

Deschutes County Natural Hazards Code and Program Review



Photo: Gary Halvorson, Oregon State Archives

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Draft Report

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About the Community Service Center

The Community Service Center (CSC), a research center affiliated with the Department of Planning, Public Policy, and Management at the University of Oregon, is an interdisciplinary organization that assists Oregon communities by providing planning and technical assistance to help solve local issues and improve the quality of life for Oregon residents. The role of the CSC is to link the skills, expertise, and innovation of higher education with the transportation, economic development, and environmental needs of communities and regions in the State of Oregon, thereby providing service to Oregon and learning opportunities to the students involved.

About Community Planning Workshop

Community Planning Workshop (CPW) is an experiential program within the Department of Planning, Public Policy and Management at the University of Oregon. Students work in teams under the direction of faculty and Graduate Teaching Fellows to develop proposals, conduct research, analyze and evaluate alternatives, and make recommendations for possible solutions to planning problems in Oregon communities. The CPW model is unique in many respects, but is transferable to any institution that desires to link pedagogy with community service.

About the Oregon Partnership for Disaster Resilience

The Oregon Partnership for Disaster Resilience (OPDR) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster-resilient and sustainable state. Developed and coordinated by the Community Service Center at the University of Oregon, the OPDR employs a service-learning model to increase community capacity and enhance disaster safety and resilience statewide.

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CHAPTER I: INTRODUCTION

Floods and wildfires are two natural hazards that impact Deschutes County. The Deschutes County Development Code has several provisions that specifically aim to mitigate the effects of these hazards; reduce risk to property, environmental quality, and human safety; and improve recovery time. The code chapters with hazard-specific elements are Title 17: Subdivisions, Title 18: County Zoning, and Title 19: Bend Urban Growth Boundary Zoning Ordinance.

This report includes analysis of the Deschutes County Development Code and the county's comprehensive plan, how they are interpreted and applied to development, and the implications for natural hazard preparedness. Case studies and model ordinances providing examples of wildfire and flood best management practices are used to support the report's recommendations.

Background

Deschutes County Community Development Department (CDD) contracted with the University of Oregon's Community Planning Workshop (CPW) to conduct a review of the Deschutes County Development Code consistent with direction provided in Comprehensive Plan Section 3.5 (Rural Growth/Natural Hazards). The review focused on improving development regulations that address wildfires and flooding.

The intent of this work is to help Deschutes County understand the implications of land-use regulations on development in areas affected by natural hazards and to develop a set of programmatic options on how to best manage those impacts. The project focused on researching best practices for mitigating the effects of wildfire and flood on development.

Strategies to reduce or mitigate risk associated with development in hazardous areas are important to Deschutes County, as the county continues to be the fastest growing in Oregon. Between 2000 and 2013, the population in Deschutes County increased 41% (47,158 people). According to Deschutes County's population forecast, by 2025 the population is anticipated to grow by 48% (78,300 people), a total population of 240,811. The City of Bend is expected to account for 40% of the population increase, while the rural unincorporated areas of the county are expected to account for 33% of the population increase.

Purpose and Methods

The purpose of this report is to identify and review a range of regulatory standards that Deschutes County can utilize to reduce risk to flood and wildfire hazards. To identify potential strategies, CPW reviewed flood and wildfire ordinances, best practices used to reduce natural hazard risk, and ordinances and programs implemented by other jurisdictions. CPW also identified model ordinances and case studies that include elements applicable and relevant to Deschutes County based on the comparable aspects of the communities and relative similar hazard

danger. The CPW team then worked with County Staff to target sections of the Deschutes County Development Code where it could incorporate higher development standards and best practices.

Organization of Report

The report is organized into five chapters, including Chapter One, and two appendices.

Chapter 2: Strategies for Mitigating Risk provides an overview of the nature of risks related to development in hazardous areas.

Chapter 3: Wildfire Hazards identifies the extent of wildfire risk in Deschutes County, the rate and location of development within the Wildland Urban Interface (WUI), existing wildfire programs, model ordinances and standards, and presents policy options to strengthen the Deschutes County Development Code as it relates to wildfire hazard.

Chapter 4: Flood Hazards identifies the extent of flood risk in Deschutes County, the rate and location of development within the Federal Emergency Management Agency's (FEMA) defined floodplain, existing flood programs, model ordinances and standards, and presents policy options to strengthen the Deschutes County Development Code as it relates to flood hazard.

Chapter 5: Conclusions and Recommendations presents a brief review of the project, summarizes the policy options, and prioritizes the recommended policies options.

This report includes two appendices. Appendix A provides case studies related to wildfire. Appendix B provides case studies related to flood.

CHAPTER 2: STRATEGIES FOR MITIGATING RISK

Chapter 2 frames the role that land use planning has in hazard mitigation and underscores the importance of focusing on flood and wildfire hazards by describing federal and state policies that support and promote mitigation strategies.

The Federal and State Policy Framework

Federal Emergency Management Agency

The pre-disaster mitigation role of the Federal Emergency Management Agency (FEMA) is to provide support and assistance to all communities across the nation to preemptively mitigate and respond to emergencies. FEMA offers financial assistance in the form of grant money through programs such as the Hazard Mitigation Grant Program (HMGP)¹ for long-term hazard mitigation following a major disaster, Pre-Disaster Mitigation (PDM)² for hazard mitigation planning and projects, and Flood Mitigation Assistance (FMA)³ for projects to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP). In the event of a wildfire disaster, the State can request emergency federal assistance from FEMA. FEMA will provide 75% of firefighting costs as part of the Fire Management Assistance Grant Program.⁴

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 requires that state, local, and Indian tribal governments develop and maintain a natural hazards mitigation plan to be eligible to receive mitigation grant assistance. The stated purpose of the act is to “amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act to authorize a program for pre-disaster mitigation, to streamline the administration of disaster relief, to control the Federal costs of disaster assistance, and for other purposes.”⁵

¹ “Hazard Mitigation Grant Program.” Federal Emergency Management Agency. Available at: <https://www.fema.gov/hazard-mitigation-grant-program>

² “Pre-Disaster Mitigation Grant Program.” Federal Emergency Management Agency. Available at: <https://www.fema.gov/pre-disaster-mitigation-grant-program>

³ “Flood Mitigation Assistance Grant Program.” Federal Emergency Management Agency. Available at: <https://www.fema.gov/flood-mitigation-assistance-grant-program>

⁴ “Fire Management Assistance Grant Program.” Federal Emergency Management Agency. Available at: <https://www.fema.gov/fire-management-assistance-grant-program> .

⁵ Public Law 106–390 106th Congress Oct. 30, 2000 [H.R. 707]

State Policy

Oregon Senate Bill 360

The Oregon Forestland-Urban Interface Fire Protection Act, commonly referred to as Senate Bill 360, enlists property owners in turning fire-vulnerable urban and suburban properties into less-volatile zones where firefighters may more safely and effectively defend homes from wildfires. The law requires property owners in identified forestland-urban interface areas to reduce excess vegetation around structures and along driveways. In some cases, it is also necessary to create fuel breaks along property lines and roadsides.⁶

Oregon Statewide Planning Goal 7

Planning for natural hazards is an integral element of Oregon's statewide land use planning program, which began in 1973 with the passage of Senate Bill 100. All Oregon counties and cities have comprehensive plans and implementing ordinances that are required to comply with the 19 statewide planning goals that direct the state's policies on land use issues. Statewide land use planning Goal 7, Areas Subject to Natural Hazards, calls for local plans to include inventories, policies, and ordinances to guide development in, or away from, hazard areas in order to protect life and property from natural hazards.

Natural hazards considered for purposes of Goal 7 are: wildfires, floods (coastal and riverine), landslides, earthquakes, tsunamis, and coastal erosion. Local governments may identify and plan for other natural hazards as they apply.

Overview of Natural Hazards in Deschutes County

Table 1 below displays the Natural Hazards Mitigation Plan hazard analysis matrix for Deschutes County (updated 2015). The hazards are listed in rank order from high to low. The table shows that hazard scores are influenced by each of the four categories combined. With considerations for historical events, the probability or likelihood of a particular hazard event occurring, the vulnerability to the community, and the maximum threat or worst-case scenario are listed in the table. Wildfire events rank as one of the top hazard threats to the county (top tier), while flood events are listed as one of the lower-ranked hazards in the county (bottom tier). For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities, but does not predict the occurrence of a particular hazard. Both floods and wildfires are considered a top priority by Deschutes County and can be directly mitigated through land use.

⁶ "Oregon Forestland-Urban Interface Fire Protection Act." Oregon Department of Forestry. Accessed June 8, 2015. Available at: <http://www.oregon.gov/odf/pages/fire/sb360/sb360.aspx>

Table I Hazard Analysis Matrix – Deschutes County

Hazard	History	Vulnerability	Maximum		Total Threat Score
			Threat	Probability	
Winter Storm	20	50	90	70	230
Wildfire	20	50	80	70	220
Earthquake (Cascadia)	2	40	100	49	191
Windstorm	16	20	80	63	179
Volcano	2	50	100	21	173
Drought	8	15	70	56	149
Flood	8	10	40	56	114
Earthquake (Crustal)	2	5	80	7	94
Landslide	2	5	40	7	54

Source: Deschutes County NHMP Steering Committee, 2015.

Flooding results when rain and snowmelt creates water flow that exceeds the carrying capacity of rivers, streams, channels, ditches, and other watercourses. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Most of Oregon’s destructive natural disasters have been floods.⁷ Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground; the spring cycle of melting snow is the most common source of flood in the region. The principal types of flood that occur in Deschutes County include: spring/snow melt flooding, warm winter rain-on-snow flooding, ice jams, flash floods, and dam failure. Regular floods have occurred and the principal sources for flood risk in the county include the Deschutes River, the Little Deschutes River, Paulina Creek, Whychus Creek, and Spring River.

Fire is an essential part of Oregon’s ecosystem, but can also pose a serious threat to life and property particularly in the state’s growing rural communities. Wildfires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. Overgrown forests possess dense fuel loads that burn more intensely and spread more rapidly. Compounding the risk posed by increased fuel loads due to fire prevention efforts is the population growth occurring in forested areas of Deschutes County. As population in the county grows, more residential development is locating in forested lands known as the wildland-urban interface (WUI). Understandably, development within the WUI is associated with significant risk to property and human life in the event of a wildfire.

Climate Change

Current climate models project warmer, drier summers and a decline in typical level of summer precipitation in Oregon. As climate change occurs, lower elevation pine ecosystems in Deschutes County will become increasingly susceptible to the

⁷ Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Corvallis, OR: Oregon State University Press. 1999

effects of changing precipitation patterns. The lower edges of dry pine vegetative zones are expected to be the first to show impacts of long-term changes in available precipitation. Coupled with projected decreases in mountain snowpack due to warmer winter temperatures, Deschutes County is expected to have more frequent wildfires.

National Marine Fisheries Service and Endangered Species

Recent developments between federal agencies could mean significant changes in the way that local communities implement the NFIP. FEMA and the National Marine Fisheries Service (NMFS) have begun consultations to assign new regulations to floodplain development with respect to endangered species.

FEMA has been sued in several states, including Oregon, for failing to consult with the NMFS or the U.S. Fish and Wildlife Service (USFWS) regarding endangered species listed as under the Endangered Species Act (ESA). The lawsuit deals with certain policies that FEMA promotes, specifically policies regarding development in their Special Flood Hazard Areas (SFHA), can negatively impact certain endangered species.

As a result of a 2010 settlement approved in federal court, the Federal Emergency Management Agency (FEMA) is consulting with NMFS and drafting new rules for communities that participate in the National Flood Insurance Program (NFIP) and have waterways bearing salmon or steelhead. In 2005, the Deschutes River was designated by NMFS as a critical habitat for Middle Columbia River Steelhead⁸. This designation will factor into the ongoing revision of Deschutes County floodplain development ordinances.

Strategies for Risk Mitigation: Regulatory and Non-Regulatory

Programs and policies discussed in this report can be divided into two major subgroups: regulatory (non-voluntary), or non-regulatory (voluntary). This section describes the functional differences between regulatory and non-regulatory risk mitigation strategies and provides high-level summary of strategies currently employed by Deschutes County.

Regulatory

Regulatory strategies are written instruments containing enforceable rules. They create and constrain rights, duties, and responsibilities. In the case of the Deschutes County Development Code, developments within County jurisdiction must gain regulatory approval and abide by the constraints put forth within. Enforcement can be either proactive – requiring a development plan to meet

⁸ National Marine Fisheries Service, Northwest Region. 5-Year Review: Summary & Evaluation of Middle Columbia River Steelhead. Available at: http://www.nmfs.noaa.gov/pr/pdfs/species/middlecolumbiariver_steelhead_5yearreview.pdf

certain standards before construction may begin; or reactive – requiring an inspector to ensure that a development is compliant with relevant regulations.

