable landowners/partners to mitigate the threat of wildfire to the city's critical infrastructure, including local water supplies.	• Natural Disasters and Hazards • Public Facilities and Services • Air, Water, Land Resource Quality
2. Adopt new wildfire hazard and WUI maps to determine mitigation requirements.	• Natural Disasters and Hazards
3. Initiate a retrofit program to incentivize existing commercial and residential structures to reduce vulnerabilities to wildfire through structural improvements and landscaping techniques.	• Natural Disasters and Hazards • Housing • Economic Development
4. Re-evaluate existing mitigation requirements for development to ensure they appropriately address wildfire threat to life and property.	• Natural Disasters and Hazards • Land Use Planning
5. Include wildfire risk as a criterion for future areas of growth, including where UGB expansion will occur.	• Natural Disasters and Hazards • Land Use Planning • Urbanization
6. Protect air and water quality and other natural resources through sustained actions that reduce high-severity wildfires.	• Natural Disasters and Hazards • Air, Water, Land Resource Quality
7. Identify opportunities to work with land management agencies to use ecosystem-based fire management as a tool for multiple objectives.	• Natural Disasters and Hazards • Open Space, Scenic and Historic Spaces, Natural Areas
8. Coordinate with Sisters-Camp Sherman Fire District to ensure emergency access is available on new and existing developments.	• Natural Disasters and Hazards • Transportation

2. Resolve Policy Conflicts

In addition to developing new goals and policies, the city must resolve any existing policy conflicts or anticipate where new ones may arise. Guidance to help address potential conflicts includes:

- Review all new hazard-related policies to ensure that proposed mitigation activities for one hazard do not inadvertently contribute to another hazard. For example, flood mitigation strategies in riparian areas that promote revegetation should be developed in

consultation with fire and forestry mitigation experts to balance hazard concerns for both flood and wildfire.

- Review policies for the Western Frontier Architectural Design Theme to ensure standards for building materials and construction methods align with ignition-resistant building requirements in the WUI (also noted in Recommendation 2).
- Review Housing Policies that promote retention of natural vegetation in residential developments to ensure landscaping mitigation requirements for wildfire can effectively be conducted.

3. Link Comprehensive Plan Wildfire Policies to Other Plans

To provide for a more comprehensive planning approach to wildfire, planning department staff should collaborate with local stakeholders to identify opportunities to link wildfire hazard mitigation and land use planning in existing and future plans. These plan opportunities include:

- Coordinate with the Upper Deschutes Watershed Council to explore how wildfire can be considered in the City of Sisters Whychus Creek Restoration and Management Plan.
- Educate local city staff departments and advisory board members on the need to include wildfire management during updates to community parks, open space, forestry or related master plans.
- Participate in the 2019 CWPP update facilitated by Project Wildfire to provide locally-relevant land use information and develop wildfire mitigation actions.
- Participate in the next Hazard Mitigation Plan update with other local jurisdictions and the county to promote land use planning solutions to local hazards affecting Sisters.

RECOMMENDATION 4: Implement Mitigation Measures on Critical Infrastructure

❖ Why This Recommendation Matters

Overview

The City of Sisters relies on critical infrastructure—including wells, reservoirs, and roads—to provide routine and emergency services to local residents and businesses. Some infrastructure is mitigated for wildfire threat; for example, the Public Works Department regularly mows vegetation near effluent ponds and rights of way throughout the city. However, during the CPAW site visit in June 2018, team members toured several critical infrastructure facilities that were not adequately prepared for wildfire threat. These facilities include:

Well #1

Well #1 is primarily used in the winter. The well structure stores chlorine gas tanks that are used to treat water when necessary. The structure is made of brick and wood, and there are significant structural vulnerabilities, including the roof, vents, siding, and exterior door. Further, access to the well is difficult due to the amount of vegetation that has grown along the restricted access entrance.

Reservoir

Sisters has a 1.6 MG reservoir of pre-stressed, post-tensioned, concrete type, constructed in 1995. Power lines run along the old logging road that leads to the reservoir, which could increase the likelihood of wildfire ignition near the reservoir. Vegetation near the reservoir is maintained and the reservoir service station can be manually operated if power is lost. However, current vegetation conditions along the reservoir access route could result in dangerous conditions during a wildfire—posing a risk to those responsible for its continued operation.

Mitigation Needs

Due to existing vulnerabilities, mitigation is required to reduce wildfire risk to Well #1 and the reservoir (see Figure 13). These are only two examples of critical infrastructure that require mitigation; additional critical infrastructure may be threatened by wildfire and further analysis is required, as recommended below.