The broad goal of development codes is to protect the public health, safety and welfare and to provide developers and landowners with transparent rules that reduce the risks associated with development. Regulatory natural hazards mitigation strategies discussed in this report are enforceable elements of the Deschutes County Development Code that dictate the location and characteristics of future development activity.

Regulatory policy options presented in this report are based upon model ordinances, best practices, and case studies from the Federal Emergency Management Agency (FEMA), the International Code Council (ICC), the National Fire Protection Association (NFPA), the National Institute for Standards and Testing (NIST), and relevant sections of development codes from jurisdictions that have addressed natural hazard risks similar to those of Deschutes County.

The role of land use planning in hazard mitigation

Land use planning guides and regulates land use so as to ensure land development is efficient, ethical, and prevents land-use conflicts. By regulating the actions of property owners and developers, land use planning has a decisive influence on development patterns. Often, the most desirable lands for residential development are also the most hazardous. Development along riverbanks is popular for its favorable views and convenient water access. However, it places homes at a greater risk for flood damage. Likewise, wildland-urban interface areas are ideal for residents seeking privacy and access to forested areas, but there is an elevated risk of wildfire damage.

Land use planning can shape development in ways that mitigate risk by prescribing regulatory provisions to types of land that are exposed to the risks of natural hazards. Development codes can prohibit development in dangerous locations or regulate development in a manner that minimizes risk.

A key consideration is that land use plans and their implementing ordinances come into effect at the time of a land use action. The implication is that they only apply to development that is subject to the regulation. Most ordinances do not apply retroactively; existing uses are “grandfathered” in and are often not subject to new regulation. That will likely be the case in Deschutes County where thousands of existing structures in the WUI will not be affected by any code amendments.

Non-Regulatory

Non-regulatory tools serve as guidance rather than law, and are often used to complement regulatory policies. These tools rely on voluntary efforts and public support and participation. They can increase awareness and buy-in to programs and are often developed to increase the effectiveness of regulations through education, outreach, incentives, or interagency coordination.

Non-regulatory strategies to mitigate natural hazards are not dependent upon government oversight, but are achieved primarily through public and community

participation. Non-regulatory strategies may rely on the county government for financial and structural support.

Natural Hazards Mitigation Plan

Natural Hazards Mitigation Plans are a planning requirement for local governments to access funds from the Disaster Mitigation Act of 2000. Although the plan is required for pre-disaster funding, its contents are non-regulatory in nature. Rather, it sets forth voluntary goals, objectives, and actions that can increase disaster preparedness or decrease recovery time.

The aim of the Deschutes County Natural Hazards Mitigation Plan is to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards. This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more disaster resistant community.⁹ The Deschutes County Natural Hazards Mitigation Plan is intended to serve many purposes. These include the following:

- Provide a methodical approach to mitigation planning;
- Enhance public awareness and understanding of natural hazards;
- Create a decision-making tool for policy and decision makers;
- Promote compliance with state and federal program requirements;
- Assure coordination of mitigation-related programming;
- Create specific hazard mitigation initiatives that can be incorporated into Deschutes County's Comprehensive Plan to assist with implementation;
- Document resources for risk reduction and loss prevention.¹⁰

⁹ Deschutes County Natural Hazard Mitigation Plan 2015 Update.

¹⁰ Ibid

CHAPTER 3: WILDFIRE HAZARDS

This chapter identifies the risk wildfire poses to Deschutes County, the extent of risk, and the rate and location of development affected by wildfire hazard. Following are policy options the county can consider to strengthen the Deschutes County Comprehensive Plan and Development Code. Policy options are presented with descriptions of best practices, identification of the applicable county code sections, and details of economic, administrative, health, or environmental impacts of implementing the policy.

Wildfire risk in Deschutes County

Extent of Wildfire risk areas

Wildfires are a natural and necessary component of many ecosystems across the country. Central Oregon is no exception. Historically, wildfires have shaped the forests and wildlands valued by residents and visitors. These ecosystems are significantly altered due to fire prevention efforts, modern suppression activities and a general lack of large-scale fires, resulting in overgrown forests and wildland-urban interfaces (WUI) with dense fuels that burn more intensely than in the past. Wildfires can be divided into three categories: interface, wildland, and firestorms. Interface fires are the most common wildfires in Deschutes County.¹

Interface fires occur where wildland and developed areas meet (the wildland-urban interface). In these locations, both vegetation and structural development combine to provide fuel. The wildland-urban interface can be divided into three categories: classic wildland-urban interface, mixed wildland-urban interface, and occluded wildland-urban interface.²

1. Classic wildland-urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas.
2. Mixed wildland-urban interface is found in areas of exurban or rural development: isolated homes, subdivisions, resorts and small communities situated in predominantly wildland settings.
3. Occluded wildland-urban interface where islands of wildland vegetation exist within a largely urbanized area.

Population growth has occurred in interface areas. The growth in residential development in interface areas increases the risk of wildfires. Fire has historically been a natural wildland element and can sweep through vegetation adjacent to combustible homes. New residents in rural areas are often surprised to learn that

¹ Deschutes County Natural Hazard Mitigation Plan 2015 Update.

² Ibid

moving away from urban areas puts them more at risk of wildfires since there are fewer readily available fire services in rural areas.

Rate and Location of Development

The majority of people across Deschutes County resides in Bend or within the unincorporated areas of the county. Between 2000 and 2013, Deschutes County experienced a 41% increase in population. The County Coordinated Population Forecast projects that by 2025 Deschutes County's population will increase by about 78,300 people, a 48% increase³. In 2000, 48,898 people lived in unincorporated areas of Deschutes County. By 2013, that number had grown by 10.2% to 53,870. Forecasts estimate that the population in currently unincorporated areas will grow to nearly 80,000 by 2025.

Unprotected residential development is an important issue for Deschutes County. There are several examples of residential developments that do not have structural or wildland fire protection. These include the Lower Bridge area east of Sisters, and the Brothers and Hampton areas along Highway 20 on the eastern edge of the county (Figure 1). In addition, there are approximately 100,000 acres of privately owned, largely unimproved rangeland east of Bend that do not have wildland fire protection.⁴ In 2013, an additional fire district for the unincorporated community of Alfalfa was created and will be running by the end of 2016 (not shown in Figure 1).⁵ This region will cover 64 square miles of unprotected development.

Since a large portion of the county has no fire protection and due to abundance of the fuel types present in some areas, wildland fires can grow quite large, often spreading and becoming threatening to protected areas. Deschutes County developed County Code Section 8.21 outlines a system for private landowners in unprotected areas to respond to the wildland fire threat with defensible space and firebreaks.

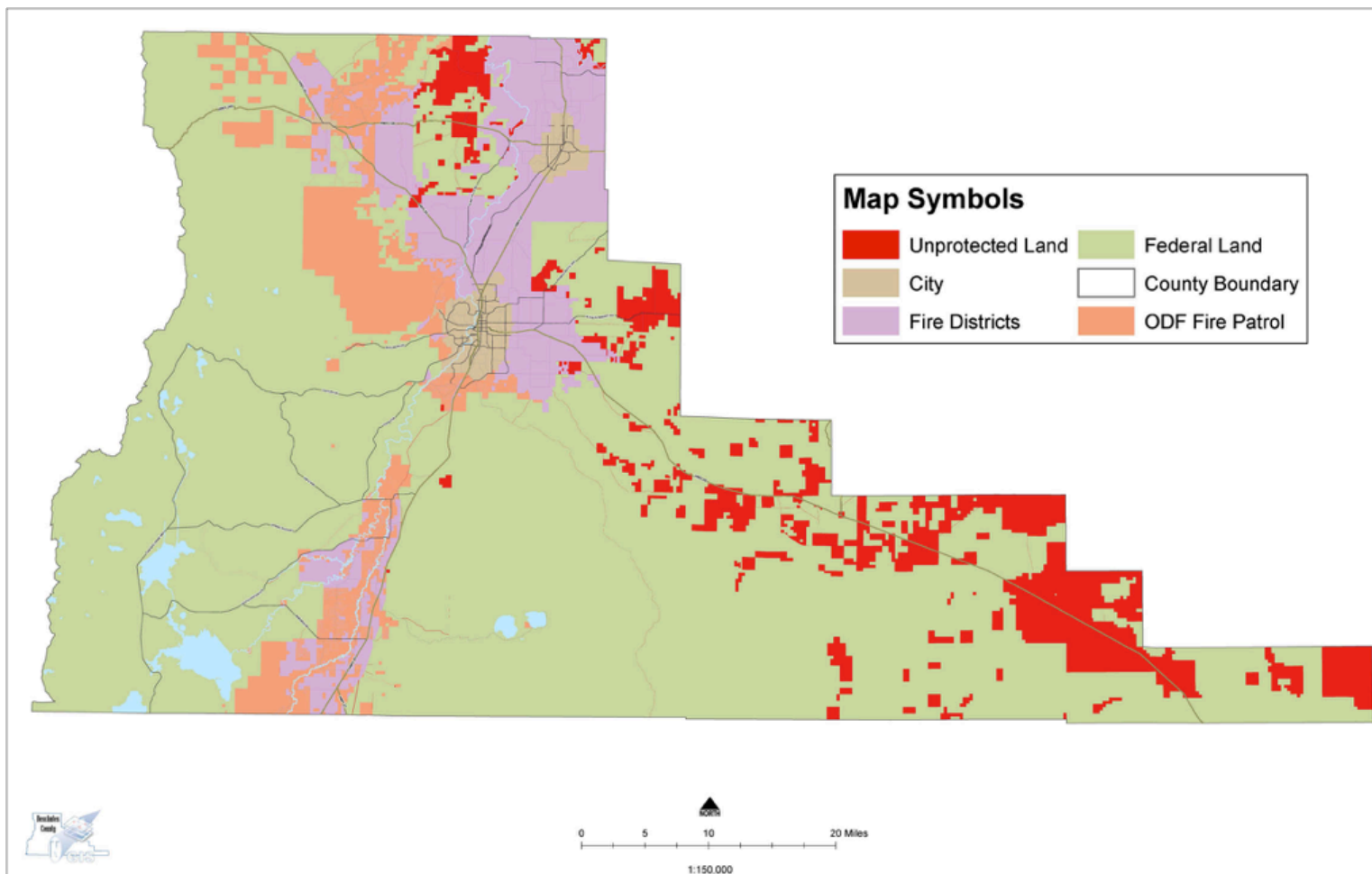
Emergency response to wildland fire incidents incurs substantial resource commitments and fiscal costs. The impact on local organizations is demonstrated each fire season. Notable incidents that exemplify the impact on local organizations are Pole Creek (2012), Burgess Road (2013), and Two Bulls (2014). The costs associated with multiple day mobilization of law enforcement, search and rescue, structural fire assets and state fire resources can quickly deplete local and state agency budgets. Depending on the scope and specifics of an individual fire, additional agency and non-governmental support organizations may also be mobilized to help mitigate the impact on citizens and community infrastructure.

³ Deschutes County Community Development Department, 2014.

⁴ Deschutes County Natural Hazard Mitigation Plan 2015 Update.

⁵ Dylan, Darling. "Fire District Has Trucks, but No Firefighters or Fire Station." The Bulletin. April 21, 2015. Accessed June 8, 2015. <http://www.bendbulletin.com/localstate/3068284-151/growing-a-fire-district-in-alfalfa#>.

Figure I Deschutes County Fire Protection



Source: Deschutes County Forester

Existing wildfire programs

There are several wildfire mitigation programs at the National, State, and County level that are in effect within Deschutes County. While non-regulatory in nature, they provide useful guidance to the County's decision makers, residents, and developers. These programs provide frameworks for outreach, education, and coordination regarding the mitigation of wildfire risk. This section outlines the general programs, state programs, and county programs that are in effect in Deschutes County.

National Programs

Healthy Forests Restoration Act: Community Wildfire Protection Plans

In 2003, the US Congress passed the Healthy Forests Restoration Act that directed federal agencies to collaborate with communities in the wildland urban interface to create Community Wildfire Protection Plans (CWPP). CWPPs allow communities to identify and prioritize areas needing hazardous fuels treatment. As of 2015, Deschutes County has seven CWPP's adopted: Greater Bend, Greater La Pine, Greater Redmond, Greater Sisters Country, Sunriver, Upper Deschutes River Coalition, and East and West Deschutes County.¹ Communities with CWPPs are given priority for funding of hazardous fuels reduction projects carried out under the auspices of the HFRA.

These CWPPs provide consistent analysis of existing fuels and WUI conditions along with recommendations and priorities for hazardous fuels reductions treatments on public and private lands. Community Wildfire Protection Plans allow communities to set wildland urban interface (WUI) boundaries and conducted risk assessments for each community.

Table 2 Deschutes County Community Wildfire Protection Plans

CWPP Area	Year Updated	Next Expected Revision
Greater Bend	2011	2016
Greater La Pine	2015	2020
Greater Redmond	2011	2016
Greater Sisters Country	2014	2019
Sunriver	2015	2020
East and West Deschutes County	2012	2017
Upper Deschutes River Coalition	2013	2018

Source: Project Wildfire

¹ Community Wildfire Protection Plans. Project Wildfire. n.d. Accessed June 8, 2015 Available at: http://www.projectwildfire.org/index.php/cwpp/list_of_cwpp_plans/

Firewise Communities

Firewise Communities USA is a program that nationally recognized communities that have taken an organized approach to wildfire preparedness. Firewise Communities educate community members on how live with the threat of wildfire and encourage neighbors to work together and take action to prevent loss of property and life. Typically, Firewise Communities have defensible space, well-marked evacuation routes, and community cohesion.

State Programs

Oregon Senate Bill 360 Implementation

The Oregon Department of Forestry (ODF) supplies information about fuel reduction standards to property owners. ODF mails each property owner a certification card, which may be signed and returned to ODF after the fuel reduction standards have been met. Certification relieves a property owner of liability of fire suppression costs if a fire were to occur on the property.² If a certification card has not been received by OFD, the state of Oregon may seek to recover certain fire suppression costs from a property owner if a fire originates on the owner's property, the fuel reduction standards have not been met, and ODF incurs extraordinary suppression costs. The cost-recovery liability under the Oregon Forestland Urban Interface Fire Protection Act is capped at \$100,000³.

For more generalized information regarding Oregon Senate Bill 360, see page 4 of this document or visit the Oregon Department of Forestry's website: <http://www.oregon.gov/odf/pages/fire/sb360/sb360.aspx>.

Oregon Ready, Set, Go!

Oregon Ready, Set, Go! is an online wildfire assessment tool that provides awareness and educational materials to property owners in Wildland Urban Interface. The website allows property owners to enter their home address and identify structural and vegetative information to calculate a wildfire risk score. Based on the score, information will be provided to help reduce the home's risk including building materials or outside landscaping. This is an educational tool for homeowners that can help protect their life and property as well as keep First Responders safe when fighting fires.⁴

² Oregon Forestland-Urban Interface Fire Protection Act Property Evaluation and Self-Certification Guide. July 2006. Oregon Department of Forestry. State of Oregon. Available at: http://www.oregon.gov/ODF/FIRE/SB360/docs/guide/guide_0106.pdf

³ Oregon Forestland-Urban Interface Fire Protection Act Property Evaluation and Self-Certification Guide. July 2006. Oregon Department of Forestry. State of Oregon. Available at: http://www.oregon.gov/ODF/FIRE/SB360/docs/guide/guide_0106.pdf

⁴ Ready, Set, Go! > Home. Accessed June 8, 2015. <http://www.wildlandfirersg.org> .

Deschutes County Programs

Project Wildfire

Project Wildfire is a long-term wildfire mitigation strategy that provides for disaster-resistant communities. Its mission is to prevent deaths, injuries, property loss and environmental damage resulting from wildfires in Deschutes County. Created by Deschutes County Ordinance 8.24.010, Project Wildfire is the community organization that facilitates, educates, disseminates and maximizes community efforts toward effective fire planning and mitigation. Project Wildfire organizes community events that help educate the community about wildfire protection strategies and techniques.⁵

FireFree Program

Project Wildfire coordinates the FireFree program, which is an educational program that teaches residents how to protect their homes from wildfire.⁶ The FireFree program and fuels reduction projects yield over 40,000 cubic yards of woody debris each year.

Existing Wildfire Model Ordinances and Standards

The following model ordinances and standards were used in the process of reviewing the County's development code in addressing wildfire hazard mitigation.

National Fire Protection Association

The National Fire Protection Association (NFPA) is a national non-profit organization that sets national fire safety codes and standards. The codes that NFPA provides are standards that range from building, process, service, design and installation. Besides providing national fire safety codes and standards, the NFPA provides training and education about fire safety and standards.

NFPA 1141: Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas

This standard provides guidance on the development of the community infrastructure necessary to eliminate fire protection problems that result from rapid growth and change.

<http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=1141>

⁵ Project Wildfire and 2015 Deschutes County Natural Hazard Mitigation Plan

⁶ FireFree.org. Accessed June 8, 2015. <http://www.firefree.org>.

NFPA 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire

This standard provides guidance on individual structure hazards. It requires a new spatial approach to assessing and mitigating wildfire hazards around existing structures and includes improved ignition-resistant requirements for new construction.

<http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=1144>

International Wildland-Urban Interface Code (2012)

This comprehensive wildland-urban interface code establishes minimum regulations for land use and the built environment in designated wildland-urban interface areas using prescriptive and performance-related provisions. It is founded on data collected from tests and fire incidents, technical reports and mitigation strategies from around the world.

<http://shop.iccsafe.org/2012-international-wildland-urban-interface-code-soft-cover.html>

Policy Options for Deschutes County

This section presents a review of the County's Comprehensive Plan in regards to land use and wildfire mitigation and identifies potential actions to strengthen current policies. The existing comprehensive plan policy language is shown in *italics* followed by our comments. Model development code language is shown in *italics and underlined*.

Review of County Comprehensive Plan Policies

Comprehensive Plan Policy 3.5.11(g):

Policy 3.5.11(g) *Review and revise County Code as needed to: Require new subdivisions and destination resorts to achieve FireWise standards from the beginning of the projects and maintain those standards in perpetuity.*

Comment: The Firewise program is inherently flexible since it is a national recognition program; it is not a certificate program and does not have standards to be met. Deschutes County should consider modifying the comprehensive plan to reflect this distinction.

The Firewise Program is, however, guided by NFPA Standards 1141 and 1144. These standards provide specific mitigation actions that bear relevance to the County Development Code. Rather than including NFPA 1141 and 1144 in the Comprehensive Plan, Deschutes County can look to the following review of County Development Code, which is informed by NFPA standards.

Review of County Development Code

This section presents a review of the County's current development code in regards to land use and wildfire mitigation policies and programs and identifies potential actions to strengthen current codes. In the following section the existing development code language is shown in italics followed by our comments. Model development code is shown in italics and underlined.

Implement a Wildfire Hazard Combining Zone

A wildfire hazard combining zone eliminates the need to individually prescribe wildfire provisions for each base zone. The combining zone could include a number of provisions such as building materials, defensible space, developable slopes, and other mitigation requirements.

Best Practice: Given the prevalence of wildfire risk within Deschutes County, applying development standards to individual base zones may not efficiently regulate development in hazardous areas. Several wildfire-affected cities and counties in the country, such as Ashland, OR and Jefferson County, CO, have adopted combining zones to broadly identify lands potentially at risk for wildfire and require mitigation measures as part of the land planning and development process. By implementing a combining zone in Deschutes County, development standards that mitigate wildfire risk could be more easily interpreted and applied.

Applicable County Code: Title 18 Zoning, 15.04.085 Building and Construction Codes and Regulations in Wildfire Hazard Zones

Implications: Implementing a combining zone would eliminate the need to individually prescribe wildfire provisions for each base zone. Wildfire Hazard Zones are currently depicted on the Deschutes County Wildfire Hazard Areas map, and County Code 15.04.085 already implements this map to apply roofing standards in a manner identical to the function of the proposed combining district. Developers and property owners will benefit from clear, consistent requirements that could be found in a single location within Deschutes County Code Title 18. This combining zone would also have implications that include higher wildfire mitigation measures being addressed to the majority of the county instead of only in Forest Zones.

Prohibit Wooden Shake Building Materials in Wildfire Hazard Zones

Wooden shake building materials pose a serious risk to residents in the event of a wildfire. Combustible wooden building materials can burn from catching a single ember from an upwind fire. Scientific evidence has shown that a home's structural characteristics are a primary factor in determining ignitability in wildland-urban

interface fires⁷. Prohibiting wooden shake building materials can reduce the likelihood of structural ignition for homes in wildfire hazard zones.

Best Practice: Currently the Deschutes County Code allows wooden shake roofs if they are Class B or higher. To attain a Class B rating, a shake roof must be treated with a fire-resistant material. However, this treatment deteriorates relatively quickly in the county's climate conditions, and it is uncommon for homeowners to retreat their homes as often as is necessary. The simplest way to address this issue is to prohibit wooden shake building materials in areas of the county identified as Wildfire Hazard Zones. This practice would ideally be included as a provision applied within a Wildfire Hazard Combining Zone.

Applicable County Code: 15.04.085 Building and Construction Codes and Regulations in Wildfire Hazard Zones

Implications: Although wooden shake building materials can be treated and re-treated to meet Class B standards, explicitly prohibiting new structures from using shake building materials is the most direct form of addressing the hazard inherent to flammable roofing material. Existing structures could be exempted from this requirement unless a homeowner undertook a significant home improvement project. Regulatory or incentive-based approaches could be considered as a means to replace combustible materials with non-combustible materials.

Requirements for Defensible Space

Along with a home's structural characteristics, a home's surroundings are the other most important factor in determining home ignitability in wildland-urban interface areas⁸. Defensible space is the most effective way to reduce the risk of structural loss from wildfires that spread into residential areas. Although there are voluntary measures that encourage defensible space in Deschutes County, there are currently no efforts to enforce the practice on a countywide scale.

Best Practice: Defensible space requirements can currently be found in a handful of places throughout Deschutes County Code. Forest Use Zones 1 and 2 require three zones of defensible space ranging from nonflammable materials in the immediate vicinity of dwellings and structures, to fuel management tactics between 20 and 100 feet. Defensible space is crucial element of wildfire mitigation, and would ideally be included as a provision applied within a Wildfire Hazard Combining Zone.

Applicable County Codes: 17.16.030 Subdivision Information Requirements, 17.16.050 Master Development Plan, 18.113 Destination Resorts, 18.36.70 Fire Siting Standards in Forest Use Zones

⁷ Cohen, JD. "Home Ignitability in the Wildland-urban Interface." Journal of Forestry, 2000. http://www.fs.fed.us/rm/pubs_other/rmrs_2000_cohen_j002.pdf?

⁸ ibid

Implications: Proper implementation and maintenance of defensible space could significantly decrease risk to residential development. However, if specific requirements were applied to all structures and dwellings within the County's Wildfire Hazard Overlay Zone, defensible space inspections could become very time consuming for County Inspectors.

Regulate Development on Steep Slopes

Development on steep slopes puts homes at risk to be in the path of fast-moving wildfires. By either restricting development on steep slopes or requiring additional mitigation measures for homes built on steep slopes, the County can reduce the risk posed to lives and property by wildfire. (See Appendix A: Steep Slopes in Rancho Bernardo, CA).

Best Practice: Topography plays a significant role in the spread of wildfire. Fire spreads much more rapidly up slopes than flat ground, which poses a threat to structures situated on steep slopes. Currently, single-family dwellings are allowed on slopes as steep as 40%. The International Code Council's Wildfire Hazard Severity Form lists any slope greater than 30% as the maximum risk category. The best practice in regards to development on steep slopes is to regulate development above a certain slope threshold. To be consistent with existing code language the county could set this threshold at 25%, the maximum developable slope in Destination Resort Zones.

Applicable County Code: 18.36.070(C) Fire Siting Standards for Dwellings and Structures in Forest Use Zone 1, 18.40.070(C) Fire Siting Standards for Dwellings and Structures in Forest Use Zone 2, 18.113.070 Destination Resorts Zone

Implications: This best practice option, when combined with defensible space measures, can achieve enhanced resilience to wildfires without impinging on private property rights. Landowners and developers should be encouraged to develop on flat terrain to the greatest degree possible, but providing sensible regulations considers the inevitability of development on slopes.

Wildfire Mitigation Planning for Subdivisions and Destination Resorts

By requiring wildfire mitigation plans before allowing the subdivision of land or placement of a destination resort, the county can ensure that NFPA Standards 1141 and 1144 guide development from its earliest stages.

Best Practice 1: National Fire Protection Association 1141: Standard for Fire Protection Infrastructure for Land Development in Wildland, Rural, and Suburban Areas are nationally approved model standards for development of fire protection and emergency services infrastructure in wildland-urban interfaces. These standards include requirements for road access, 30 feet of separation between buildings, adequate levels of water supply, and fire sprinkler systems.

Best Practice 2: National Fire Protection Association 1144: Standard for Reducing Structure Ignition Hazards from Wildland Fire are nationally approved model standards for assessing wildfire ignition hazards around existing structures. The

standards provide requirements for new construction such as wildfire hazard assessments, mitigation and maintenance plan, and defensible space standards.