Figure 13. ***Well #1*** *(top) has unique vulnerabilities to wildfire that require mitigation strategies. Specific vulnerabilities include the storage of chlorine gas. Fire damage to the well structure that affects the gas tanks may lead to well contamination, chlorine exposure, or malfunction of water treatment systems. Concerns related to the city's* ***reservoir*** *(bottom) include restricted access during a wildfire event to ensure an ongoing power supply is maintained. Images source: CPAW*

❖ Implementation Guidance

Identify Additional Vulnerabilities

CPAW's field tour focused on two specific examples of critical infrastructure that require mitigation. However, mitigation best practices may also apply to other facilities within the city that may be at risk to wildfire, such as the waste water treatment plant. The city should use the Potential Impact to Infrastructure layer of the Advanced Oregon Wildfire Risk Explorer, with the assistance of a qualified professional, to appropriately identify, assess, and guide mitigation of critical infrastructure. Mitigation strategies should use a combination of defensible space and

construction design and material. A full inventory and assessment will ensure that infrastructure is adequately protected.

Structural Improvements

With respect to the Well #1 storage facility, the city should implement structural improvements. The city can request an on-site assessment from a qualified mitigation professional, such as the Sisters-Camp Sherman Fire District Fire and Life Safety Manager, to look at unique parcel vulnerabilities and make specific on-site recommendations related to structural modifications.

Agency Coordination

Coordination will be required with Deschutes National Forest, Deschutes County, and other land managers near Well #1 and the reservoir to manage vegetation on adjacent properties, including access roads. Vegetation management will reduce the intensity of a wildfire which will limit radiant heat, convective heat, and ember exposure to structures and allow city staff safer access to these locations for critical emergency maintenance or operations.

Emergency Planning

The city should also coordinate with agency partners to develop an action plan for the reservoir in the event that a wildfire threatens that area. Because access is necessary to manually operate the reservoir facility in the event that power is cut off, city staff must be clear with roles and responsibilities. This includes establishing communication procedures with emergency responders to ensure access is allowed to the facility during an emergency.

Long-Term Maintenance

Finally, the city should develop long-term maintenance actions for all critical infrastructure through inclusion in the Community Wildfire Protection Plan (CWPP). Actions will ensure critical infrastructure is part of mitigation action planning. Actions should include both structural and vegetation management activities and should be conducted in collaboration with other land managers or regulating agencies.

❖ References

City of Sisters, Oregon. 2017. Water System Capital Facilities, Water Conservation and Management Plans - 2017 Update. Accessible at: https://www.ci.sisters.or.us/sites/default/files/fileattachments/public_works/page/2471/2017_water_capital_facilities_plan_04-21-2017.pdf

Waskom R., J. Kallenberger, B. Grotz, and T. Bauder. 2013. Addressing the Impacts of Wildfire on Water Resources. Colorado State University Extension. Fact Sheet No. 6.706. Accessible at http://extension.colostate.edu/docs/pubs/natres/06706.pdf

Conclusion

Like many wildland-urban interface communities, the City of Sisters has several wildfire planning challenges that pose a future threat to residents and visitors. These challenges include unmitigated existing development, proximity of a fire-dependent ecosystem near development, and a high number of tourists during fire season. To address these challenges and build on opportunities, CPAW recommends the City of Sisters, in partnership with Sisters-Camp Sherman Rural Fire Protection District, implement four approaches:

1. Spatially Define the Wildland-Urban Interface and Adopt the Advanced Oregon Wildfire Risk Explorer;
2. Update Defensible Space Requirements and Adopt New Building Code Requirements;
3. Update Wildfire Planning Goals and Policies; and
4. Implement Mitigation Measures on Critical Infrastructure.

These recommendations are focused on planning and regulatory mechanisms to reduce wildfire risk – the core of the CPAW program. CPAW recognizes that many other related activities, such as fuel mitigation projects, are complementary to a comprehensive risk management program.

Many of CPAW's recommendations are interconnected and present immediate opportunities for implementation. For example, developing and adopting a new wildfire hazard assessment is an appropriate policy to be included in the Comprehensive Plan and will inform the administration and enforcement of mitigation requirements. Local hazards assessments can also act as powerful education tools to help residents learn about different ways in which their property may be susceptible to wildfire.

All CPAW recommendations are voluntary and should be modified to meet the needs of the local community. Where applicable, this report has provided detailed guidance to offer as much assistance as possible. CPAW also recognizes that addressing the WUI and wildfire risk is a complex and nuanced process that requires long-term commitment. Many educational, outreach, and public engagement activities will be required to successfully implement new wildfire mitigation practices. In some cases, CPAW can offer supplemental support in the form of additional advisory services to promote long-term success.

In summary, this report reflects a year-long process of stakeholder engagement, coupled with local and national expertise and best practices, to culminate in a final set of recommendations. The city, fire district, and additional stakeholders provided valuable direction and insight and are well-suited to advance local wildfire planning activities.

CPAW Definitions

The following list of definitions is intended to aid understanding of terms associated with CPAW recommendations.

Built Fuels - Man-made structures (buildings and infrastructure).

Burn Probability - The probability or effect of a wildland fire event or incident, usually evaluated with respect to objectives.