Best Practice 3: Achieve Firewise Standards or Firewise Recognition. Firewise is a non-regulatory program managed by the NFPA that provides principles or standards that include many NFPA 1141 and 1144 standards. They reflect standards to reduce wildfire ignition to the home through building materials and defensible space around the structure. Communities can receive Firewise Recognition by following five steps that include: a wildfire hazard assessment, creating a community task force, holding an annual Firewise Day, spending \$2 per capita on Firewise projects, and submitting an annual report to Firewise documenting the community's progress.

Best Practice 4: City of Ashland Municipal Code 18.62.090 requires subdivisions to submit a Fire Prevention and Control Plan with any application for an outline plan, preliminary plat of a subdivision, or application to partition land when in areas designated Wildfire Hazard areas. Plans include the following items: analysis of the fire hazards on site influenced by existing vegetation and topography, a map showing the areas that are to be cleared of dead, dying, or severely diseased vegetation, a map of areas that will be thinned to reduce the interlocking canopy of trees, tree management plan, areas of Primary and Secondary Fuel Breaks, and roads and driveways sufficient for emergency vehicle access, including the slope of all roads and driveways (See Appendix A: City of Ashland, OR).

Applicable County Code: Title 17.16.030 Subdivisions: Informational Requirements, 17.16.050 Master Development Plan, and 18.113 Destination Resorts.

Implications: The County Code does not address specific wildfire mitigation requirements for Subdivisions or Destination Resorts. Chapter 18.113 for Destination Resorts does require a wildfire prevention, control and evacuation plan but does not include any specifications regarding that plan. The county could decide to include regulations from NFPA 1141 and 1144 to address adequate access for emergency responders, water supply, non-combustible building materials, defensible space, fire-resistant landscaping, and requirements for a mitigation plan as well as maintenance plan. Implementing standards identified from Firewise, or achieving Firewise recognition, would help ensure that communities prepare for wildfire mitigation prior to development and have a maintenance plan to continue to prevent wildfire risk to homeowners and their properties. These additional wildfire mitigation requirements could be viewed as restrictive and cause higher costs to developers. However, achieving these standards can also be used as a successful marketing tool. A Fire Prevention and Control Plan would ensure that subdivisions have clear plans in place before development. Clear standards and requirements for this plan would assist developers in the project planning process and ensure that maintenance of these standards remain in perpetuity.

Require Fire Protection Proof for Subdivisions

Requiring proof of fire protection ensures that a fire district will be able to serve new subdivisions before they are permitted. Although this is not a currently

pressing issue, continued population growth into unincorporated areas could exceed the capacity of rural fire districts.

Best Practice: Proof of Fire Protection is a best practice found in the Jefferson County, CO Land Development Regulation Section 4.C.18. It requires a written statement from the appropriate fire district indicating that they will serve the property. If the property is not within a fire district, a contract with the district would need to be established indicating that fire protection to the property will be provided.

Applicable County Code: Title 17.16.030 Subdivisions: Informational Requirements

Implications: The Deschutes County Code does not currently require proof of fire protection for subdivisions. Requiring proof of fire protection from a fire district to serve the development will help ensure that emergency responders will adequately be able to service the property. If a property is not currently provided fire protection service a contract, or annexation into a fire district, will help ensure fire protection can be provided. This policy could be restrictive to developers and cause service problems for fire districts however; it will ensure that adequate protection can be provided before property is developed.

Wildfire Mitigation Plan for Single-Family Homes

Including wildfire mitigation plans as part of the site plan review process for single-family homes ensures that homeowners and developers are mindful of and take an active role in mitigating the risks associated with locating in the wildland-urban interface.

Best Practice: Due to the frequency with which homes are being built in wildland areas of Deschutes County, requiring Wildfire Mitigation Plans may be a useful addition to the site plan review process. Including Wildfire Mitigation Plans as required contents for the site plan review process could minimize the loss of lives and property from wildfires. A sample Wildfire Mitigation Plan from Kane County, Utah is as follows:

A site plan, showing 1) the location and extent of structures and other improvements, the defensible space management zones around the structures, the driveway access for emergency vehicles, emergency water supply for fire fighting, and the locations of other specific natural and human created features; and 2) a narrative that describes in detail these same features.⁹

Another sample of code language from Boulder County Land Use Code Article 4-804.C.12 (See Appendix A: Boulder County, CO):

⁹ Kane County Wildfire Mitigation Plan. Available at: <http://kane.utah.gov/att/38/store/Wildfire-Mitigation-Plan.pdf>.

A Wildfire Mitigation Plan demonstrating the appropriate site location of structures, construction design and the use of ignition resistant building material, defensible space and fuel reduction around the structures, driveway access for emergency vehicles, and an emergency water supply for fire fighting.

Applicable County Code: 18.36.050(A) Standards for Single-Family Dwellings in Forest Use Zone 1 and 2, 18.124.040 Site Plan Review: Contents and Procedure, and 19.76 Site Plan Review.

Implications: Wildfire Mitigation Plans would ensure an action and maintenance plan in regards to wildfire be developed prior to construction and occupancy. This would ensure that the homeowner considers wildfire mitigation planning and maintenance before development and in perpetuity. The Plan would ensure the development is built to NFPA standards. It would require additional effort from homeowners and developers prior to development along with the continued maintenance as well as create restrictions to design.

Wildland Fire Hazard Assessment

A wildland fire hazard assessment determined through SB360 could be put to use by informing conditional use development in wildland-urban interface areas. If specific mitigation measures should be taken, they would be taken into consideration prior to development.

Best Practice: This code does not indicate how the increase in fire hazard, fire suppression costs, or risk to fire suppression personnel would be measured. We suggest the county consider including language stating the fire hazard risk would be determined by a wildland fire hazard assessment. Wildland Fire Hazard Assessments have already been determined through SB360, which could be used to measure the hazard rating and applicable requirements necessary for each parcel. Other examples of this language and assessment can be found in NFPA 1144 Chapter 4, and the ICC International Wildland-Urban Interface Code.

Applicable County Code: 18.36.40(B) Conditional Use in Forest Use Zone 1 and 2

Implications: A Wildland Hazard Assessment initiated before development would identify the level of risk to a property and ensure adequate mitigation standards are obtained before construction and occupancy. The assessments could require additional staff time; however, they would also provide an educational opportunity to discuss specific mitigation action items for the property to address before development.

Standards for Road Identification Signs

Standardized protocols regarding road identification signs and address markers can help emergency responders quickly find their destinations. As population growth into unincorporated areas continues, explicit language can standardize the location and appearance of road and address markers.

Best Practice: The Code does not include language to address road identification signs or markers. Proper signage is important for emergency responders to quickly locate and identify a residence. We recommend the County consider including policies on road and address marking. The International Wildland-Urban Interface Code section 403.4 and 403.6 provide specific language addressing road and address marking. The International Wildland-Urban Interface Code section 403.6 includes specific standards for address identification signs that could help emergency responders quickly and easily locate a residence in danger. An example of this language includes:

“All buildings shall have a permanently posted address, which shall be placed at each driveway entrance and be visible from both directions of travel along the road. In all cases, the address shall be posted at the beginning of construction and shall be maintained thereafter, and the address shall be visible and legible from the road on which the address is located.”

Applicable County Code: Title 18.36.080 Fire Safety Design Standards for Roads

Implications: Clearly identifiable signage for roads and residences helps emergency responders quickly locate and identify residences in time-sensitive situations.

Wildfire Policy Options Matrix

The following matrix lists each policy options listed in this document, with a condensed breakdown of applicable county code, a description of the policy option, the issues each policy option addresses, the applicability for Deschutes County, and the implications on the county if it were to adopt the option. Sections that are highlighted in gray are areas that the county may want to initiate its code update review process.

Table 3 Wildfire Policy Options Matrix

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
W1	Wildfire Hazard Combining Zone	15.04.085 Building and Construction Codes and Regulations: Wildfire Hazard Zones Title 18 - County Zoning	Given the prevalence of wildfire risk within Deschutes County, applying transparent and effective standards to each individual base zone may not be the most effective means of regulating development. By implementing an overlay district in Deschutes County, development standards for mitigating wildfire risk could be more easily interpreted and applied.	Adoption of the Wildfire Hazard Areas map implements the provisions of the Wildfire Hazard Mitigation Section of the Oregon Residential Specialty Code	All new development on private land in Deschutes County	Eliminates the need to individually prescribe wildfire provisions for each base zone. Provides clear, consistent requirements for developers and property owners. Will require most of the County to now follow higher wildfire regulation standards instead of only the Forest Zones.	Commission was interested to see a potential hazard tiering system.
W2	Building Materials	15.04.08515.04.085 Building and Construction Codes and Regulations in Wildfire Hazard Zones 18.36.070(E) Structural Standards in Forest Use Zone	In order to maintain fire resistance of shake roofs and siding, frequent retreatments are required. Since it is unlikely that homeowners will treat their homes as often as necessary, we recommend the County consider specifically prohibiting shake building materials within 15.04.085.	Wooden shake building materials pose a serious risk to residents in the event of a wildfire. Current County Code allows wooden shake roofs and siding if they are Class B or higher. To attain a Class B rating, a shake roof must be treated with a fire-resistant material. However, this treatment deteriorates relatively quickly in the County's climate conditions, and it is uncommon for homeowners to retreat their homes as often as is necessary.	New construction; roof replacements. Would require Class A fire rated materials.	Although wooden shake building materials can be treated and re-treated to meet Class B roofing standards, explicitly prohibiting new structures from using wooden shake building materials addresses the hazard inherent to combustible building materials. Existing structures could be exempted from this requirement unless a homeowner undertook a significant re-roofing or siding project. Requires Class A materials.	Commission was very interested in this topic. Retroactive application was a topic of conversation, citing Sunriver's mandatory Class A fire rated materials for roofing.
W3	Steep Slopes	18.36.070 Fire Siting Standards for Dwellings and Structures in Forest Use Zone	Set a slope grade threshold above which development requirements, such as augmented defensible space, must be met. To be consistent with existing code language, the County could set this threshold at 25 percent. This threshold and its requirements would ideally be included as a provision applied within a Wildfire Hazard Combining Zone.	Fire spreads much more rapidly up slopes than flat ground, which poses a threat to structures situated on steep slopes. Currently, single-family dwellings are allowed on slopes as steep as 40% in Forest Use Zones. The best practice in regards to development on steep slopes is to regulate development above a certain slope threshold.	Applicable to new developments. There are not many developable properties with slopes greater than 25%; a full analysis has yet to be completed.	This best practice option, when combined with defensible space measures, can achieve enhanced resilience to wildfires without impinging on private property rights. Landowners and developers should be encouraged to develop on flat terrain to the greatest degree possible, but providing sensible regulations considers the inevitability of development on slopes.	No comments were provided.
W4	Defensible Space	17.16.030(C)(12) Informational Requirements for Subdivisions 17.16.050 Master Development Plan 18.113.060 Destination Resorts	Requirements currently stated in 18.36.070. Suggestion to include requirements in Subdivisions and Destination Resorts as well as include requirements for fire-resistant landscaping.	Defensible space standards are not mentioned for Subdivisions and Destination Resort requirements. Defensible space standards listed in 18.36.070 for Forest Zones do follow NFPA and Firewise standards but do not include fire-resistant landscaping requirements which is a key proven factor in maintaining effective defensible space.	Applicable to new developments.	Decreased risk to residential development, however, an increase of staff time to County inspector. Homeowners will be responsible for maintenance of their defensible space.	Commission voiced concern about the 100 to 200 foot buffer zone. Commission was also interested in including defensible space requirements for Subdivisions and Destination Resorts and wanted fire-resistant landscaping to be addressed.
W5	Subdivision Fire Protection (NFPA 1141)	17.16.030(C)(12) Informational Requirements for Subdivisions 17.16.050 Master Development Plan 18.113.060 Destination Resorts	The County may want to consider including a provision for Subdivisions and Destination Resorts that requires areas at risk of wildfires to achieve specific NFPA 1141 standards. Standards include requirements for subdivision access, building separation, fire protection, and water supply.	Standards would address national best practices for emergency access requirements, road grades, building separation to reduce the spread of wildfire, water supply, building materials, and wildfire mitigation planning before development.	Applicable to new developments.	Provides additional protection from wildfire risk. Could require additional costs to developers, however, can also be used as a useful marketing and real estate tool.	No comments were provided.

Source: Community Planning Workshop

Table 3 Wildfire Policy Options Matrix (continued)

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
W6	Structure Ignition Fire Protection (NFPA 1144)	17.16.030(C)(12) Informational Requirements for Subdivisions 17.16.050 Master Development Plan 18.113.060 Destination Resorts	The County may want to consider including a provision for Subdivisions and Destination Resorts that requires areas at risk of wildfires to achieve specific NFPA 1144 standards. Standards include requirements such as reducing structure ignition through defensible space zones, non-combustible construction materials, hazard mitigation assessments, and wildfire mitigation action and maintenance plans.	Standards would address national best practices for emergency access requirements, road grades, building separation to reduce the spread of wildfire, water supply, building materials, and wildfire mitigation planning before development.	Applicable to new developments.	Provides additional protection from wildfire risk. Could require additional costs to developers, however, can also be used as a useful marketing and real estate tool.	No comments were provided.
W7	Firewise Recognition	17.16.030(C)(12) Informational Requirements for Subdivisions 18.113.060 Destination Resorts	Firewise Recognition or becoming a Firewise Community would help subdivisions create neighborhood action plans to mitigate wildfire from the beginning of development.	Requirement would address consistent standards for all Subdivisions and Destination Resorts to create wildfire mitigation plans before development and maintain standards in perpetuity.	Applicable to new developments.	Earns neighborhood national recognition, can reduce insurance premiums, protects community from wildfire risk. Could require additional costs to developers, however, can also be used as a useful marketing and real estate tool.	Commission said this translates well to increased property values and increased safety.
W8	Fire Protection Proof	17.16.030(C)(12) Informational Requirements for Subdivisions	In addition to requiring a proposed fire protection system it would be beneficial to include Fire Protection Proof. Fire Protection Proof requires the applicant to show proof that the property is located within a fire protection district that will serve the property. (Jefferson County, CO)	This requirement would address assurance that a fire district could have the capability to service the property. If adequate level of service could not be provided, this would alert the fire districts to plan which department could provide the service or if annexation or a new district would need to be created.	Applicable to new developments.	Requiring applicants to prove they are protected by a fire protection district appears to place extra administrative pressure on rural fire districts. However, requiring fire protection information prior to subdivision approval can shed light on potential issues that could arise as a result of overloading a rural fire district.	No comments were provided.
W9	Firewise Protection Standards	17.16.030(C)(12) Informational Requirements for Subdivisions 18.113.060 Destination Resorts	Firewise standards include: nonflammable roofing materials, requirements for windows, vents, and attachments, Firewise plants, defensible space, and landscape maintenance.	Standards would ensure developments follow national best practice models to reduce wildfire risk by using non-flammable construction materials and fire-resistant landscaping.	Applicable to new developments.	Provides additional protection from wildfire risk. Could require additional costs to developers, however, can also be used as a useful marketing and real estate tool.	No comments were provided.
W10	Fire Apparatus Access	17.36.260 Fire Hazards	The Deschutes County Code currently requires a minimum of two points of access to a subdivision in a fire hazard area. ICC International Wildland-Urban Interface Code includes additional standards for fire apparatus access in subdivisions. We recommend The County consider these higher standards to ensure adequate access in future subdivisions. Requirements currently found in 18.36.080. We suggest these same requirements be applied to 17.36.260	These requirements would explicitly state higher access requirements to be addressed for Subdivisions as listed in the ICC code and in 18.36.260.	Applicable to new developments.	The costs associated with providing additional points of access can be considered by developers as barriers to development. However, higher standards for access help prevent the loss of structures and ensure the safe ingress and egress of fire crews, emergency personnel, and residents.	Commission wanted to clarify that this applies to developments with over 600 dwelling units. Staff will determine the appropriate scale of development to apply this standard.

Source: Community Planning Workshop

Table 3 Wildfire Policy Options Matrix (continued)

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
W11	Road/Address Identification Signs	18.36.080 Fire Safety Design Standards for Roads in Forest Use Zone 1 & 2	The Code does not include language to address road identification signs or markers. Proper signage is important for emergency responders to quickly locate and identify a residence. We recommend the County consider including policies on road and address marking. The International Wildland-Urban Interface Code section 403.4 and 403.6 provide specific language addressing road and address marking.	This requirement would include requirements for proper signage fore emergency responders that currently does not exist and would help identify locations in need of emergency.	Applicable to new developments.	Creates accessible signage for emergency responders to quickly locate and identify residences.	Increases visibility and correct address identification and location in time-sensitive emergency responses. Desire to include same requirement on long private driveways with multiple residences.
W12	Wildland Fire Hazard Assessment	18.36.40(B) Conditional Use in Forest Use Zone 1 & 2	This section does not indicate how the increase in fire hazard, fire suppression costs, or risk to fire suppression personnel would be measured. We suggest the County consider including language stating the fire hazard risk would be determined by a wildland fire hazard assessment. Examples of this language and assessment can be found in NFPA 1144 Chapter 4 and the ICC International Wildland-Urban Interface Code	A Wildfire Hazard Assessment imitated before development would identify the level of risk to a property and ensure adequate mitigation standards are obtained before construction and occupancy.	Applicable to new single-family dwellings.	Additional staff time for individual assessments, provides specific mitigation action items for property to address before development	No comments were provided.
W13	Wildfire Mitigation Plans	18.36.050(A) Standards for Single-Family Dwellings in Forest Use Zone 1 & 2 18.124.040(D) Site Plan Review	Due to the frequency with which homes are being built in wildland areas of Deschutes County, requiring Wildfire Mitigation Plans may be a useful addition to the site plan review process. We recommend the County consider Including Wildfire Mitigation Plans as required contents for the site plan review process could minimize the loss of lives and property from wildfires. (Kane County, UT; Boulder County, CO, NFPA 1144 Chapter 4.3)	Wildfire Mitigation Plans would ensure an action and maintenance plan in regards to wildfire be developed prior to construction and occupancy. This would ensure that the homeowner considers wildfire mitigation planning and maintenance before development and in perpetuity.	Applicable to new single-family dwellings.	Creates a wildfire mitigation plan at the time of development. Builds and develops land to NFPA standards. Requires additional effort from homeowners and developers as well as restrictions to design.	No comments were provided.
W14	Fire Prevention and Control Plans	Section 17.16.050 Master Development Plan	The Master Development Plan does not include a requirement for wildfire treatment in the wildfire hazard zone. Fire Prevention and Control Plans address water supply, access, building ignition and fire-resistance factors, fire protection systems and equipment, defensible space, and vegetation management. (City of Ashland / International Wildland-Urban Interface Code)	Fire Prevention and Control Plans address Subdivisions that did not have clear wildfire prevention plans in place before development. Clear standards and requirements for this plan would help developers with their design plan and ensure that maintenance of these standards remain in perpetuity.	Applicable to new developments.	Provides clear expectations for developers, wildfire planning considered in early phases of planning	No comments were provided.

Source: Community Planning Workshop

CHAPTER 4: FLOOD HAZARDS

This chapter identifies the risk flood poses to Deschutes County, the extent of the risk, and the rate and location of development affected by flood hazard. Following are policy options to strengthen Deschutes County Comprehensive Plan and Development Code. The policy options have been made by cross-referencing the existing development code against the County's Comprehensive Plan and the Natural Hazard Mitigation Plan (NHMP), and based upon best practices, case studies and model ordinances. Policy options are presented with descriptions of best practices, identification of the applicable county code, and details of economic, administrative, health, or environmental impacts of implementing the policy.

Flood risk in Deschutes County

The geological makeup and arid climate of Deschutes County makes it less susceptible to flooding than surrounding counties. Due to underlying porous volcanic rocks that have a large capacity for water storage, flooding has not been a serious problem in Deschutes County. Total precipitation in the Pacific Northwest region may remain similar to historic levels but climate projections indicate the likelihood of increased winter precipitation and decreased summer precipitation.¹ Increasing temperatures affects hydrology in the region. Spring snowpack has substantially decreased throughout the Western part of the United States, particularly in areas with milder winter temperatures, such as the Cascade Mountains. In other areas of the West, such as east of the Cascades Mountains, snowfall is affected less by the increasing temperature, because the temperatures are already cold, and more by precipitation patterns.²

Deschutes County has assessed the probability of a flood event to be high (at least one flood event within the next 10 to 35 years) and the vulnerability to the population and property to be low (less than 1% of population and property expected to be affected by any one event).³

Extent of flood prone areas

Flooding in Deschutes County mainly occurs from prolonged warm rain on snow, snowmelt flooding, or frazil ice and ice jams near Mirror Pond.⁴ There is also a potential flood hazard due to a moraine dam at Carver Lake near the Three Sisters

¹ Climate Impacts Group, "Climate Change," <http://cse.washington.edu/cig/pnwc/cc.shtml#anchor6>

² Mote, Philip W., et. al., "Variability and trends in Mountain Snowpack in Western North America," <http://cse.washington.edu/db/pdf/moteetalvarandtrends436.pdf>

³ Deschutes County Natural Hazard Mitigation Plan 2015 Update

⁴ Ibid

and Broken Top that could fail due to seismic activity, avalanches of rock and ice, or the unstable nature of the dam material.

Historically, a few significant flooding events have affected the county. Two noteworthy floods occurred in 1909 and 1964 along the Deschutes River downstream of the Little Deschutes River at the gauge near Benham Falls. The principal sources of flooding occur from the Deschutes River, Little Deschutes River, Whychus Creek, Paulina Creek, and Spring River. These locations can potentially threaten the communities of Bend, La Pine, Sisters, and Tumalo. The annual flood season for these regions occurs approximately between October through July.⁵

Rate and location of development

Deschutes County has approved roughly 50 land use permits for some type of development in the 100-year floodplain since 2005. Approximately 20 of these permits were conditional use permits that allowed for development of new residential structures in the floodplain. Most of the approved conditional use permits were located between Sunriver and La Pine along the Deschutes River.

A majority of people in Deschutes County reside in Bend or within the unincorporated areas of the county. Deschutes County experienced a 41% increase in population between 2000 and 2013. The County Coordinated Population Forecast projects that by 2025 Deschutes County's population will increase by 48% to about 78,300 people. Between 2000 and 2013, the number of people residing in unincorporated areas grew by more than 10%, totaling 53,870 people. Forecasts estimate this number to grow to nearly 80,000 people by 2025.

Existing Flood Programs in Deschutes County

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) offers affordable flood insurance to property owners in communities that adopt and enforce minimum floodplain management regulations set by FEMA. Deschutes County participants in the NFIP and continues to maintain compliance with the program's minimum standards. Homeowners with federally backed mortgages located in the floodplain zone are required to purchase flood insurance.

Flood Insurance Rate Maps (FIRM) are maps which identifies the special flood hazard area and the risk premium zones for a community. Deschutes County's current FIRMs were digitally updated in 2007. In 2012, based upon data from the U.S. Census, the Federal Insurance and Mitigation Administration (FIMA), a division

⁵ Ibid

of FEMA, reported that approximately 15% of Deschutes households were eligible for the NFIP had policies been in force.⁶

Existing Flood Model Ordinances and Standards

The following model ordinances and standards were used in the process of reviewing the County's development code in addressing flood hazard mitigation.

FEMA Model Washington National Floodplain Insurance Program: Endangered Species Act Ordinance

Provides guidance on ways to improve floodplain management practices while assisting communities to meet the requirements of the Endangered Species Act within FEMA Region 10.

http://www.fema.gov/media-library-data/1383597893424-4747f702310a2bbc7e04ea83d66f73f5/NFIP_ESA_Model_Ordinance.pdf

Oregon Model Flood Damage Prevention Ordinance

The model ordinance includes required, and recommended, standards and provisions that ensure sound floodplain management practices to comply with the National Flood Insurance Program (NFIP) in the state of Oregon.⁷

Review of Existing Policy Options for Deschutes County

This section presents a review of the County's Comprehensive Plan in regards to land use and flood mitigation and identifies potential actions to strengthen current policies. The existing comprehensive plan policy language is shown in *italics* followed by our comments. Model development code language is shown in *italics and underlined*.

Review of County Comprehensive Plan Policies

Comprehensive Plan Policy 3.5.10 (a): National Flood Insurance Program Community Rating System Participation

The CRS is a voluntary incentive program that recognizes and encourages floodplain management activities that exceed the minimum NFIP requirements. When a community participates in the CRS, flood insurance rates are discounted to reflect

⁶ Community Development Department: Deschutes County. 2015 .
http://www.deschutes.org/sites/default/files/fileattachments/community_development/page/1189/memo_re_review_of_policies_re_fires_and_floods.pdf

⁷ Oregon.gov,. 2015. 'DLCD Natural Hazards Floods: Local Government'.
<http://www.oregon.gov/LCD/HAZ/pages/localgov.aspx>

the reduced flood risk resulting from the community actions meeting the three goals of the CRS: 1. Reduce flood damage to insurable property; 2. Strengthen and support the insurance aspects of the NFIP, and; 3. Encourage a comprehensive approach to floodplain management.