Burn Severity - A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

Community Based Ecosystem Management - With an emphasis on local stakeholder participation, allowing the local community to manage their ecosystem based on the unique characteristics of an area.

Community Wildfire Protection Plan (CWPP) - Established by the 2002 Healthy Forest and Restoration Act, A CWPP is a plan that identifies and prioritizes areas for hazardous fuel reduction treatments on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure and recommends measures to reduce structural ignitability throughout the at-risk community. A CWPP may address issues such as wildfire response, hazard mitigation, community preparedness, and structure protection.

Convection Heat - The movement caused through the rising of a heated gas or liquid.

Conduction Heat - Transfer of heat through direct contact of material.

Critical Facilities - FEMA defines critical facilities as “facilities/infrastructure that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police, fire stations, and hospitals”. In addition, CPAW recognizes emergency water pumping stations, egress routes, communication facilities, and backup power supplies as critical facilities.

Ecosystem Based Fire Management - The incorporation of the natural or desired ecological role of fire into the management and regulation of community’s natural areas.

Effects - The anticipated benefits and losses associated with exposure to a hazard or event, in this case fire.

Embers - A small piece of burning material that can be thrown into the air due to the convective heating forces of a wildfire. Larger embers and flammable materials have the ability to sustain ignition through transport.

Exposure - The contact of an entity, asset, resource, system, or geographic area with a potential hazard. Note: In incident response, fire responder exposure can be characterized by the type of activity.

Fire Adapted Communities - A group of partners committed to helping people and communities in the wildland-urban interface adapt to living with wildfire and reduce their risk for damage, without compromising firefighter or civilian safety.

Fire Effects - The physical, biological, and ecological impacts of fire on the environment.

Fire Intensity - Commonly referred to as fire line intensity, this is the amount of heat energy that is generated by burning materials.

Firewise - Program administered by the National Fire Protection Association which teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action to prevent losses. The program encourages local solutions for wildfire safety by involving homeowners and others in reducing wildfire risks by fostering defensible space and resilient structures for homes and communities.

Frequency - The number of occurrences of an event per a specified period of time.

Hazard - Any real or potential condition that can cause damage, loss, or harm to people, infrastructure, equipment, natural resources, or property.

Hazard Reduction - Coordinated activities and methods directed to reduce or eliminate conditions that can cause damage, loss, or harm from real or potential hazards.

Home Ignition Zone - The characteristics of a home and immediate surrounding area when referring to ignition potential during a fire event.

Infrastructure - The basic physical structures and facilities (e.g., buildings, roads, and power supplies) needed for the operation of a community.

Prescribed Fire - A planned controlled wildland fire that is used to meet a variety of objectives for land managers.

Radiation Heat - Transmission of heat through waves or particles.

Residual Risk - Risk that remains after risk control measures have been implemented.

Resilience - The ability to recover from undesirable outcomes, both individually and organizationally.

Risk - A measure of the probability and consequence of uncertain future events.

Risk Acceptance - A strategy that involves an explicit or implicit decision not to take an action that would affect all or part of a particular risk.

Risk Assessment - A product or process that collects information and assigns values (relative, qualitative, quantitative) to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making.

Risk Avoidance - A strategy that uses actions or measures to effectively remove exposure to a risk.

Risk Based Decision Making - A decision making process that relies on the identification, analysis, assessment, and communication of wildland fire risk as the principal factors in determining a course of action to improve the likelihood of achieving objectives.

Risk Communication - An exchange of information with the goal of improving the understanding of risk, affecting risk perception, or equipping people or groups to act appropriately in response to an identified risk.

Risk Management - A comprehensive set of coordinated processes and activities that identify, monitor, assess, prioritize, and control risks that an organization faces.

Risk Mitigation - The application of measure to alter the likelihood of an event or its consequences.

Risk Perception - Subjective judgment about the characteristics and magnitude of consequences associated with a risk.

Risk Reduction - A decrease in risk through risk avoidance, risk control, or risk transfer.

Risk Transfer - A strategy that uses actions to manage risk by shifting some or all of the risk to another entity, asset, resources, system, or geographic area.

Values-At- Risk - Those ecological, social, and economic assets and resources that could be impacted by fire or fire management actions.

Vulnerability - The physical feature or attribute that renders values susceptible to a given hazard.

Wildfires - Unplanned wildland fires resulting in a negative impact.

Wildland Fire - Any non-structure fire that occurs in vegetation or natural fuels. Wildland fire includes prescribed fire and wildfire.

Wildland Fuels - All vegetation (natural and cultivated).

Wildland-Urban Interface (WUI) - Any developed area where conditions affecting the combustibility of both wildland and built fuels allow for the ignition and spread of fire through the combined fuel complex.

Wildland-Urban Interface Hazard - Combustibility of the wildland or built fuels, fuel type or fuel complex.

Wildland-Urban Interface Risk - The WUI hazard accounting for factors that contribute to the probability and consequences of a WUI fire.