Best Practice: The Deschutes County Comprehensive Plan Policy 3.5.10 (a) states that the county will: *Regulate development in designated floodplains identified on the Deschutes County Zoning Map based on Federal Emergency Management Act regulations. Participate in and implement the Community Rating System (CRS) as part of the National Flood Insurance Program (NFIP).* CRS standards go beyond the minimum requirements of the NFIP. Adoption of CRS strengthens and supports the insurance aspects of the NFIP and encourages a comprehensive approach to floodplain management.

Applicable County Code: County Comprehensive Plan Policy 3.5.10 (a)

Implications: According to County Development Department staff, “based on coordination with Department of Land Conservation (DLCD), staff believes that the above-and-beyond programs of the Community Rating System (CRS) would present a low return on investment of staff time and resources.” CPW recommends that the County periodically review participation in the Community Rating System. The County may choose to implement the CRS program if there is a significant increase in participation by county residents in the NFIP flood insurance program, increasing the value of reduced insurance rates, or if basic CRS activities were pre-packaged for easy deployment by DLCD, reducing the cost.

Due to the County’s lack of participation and implementation of the CRS program it is recommended that Comprehensive Plan Policy, 3.5.10 (a), be repealed.

Comprehensive Plan Policy 3.5.10 (a): Improving Flood Damage Insurance and Human Health

Alongside the benefit of reduced insurance rates, CRS floodplain management activities enhance public safety, reduce damages to property and public infrastructure, avoid economic disruption and losses, reduce human suffering, and protect the environment.

Best Practice: Community Rating System (CRS) standards go beyond the minimum requirements of the National Flood Insurance Program (NFIP). Implementation of CRS supports and strengthens the insurance aspects of the NFIP and fosters a widespread approach to floodplain management. Deschutes County Community Development staff has stated that opting into the CRS would not be worth the effort involved in participation at this time. However, the following specific CRS higher standards are worth consideration to reduce damages to property and public infrastructure, enhance public safety, reduce human suffering, avoid economic disruption and losses, and protect the environment:

- 432.e - Lower Substantial Improvements Threshold (See Lower and Cumulative Substantial Improvements)
- 432.d - Cumulative Substantial Improvements
- 431.a - Protecting Critical Facilities (See Critical Facilities)

- 432.a.(3) - Development Limitations (See Hazardous Materials)

Utilizing these higher standards would add more clarity to the Deschutes County Code purposes section. This section of the code currently doesn't provide enough detail on the financial impacts or human health aspects of flooding. Additionally, the Oregon Model Floodplain Ordinance has sample code language that provides an emphasis on human health and financial impacts.

Applicable County Code: Comprehensive Plan Policy 3.5.10; 18.96.040(B) County Zoning, Conditional Uses Permitted; 18.96.040(I) County Zoning, Conditional Uses Permitted; 18.96.050 County Zoning, Prohibited Uses.

Implications: As stated, opting into the CRS may not be worth the effort involved in participation at this time. However, implementing identifiable higher standards that are particularly relevant to Deschutes County will add targeted improvement to flood hazards. Roseville, CA, is one community that currently participates in the CRS and is the only one in the country to receive a Class 1 CRS rating and it has benefited property owners and developers alike (See Appendix B: Case Study: Roseville, CA). Deschutes County can choose not to participate in the CRS while still implementing several of the program's higher standards that will have a direct benefit to residents.

Comprehensive Plan Policy 3.5.11 (f): Floodplain Combining Zone

Converting a base zone to a floodplain combining zone allows for each property within the zone to be appropriately designated based on the neighborhood. It would indicate restrictions and conditional development that are subject to the flood hazard in accordance with FEMA regulations.

Best Practice: Deschutes County Code has three sections that include floodplain regulations (two of which are combining districts):

1. Chapter 18.96 County Zoning, Flood Plain Zone,
2. Chapter 18.108 County Zoning, Urban Unincorporated Community Zone – Sunriver (in particular 18.108.190 Flood Plain Combining District), and
3. Chapter 19.72 Bend Urban Growth Boundary Zoning Ordinance, Flood Plain Combining Zone.

Repeal of the existing floodplain zones (18.96 and 18.108.190) and creation of one Floodplain Combining Zone for Title 18 County Zoning and one for Title 19 Bend Urban Growth Boundary would reduce redundancy and eliminate the increased zoning legalities (See Case Study: Marion County, OR).

Applicable County Code: Comprehensive Plan Policy 3.5.11 (f): Review and revise Deschutes County Code as needed to: Make the Floodplain Zone a combining zone and explore ways to minimize and mitigate floodplain impacts.

Implications: Creation of a floodplain combining zone would reduce the redundancy of two sections of Chapter 18 with floodplain regulations, help to

eliminate code interpretation challenges, and remove potential code enforcement errors.

The Floodplain Zone (18.96) is currently a base zone, meaning that it has its own list of allowed uses, restrictions, and special provisions, like the Rural Residential Zone (RR-10) or Exclusive Farm Use Zone (EFU).

Many properties have some Floodplain Zoning near the river with the majority of the property in a different zone. This “split-zoning” presents a number of code interpretation challenges. Creating a floodplain combining zone would help to reduce code interpretation challenges and potential code enforcement issues.

REVIEW OF COUNTY DEVELOPMENT CODE

This section presents a review of the county’s current development code in regards to land use and flood mitigation policies and programs and identifies potential actions to strengthen current codes. In the following section the existing development code language is shown in *italics* followed by our comments. Model development code is shown in *italics and underlined*.

Definitions

Explicit definitions for specific words and terms utilized throughout county code assists understanding and fluidity at a common level.

Best Practice: There are several definitions provided in the Oregon Model Floodplain Ordinance, Section 2.0 Definitions, that the County may choose to consider adding to the Code, including:

“Below-grade Crawl Space” means an enclosed area below the base flood elevation in which the interior grade is not more than two feet below the lowest adjacent exterior grade and the height, measured from the interior grade of the crawlspace to the top of the crawlspace foundation, does not exceed 4 feet at any point.

Note: See comment under 18.96.080(D)(4) for more information regarding below-grade crawl spaces.

“Conditional Letter of Map Revision (CLOMR)” means a letter from FEMA commenting on whether a proposed project, if built as proposed, would meet the minimum NFIP standards or proposed hydrology changes.

“Critical Facility” means a facility for which even a slight chance of flooding might be too great. Critical facilities include, but are not limited to schools, nursing homes, hospitals, police, fire and emergency response installations, installations which produce, use or store hazardous materials or hazardous waste.

“Elevated Building” means for insurance purposes, a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

“Substantial Damage” means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred.

Applicable County Code: 18.04 Definitions

Implications: Adopting specific definitions of commonly used words or phrases will reduce ambiguity. Clear definitions make standards more transparent for developers and homeowners.

Purpose Statement

A purpose statement is a declarative sentence or list that summarizes the specific topic and goals near the beginning of a document to give readers an accurate, concrete understanding of what will be covered in the text.

Best Practice: The Deschutes County Code does a good job of addressing environmental impacts, but only has a broad scope of addressing human health. There is also no focus on the financial impact of flooding; from money for flood control projects to economic impacts on business interruptions. The Oregon Model Floodplain Ordinance, Section 1.3 Statement of Purpose, provides specific language that illustrates the potential financial impact from flooding ranging from mitigation efforts to loss of business interruptions.

Section 1.3 Statement of Purpose:

- 1) *To protect human life and health;*
- 2) *To minimize expenditure of public money and costly flood control projects;*
- 3) *To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;*
- 4) *To minimize prolonged business interruptions;*
- 5) *To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard;*
- 6) *To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;*
- 7) *To ensure that potential buyers are notified that property is in an area of special flood hazard; and,*
- 8) *To ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.*

Applicable County Code: 18.96.010 Purposes

Implications: Expanding the purpose statement to include economic impacts will directly support Deschutes County Comprehensive Plan Section 3.5, Goal 1 “Protect people, property, infrastructure, the economy and the environment from natural hazards.”

Designation of Local Floodplain Administrator

The duties of the local floodplain administrator are varied and include several tasks including: Review and evaluate development permit applications, issue permits, and maintain required records according to NFIP regulations.

Best Practice: The designation of the local floodplain administrator and their duties and responsibilities are covered in 18.96.020 and 18.96.070. The duties, however, could be more explicit and ensure that the elevation certificate, base flood elevation, and substantial damage requirements of the National Flood Insurance Program are explicitly referenced. The Oregon Model Floodplain Ordinance, Section 4.3 Duties and Responsibilities of the Local Administrator, provides more explicit language:

4.3 Duties and Responsibilities of the Local Administrator

Duties of the local administrator shall include, but not be limited to:

4.3-1 Provide Base Flood Elevation and Freeboard

When base flood elevation has been provided in accordance with Section 3.2, Basis for Establishing the Areas of Special Flood Hazard, and the local administrator shall provide it to the Building Official along with any freeboard requirements established in Section 5.2 Specific Standards.

When base flood elevation data has not been provided (A and V Zones) in accordance with Section 3.2, Basis for Establishing the Areas of Special Flood Hazard, the local administrator shall obtain, review, and provide any base flood elevation and floodway data available from a Federal, State or other source, in order to administer Sections 5.2, Specific Standards, and 5.3 Floodways and the Building Codes.

Applicable County Code: 18.96.020 Designated Areas; 18.96.070 Application for Conditional Use

Implications: Adoption of Oregon Model Floodplain Ordinance, Section 4.3, will address changes in 2014 Oregon Residential Specialty Code, which removed NFIP duties from building code.

Hazardous Material

The storage of hazardous material in the floodplain poses a serious threat to residents in the event of a flood. Stored materials can become debris during flooding when river currents dislodge and move materials across the floodplain.

Best Practice: The Deschutes County Code does not explicitly prohibit storage of hazardous materials in the floodplain. Prohibiting storage of hazardous materials in the floodplain is critical in reducing the damage caused by floods. The Model Washington NFIP-ESA Ordinance, Section 5.3 Hazardous Materials, offers explicit language for prohibiting hazardous materials in the floodplain:

Section 5.3 Hazardous Materials:

A. No new development shall create a threat to public health, public safety, or water quality. Chemicals, explosives, gasoline, propane, buoyant materials, animal wastes, fertilizers, flammable liquids, pollutants, or other materials that are hazardous, toxic, or a threat to water quality are prohibited from the Special Flood Hazard Area. This prohibition does not apply to small quantities of these materials kept for normal household use. This prohibition does not apply to the continued operations of existing facilities and structures, reuse of existing facilities and structures, or functionally dependent facilities or structures.

Applicable County Code: 18.96.040 (B) Conditional Uses Permitted

Implications: Utilizing more specific language for hazardous materials will add to the safety and health of the public during and after a flood. Adoption of hazardous materials storage prohibition in the floodplain supports Oregon's Statewide Planning Goal 7 Implementation Guidelines: "Local governments should consider measures that exceed the National Flood Insurance Program (NFIP) such as: prohibiting the storage of hazardous materials in floodplains or providing for safe storage of such materials." Implementation of this policy may require additional staff time for monitoring.

Lower Substantial Improvements Threshold

A substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure that will cost 50% of the market value of the structure before improvements begin.

Best Practice: The National Flood Insurance Program minimum requirement treats any construction that will incur improvements totaling more than 50% of the market value of the structure as a new structure. This means the structure will need to be elevated above base flood elevation and meet other flood protection measures specified by the NFIP. A lower substantial improvements threshold (example 25%, 40%, etc.) standard allows improvements valued at up to 50% of the building's pre-improvement value to be permitted without meeting the flood protection requirements for buildings located in the special flood hazard area. Applying this would require structures to comply with NFIP requirements if improvements met the lower threshold.

Applicable County Code: 18.96.040(I) Conditional Uses Permitted

Implications: Adoption of the standard applies to expansion or substantial improvement of an existing dwelling, an agricultural related structure, a commercial, industrial or other non-residential structure, or an accessory building in a floodplain. Implementation of the standard would increase the minimum requirement of the NFIP and treat any structure that incurs improvements totaling the new threshold standard (25%, 40%, etc.) of the market value of the structure as a new structure. Adoption of the policy may require additional staff time for permit assessment.

Cumulative Substantial Improvements

A substantially improved structure must be brought into compliance with NFIP regulations and other requirements in the local ordinance for new construction. This will include cumulative damages incurred over time to the structure.

Best Practice The National Flood Insurance Program minimum requirement treats any construction that will incur improvements totaling more than 50% of the market value of the structure as a new structure. This means the structure will need to be elevated above base flood elevation and meet other flood protection measures specified by the NFIP. Different from a lower substantial improvement threshold, cumulative substantial improvement ensures that the total value of all improvements or repairs permitted over time does not exceed 50% of the value of the structure. According to FEMA's Higher Floodplain Management Regulatory Standards, some communities have begun to track these improvements over time (i.e., the structure must be elevated if they received flood damage two times over the past 10 years, of which the cost to repair after each flood equals 25% of the market value on average). In addition, applying the standard to cumulative substantial improvement would apply the NFIP regulation for improvements over the lifetime of the structure.

Applicable County Code: 18.96.040(I) Conditional Uses Permitted

Implications: Adoption of the standard applies to expansion or substantial improvement of an existing dwelling, an agricultural related structure, a commercial, industrial or other non-residential structure, or an accessory building in a floodplain. Adoption of the standard would increase the minimum requirement of the NFIP and treat any structure that incurs improvements totaling more than 50% of the market value of the structure over the lifetime of the structure, as a new structure. Implementation of the policy would require additional staff time for assessment and management of permits over time.

Critical Facilities

Critical facilities are vital to flood response activities or critical to the health and safety of the public before, during, and after a flood, such as a hospital, emergency operations center, electric substation, police station, fire station, nursing home, school, vehicle and equipment storage facility, or shelter. Facilities that, if flooded, would make the flood problem and its impacts much worse, such as a hazardous materials facility, power generation facility, water utility, or wastewater treatment plant. Given this, it is prudent to require these facilities to be sited outside of the floodplain unless no viable alternative exists.

Best Practice: The Deschutes County Code does not define critical facilities or prohibit development in the special flood hazard area. The Model Washington NFIP-ESA Ordinance, Section 5.4 Critical Facility, defines and provides language specific to critical facilities:

Critical facility:

A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include health and safety facilities, utilities, government facilities, and hazardous materials facilities. For the purposes of a local regulation, a community may also use the International Codes' definition for Category III and IV buildings.

5.4. Critical Facilities

A. Construction of new critical facilities shall be, to the extent possible, located outside the limits of the Special Flood Hazard Area.

B. Construction of new critical facilities in the Special Flood Hazard Area shall be permissible if no feasible alternative site is available, provided

1. Critical facilities shall have the lowest floor elevated three feet above the base flood elevation or to the height of the 500-year flood, whichever is higher. If there is no available data on the 500-year flood, the permit applicants shall develop the needed data in accordance with FEMA mapping guidelines.

2. Access to and from the critical facility shall be protected to the elevation of the 500-year flood.

An additional provision regarding hazardous materials facility, power generation facility, water utility, or wastewater treatment plant located in the floodplain is provided by the Oregon Model Floodplain Ordinance, Section 5.7 Critical Facility:

Floodproofing and sealing measures must be taken to ensure that toxic substances will not be displaced by or released into floodwaters.

Applicable County Code: 18.96.050 Prohibited Uses

Implications: Adoption of critical facilities prohibition in the floodplain supports Deschutes County Comprehensive Plan Policy 3.5.6: "Critical facilities (schools, churches, hospitals and other facilities as defined by the Federal Emergency Management Agency) should be located outside high risk natural hazard areas, where possible." Implementation of this policy may require additional staff time for permit assessment.

Below-grade Crawlspace

Crawlspace foundations are commonly used in some parts of the nation to elevate the lowest floors of residential buildings located in Special Flood Hazard Areas above the Base Flood Elevation (BFE). Crawlspace that have their floors below BFE

must have openings to allow the equalization of flood forces. Crawlspace should be constructed so that the floor of the crawlspace is at or above the lowest grade adjacent to the building.

Best Practice: Defining below-grade crawlspaces is important for both developers and property owners to ensure that flood damage is kept to a minimum. The Oregon Model Floodplain Ordinance section 4.3.3(1) explicitly lists “below-grade crawl spaces” in addition to the requirements of 18.96.070(E). It’s recommended that the county consider specifically listing “below-grade crawl spaces” in relation to elevation of the lowest habitable floor. A definition for below-grade crawl space has been offered in the section on Definitions (18.04).

Applicable County Code: 18.96.070. Application for Conditional Use.

Implications: Adoption of the policy would require that each applicant enter into a non-conversion deed declaration for construction within flood hazards areas or equivalent. The deed would be recorded and in a form that the Floodplain Administrator finds acceptable. This may require additional staff time for the permit process.

Conditional Letter of Map Revision (CLOMR)

A CLOMR is FEMA’s comment on a proposed project that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective Base Flood Elevations, or the Special Flood Hazard Area. The letter does not revise an effective NFIP map, but rather it indicates whether the project, if built as proposed, would be recognized by FEMA.

Best Practice: The Oregon Model Floodplain Ordinance section 4.3.4(4) provides specific language requiring an applicant to obtain a CLOMR from FEMA before encroachments are permitted. Deschutes County Code does not currently explicitly require this. It’s recommended the County adopt similar language to the following:

(4) Applicants shall obtain a Conditional Letter of Map Revision (CLOMR) from FEMA before any encroachment, including fill, new construction, substantial improvement, or other development, in the regulatory floodway is permitted. The applicant shall be responsible for preparing technical data to support the CLOMR application and paying any processing or application fees to FEMA.

Applicable County Code: 18.96.080(B) Criteria to Evaluate Conditional Uses

Implications: Adoption of the policy would require that any applicant prepare technical data to support the CLOMR application and pay processing or application fees to FEMA prior to any encroachment. This will prevent the alteration or relocation of water course without prior approval or notification to adjacent communities. This may require additional staff time for permit assessment.

Density and Provision of Open Space

Designating open space in the Special Flood Hazard Area (SFHA), and limiting the density of development in this area allows for flood waters to overrun natural land uses, while protecting the more densely developed areas outside the SFHA.

Best Practice: The Deschutes County Code currently requires all subdivision and partition proposals to “be consistent with the need to minimize flood damage.” However, the code fails to address the density of development or adds a provision for open space. Model Washington NFIP-ESA Ordinance provides an example of open space use requirements to manage density in the floodplain:

Section 5.1 Subdivisions:

B. The proposed subdivision must have one or more new lots in the Special Flood Hazard Areas set aside for open space use through deed restriction, easement, subdivision covenant, or donation to a public agency.

1. In the Special Flood Hazard Area outside the Protected Area, zoning must maintain a low density of floodplain development.

2. In the Special Flood Hazard Area outside the protected area in which the current zoning is less than 5 acres must maintain the current zoning.

3. The density of the development in the portion of the development outside the Special Flood Hazard Area may be increased to compensate for the amount of land in the Special Flood Hazard Area preserved as open space in accordance with (section of the community’s zoning or other development ordinance that allows PUDs and/or transfers of development rights).

C. If a parcel has a buildable site outside the Special Flood Hazard Area, it shall not be subdivided to create a new lot, tract, or parcel within a binding site plan that does not have a buildable site outside the Special Flood Hazard Area. This provision does not apply to lots set aside from development and preserved as open space.

Applicable County Code: 18.96.080(E) Subdivision and Partition Proposals

Implications: Adoption of density restriction and allocation of open space in the floodplain supports Oregon’s Statewide Planning Goal 7 Implementation Guidelines: “In adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider: the benefits of maintaining natural hazard areas as open spaces, recreation and other low density uses.” This could require additional costs to developers; however, it can also be used as a useful marketing and real estate tool. This may require additional staff time for permit assessment.

Access Roads

An access road that is built at or above the floodplain elevation provides an evacuation route for residents, as well as an emergency response route for emergency responders.

Best Practices: Providing access roads that can be utilized during a flood event is critical for emergency response and the evacuation of residents. Current Deschutes County code does not provide regulations to ensure subdivisions are accompanied by access roads that are both connected to land outside the floodplain and above the floodplain elevation. There is specific language listed in the Model Washington NFIP-ESA Ordinance Section 5.1(E) that addresses evacuation safety of residents in the event of a flood.

Section 5.1 Subdivisions

E. All proposals shall ensure that all subdivisions have at least one access road connected to land outside the Special Flood Hazard Area with the surface of the road at or above the FPE wherever possible.

Applicable County Code: 18.96.080(E) Subdivision and Partition Proposals

Implications: Adoption of this policy supports Oregon’s Statewide Planning Goal 7 Implementation Guidelines: “Local governments should give special attention to emergency access when considering development in identified hazard areas.” This may require additional staff time for permit assessment.

Filed Notice on the Final Recorded Subdivision Plat

The final plat is the legal document that is recorded with the County Recorder’s office. The sale of subdivided lots can only proceed after this recording. Adding a field notice to the final plat meets the requirements for Community Rating System credits.

Best Practices: Current county code does not require subdivisions located within the Special Flood Hazard Areas (floodplain), a channel migration area, or a riparian habitat zone to be accompanied by field notice on the final recorded subdivision plat. If the county were to include this requirement, Deschutes County would qualify for Community Rating System (CRS) credit. The Model Washington NFIP-ESA Ordinance utilizes notification language for the county to consider:

G. The final recorded subdivision plat shall include a notice that part of the property is in the SFHA, riparian habitat zone and/or channel migration area, as appropriate.

Applicable County Code: 18.96.080(E) Subdivision and Partition Proposals

Implications: Adoption of this policy supports Oregon’s Statewide Planning Goal 7 Implementation Guidelines: “Local governments should evaluate the risk to people and property based on the new inventory information and an assessment of the types and intensities of land uses to be allowed in the hazard area.” This may require additional staff time for the permit process.

Maintenance Plan or Emergency Action Plan

A Maintenance Plan ensures that a building maintains floodproofing protection measures and outlines how the plan will be executed. An Emergency Action Plan details the facilitation and organization of individuals during an emergency, while

also outlining where people will go based on the emergency, what triggers the implementation of the plan, and who is responsible for executing the plan.

Best Practices: Implementing a comprehensive Maintenance Plan or an Emergency Action Plan provides community assurance that floodproofing protection measures are preserved and that building operators implement a plan of action for the installation and sealing of the structure for nonresidential construction prior to flooding. Deschutes County Code does not currently have any provisions addressing either of these plans. The Oregon Model Floodplain Ordinance has specific language that the County may consider:

5.2.2(6) Applicants shall supply a comprehensive Maintenance Plan for the entire structure to include but not limited to: exterior envelope of structure; all penetrations to the exterior of the structure; all shields, gates, barriers, or components designed to provide floodproofing protection to the structure; all seals or gaskets for shields, gates, barriers, or components; and, the location of all shields, gates, barriers, and components as well as all associated hardware, and any materials or specialized tools necessary to seal the structure.

5.2.2 (7) Applicants shall supply an Emergency Action Plan (EAP) for the Installation and sealing of the structure prior to a flooding event that clearly identifies what triggers the EAP and who is responsible for enacting the EAP.

Applicable County Code: 18.96.080(G)(2) Nonresidential Construction

Implications: Adoption of this policy may require additional staff time for individual assessments, provides specific mitigation and response action items for property owner to address.

Manufactured Homes

A manufactured home is a structure that is transportable in one or more sections that is built on a permanent chassis and designed for use with or without a permanent foundation when attached to required utilities. Anchoring these structures to a permanent foundations helps to resist flotation, collapse, or lateral movement during a flood event.

Best Practices: Deschutes County Code does not currently state that manufactured homes must be anchored to prevent them from serious damage in the event of a flood. Utilizing specific language addressing this will reduce damages during and after a flood event. Oregon Model Floodplain Ordinance 5.2.3(1) has specific language for the County to consider:

(1) All manufactured homes to be placed or substantially improved sites on:
(i) Outside of a manufactured home park or subdivision
(ii) In a new manufactured home park or subdivision,
(iii) In an expansion to an existing manufactured home park or subdivision, or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred “substantial damage” as the result of a flood;

(v) shall be elevated on a permanent foundation such that the finished floor of the manufactured home is elevated to a minimum 18 inches (46 cm)2 above the base flood elevation and be securely anchored to an adequately designed foundation system to resist flotation, collapse and lateral movement.

Applicable County Code: 18.96.080(G)(3) Manufactured Homes

Implications: Adoption of this policy supports the Deschutes County Comprehensive Plan Section 3.5, Goal 1: “Protect people, property, infrastructure, the economy and the environment from natural hazards.” This will require additional staff time for individual assessment.

Flood Policy Option Matrix

The following matrix lists each policy option listed in this document, with a condensed breakdown of applicable county code, a description of the policy option, the issues each policy option addresses, the applicability for Deschutes County, and the implications on the county if it were to adopt the option. Sections that are highlighted in grey are areas that the county may want to initiate their code update review process.

Table 4 Flood Policy Options Matrix

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
F1	Lower Substantial Improvements Threshold	18.96.040(I) County Zoning, Conditional Uses Permitted	Adopt higher standards in accordance with Community Rating System (CRS) 432.e Lower Substantial Improvements Threshold with FEMA's Higher Floodplain Management Regulatory Standards language.	The minimum requirement of the NFIP treats any structure that will incur improvements totaling more than 50% of the market value of the structure, as a new structure – meaning the structure will need to be elevated above base flood elevation and meet other flood protection measures specified by the NFIP. Applying a lower substantial improvements threshold (example 25%, 40%, etc.) standard would require structures to comply with NFIP requirements if improvements met the lower threshold.	Adoption of the standard applies to expansion or substantial improvement of an existing dwelling, an agricultural related structure, a commercial, industrial or other non-residential structure, or an accessory building in a floodplain.	Adoption of the standard would increase the minimum requirement of the NFIP and treat any structure that incurs improvements totaling the new threshold standard (25%, 40%, etc.) of the market value of the structure as a new structure. May require additional staff time for permit assessment.	No comments were provided.
F2	Cumulative Substantial Improvements	18.96.040(I) County Zoning, Conditional Uses Permitted	Adopt higher standards in accordance with Community Rating System (CRS) 432.d Cumulative Substantial Improvements with FEMA's Higher Floodplain Management Regulatory Standards language.	The minimum requirement of the NFIP treats any structure that will incur improvements totaling more than 50% of the market value of the structure, as a new structure – meaning the structure will need to be elevated above base flood elevation and meet other flood protection measures. Currently the standard is applied at each permit and does not account for cumulative improvements over time. Applying the standard to cumulative substantial improvement would apply the NFIP regulation for improvements over the lifetime of the structure.	Adoption of the standard applies to expansion or substantial improvement of an existing dwelling, an agricultural related structure, a commercial, industrial or other non-residential structure, or an accessory building in a floodplain.	Adoption of the standard would increase the minimum requirement of the NFIP and treat any structure that incurs improvements totaling more than 50% of the market value of the structure over the lifetime of the structure, as a new structure. Requires additional staff time for assessment and management of permits overtime.	Commission questioned number of properties this policy would apply to. An analysis will need to occur to document affected properties.
F3	Critical Facilities	18.96.050 County Zoning, Prohibited Uses	Adopt higher standards in accordance with Community Rating System (CRS) 431.a Protecting Critical Facilities with Model Washington NFIP-ESA Ordinance (section 5.4, p. 39).	Critical facilities are crucial to flood response activities, as well as to the health and safety of the public before, during, and after a flood event.	Adoption of this policy applies to development of new critical facilities to ensure they are sited outside the floodplain, unless no alternative exists.	Adoption of critical facilities prohibition in the floodplain supports Deschutes County Comprehensive Plan Policy 3.5.6: "Critical facilities (schools, churches, hospitals and other facilities as defined by the Federal Emergency Management Agency) should be located outside high risk natural hazard areas, where possible." May require additional staff time for permit assessment.	Commission interested in this policy regards to Waste Water Treatment Plant located in South County.
F4	Hazardous Materials	18.96.040(B) County Zoning, Conditional Uses Permitted	Adopt higher standards in accordance with Community Rating System (CRS) 432.a.(3) Development Limitations as demonstrated in Model Washington NFIP-ESA Ordinance that offers explicit language for prohibiting hazardous materials in the floodplain.	Prohibiting storage of hazardous materials in the floodplain is critical in reducing the damage caused by floods. Stored hazardous materials can become debris during a flood event, and move across the floodplain causing contamination.	According to the Model Washington NFIP-ESA ordinance language; the "prohibition does not apply to small quantities of materials kept for normal household use. This prohibition does not apply to the continued operations of existing facilities and structures, reuse of existing facilities and structures, or functionally dependent facilities or structures."	Adoption of hazardous materials storage prohibition in the floodplain supports Oregon's Statewide Planning Goal 7 Implementation Guidelines: "Local governments should consider measures that exceed the National Flood Insurance Program (NFIP) such as: prohibiting the storage of hazardous materials in floodplains or providing for safe storage of such materials. Requires additional staff time for monitoring.	Commission concerned that policy as written does not cover existing structures. Question regarding if policy would apply to golf courses.

Source: Community Planning Workshop

Table 4 Flood Policy Options Matrix (continued)

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
F5	Floodplain Combining Zone	18.96 County Zoning, Flood Plain Zone; 18.108 County Zoning, Urban Unincorporated Community Zone - Sunriver (in particular 18.108.190 Flood Plain Combining district); 19.72 Bend Urban Growth Boundary Zoning Ordinance, Flood Plain Combining Zone	Create a flood plain zone a combining zone. There are currently three sections in the Deschutes County Code that include floodplain regulations (two of which are combining districts): Chapter 18.96 County Zoning, Flood Plain Zone, Chapter 18.108 County Zoning, Urban Unincorporated Community Zone – Sunriver (in particular 18.108.190 Flood Plain Combining District), and Chapter 19.72 Bend Urban Growth Boundary Zoning Ordinance, Flood Plain Combining Zone. In order to reduce redundancy and eliminate the increased zoning legalities, merge the two zones within Chapter 18 to eliminate these issues.	Many properties near the river have some Floodplain Zoning with the property in various zones. This “split-zoning” presents a number of code interpretation challenges.	Make standards more transparent for developers and homeowners for new development and improvements on private land in Deschutes County.	Reduce the redundancy of two sections of Chapter 18 with floodplain regulations, and create one combining zone would help to eliminate code interpretation challenges and remove potential code enforcement errors.	Commissioners raised concern that policy would limit development. Discussion included the need to balance health and welfare with property rights.
F6	Definitions	18.04 County Zoning, Definitions	Adopt Oregon Model Floodplain Ordinance language that defines; "Below-grade Crawl Space," "Conditional Letter of Map Revision (CLOMR)," "Critical Facility," "Elevated Building," and "Substantial Damage."	Adoption of definitions specify meaning of commonly used words or phrases and reduce ambiguity.	Policy applies to applicable standards in order to be more transparent for developers and homeowners for new development and improvements on private land in Deschutes County.	Adoption of this policy will make standards more transparent for developers and homeowners.	No comments were provided.
F7	Purpose Statement	18.96.010 County Zoning, Purposes	Adopt Oregon Model Floodplain Ordinance Section 1.3 Statement of Purpose to address economic impacts.	Expansion of the purpose statement illustrates the Deschutes County's recognition of potential financial impact from flooding hazard ranging from mitigation efforts to loss of business interruptions.	Policy applies to county staff and administrative efforts to make financial impacts of flood hazards and mitigation efforts more transparent in Deschutes County.	Expansion of purpose statement to include economic impacts supports the Deschutes County Comprehensive Plan Section 3.5, Goal 1 “Protect people, property, infrastructure, the economy and the environment from natural hazards.”	No comments were provided.
F9	Local Floodplain Administrator	18.96.020 County Zoning, Designated Areas; 18.96.070 County Zoning, Application for Conditional Use	Adopt Oregon Model Floodplain Ordinance Section 4.3 Duties and Responsibilities of the Local Administrator to ensure that the administrator's duties and responsibilities are explicitly designated.	Explicitly designate local floodplain administrator and define duties and responsibilities to ensure that the elevation certificate, base flood elevation, and substantial damage requirements of the NFIP are referenced.	Policy applies to local floodplain administrator duties and responsibilities.	Adopt Oregon Model Floodplain Ordinance, Section 4.3, to address changes in 2014 Oregon Residential Specialty Code which removed NFIP duties from building code.	No comments were provided.
F8	Below-Grade Crawl Spaces	18.96.070(E) County Zoning, Application for Conditional Use	Adopt Oregon Model Floodplain Ordinance Section 4.3.6 Non-Conversion of Enclosed Areas below the Lowest Floor to ensure that below-grade crawl spaces are identified as uninhabitable.	Enclosed areas below the lowest floor are not intended for human habitation and conversion of these areas to habitable space increases the risk to public health and safety.	Adoption of this policy applies to conditional use permits for any dwelling unit or structure in a floodplain.	Adoption of the policy would require such applicants to enter into a "Non-conversion deed declaration for construction within flood hazard areas" or equivalent. The deed declaration would be recorded and be in a form acceptable to the Floodplain Administrator. May require additional staff time for permit process.	No comments were provided.

Source: Community Planning Workshop

Table 4 Flood Policy Options Matrix (continued)

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
F9	Conditional Letter of Map Revision (CLOMR)	18.96.080(B) County Zoning, Criteria to Evaluate Conditional Uses	Adopt Oregon Model Floodplain Ordinance section 4.3.4(4) that states "applicants shall obtain a Conditional Letter of Map Revision (CLOMR) from FEMA before any encroachment, including fill, new construction, substantial improvement, or other development, in the regulatory floodway is permitted."	Prevent alteration or relocation of water course without prior approval or notification to adjacent communities.	Adoption of this policy applies to criteria to evaluate conditional uses before any encroachment, including fill, new construction, substantial improvement, or other development in the floodplain.	Adoption of the policy would require the applicant to prepare technical data to support the Conditional Letter of Map Revision (CLOMR) application and pay processing or application fees to FEMA prior to any encroachment. May require additional staff time for permit assessment.	No comments were provided.
F10	Crawl-Space	18.96.080(D)(4) County Zoning, Criteria to Evaluate Conditional Uses	Adopt Oregon Model Floodplain Ordinance section 5.2-6 Below-Grade Crawl Spaces that defines and specifies appropriate development ordinance if below grade crawlspaces are allowed.	The Oregon Model Floodplain Ordinance sections 5.2-6 explicitly lists specific requirements that creates more transparency for developers and homeowners for new development and improvements on private land in Deschutes County.	Adoption of this policy applies to criteria to evaluate conditional uses for below-grade crawl spaces in a floodplain.	Adoption of this policy regulates development in a floodplain "because of hydrodynamic loads, crawlspace construction is not allowed in areas with flood velocities greater than five feet per second unless the design is reviewed by a qualified design professional, such as a registered architect or professional engineer." May require additional staff time for permit assessment.	Commissioners raised concern that reference of FEMA bulletin for policy option creates confusion when FEMA modifies regulations. Referencing third-party documents risks becoming outdated.
F11	Access Roads	18.96.080(E) County Zoning, Criteria to Evaluate Conditional Uses	Adopt Model Washington NFIP-ESA Ordinance, Section 5.1 (E) Subdivision, proposes subdivisions "have at least one access road connected to land outside the Special Flood Hazard Area with the surface of the road at or above the flood plain elevation wherever possible."	The Deschutes County Code currently lacks regulations to ensure subdivisions have access roads that are both above the floodplain elevation and connect to land outside the floodplain.	Adoption of this policy applies to subdivisions development in a floodplain.	Adoption of policy supports Oregon's Statewide Planning Goal 7 Implementation Guidelines: "Local governments should give special attention to emergency access when considering development in identified hazard areas." May require additional staff time for permit assessment.	No comments were provided.
F12	Density and Open Space	18.96.080(E) County Zoning, Criteria to Evaluate Conditional Uses	Adopt Model Washington NFIP-ESA Ordinance, Section 5.1 Subdivision, that proposes subdivisions "must have one or more new lots in the Special Flood Hazard Area set aside for open space use through deed restriction, easement, subdivision covenant, or donation to a public agency."	The Deschutes County Code requires all subdivision and partition proposals to "be consistent with the need to minimize flood damage" but fails to address density of development or adds a provision for open space.	Adoption of this policy applies to subdivision and partition proposals in a floodplain.	Adoption of density restriction and allocation of open space in the floodplain supports Oregon's Statewide Planning Goal 7 Implementation Guidelines: "In adopting plan policies and implementing measures to protect people and property from natural hazards, local governments should consider: the benefits of maintaining natural hazard areas as open space, recreation and other low density uses." Could require additional costs to developers, however, can also be used as a useful marketing and real estate tool. May require additional staff time for permit assessment.	Commissioners raised concern that the policy option is impractical. Further discussion indicated that Deschutes County Flood mitigation regulation was not commensurate with FEMA. The policy presented is proposed at the local and federal standard levels.

Source: Community Planning Workshop

Table 4 Flood Policy Options Matrix (continued)

Ref. #	Policy Option	Deschutes County Code	Description	Issues Addressed	Applicability	Implications of Adoption	Planning Commission Comments
F13	Filed Notice on the Final Recorded Subdivision Plat	18.96.080(E) County Zoning, Criteria to Evaluate Conditional Uses	Adopt Model Washington NFIP-ESA Ordinance, Section 5.1(G) Subdivision, that proposes that "the final recorded subdivision plat shall include a notice that part of the property is in the Special Flood Hazard Area."	Deschutes County Code does not currently require subdivisions located within the special flood hazard areas (floodplain), a riparian habitat zone, or a channel migration area to be accompanied by a filed notice on the final recorded subdivision plat.	Adoption of this policy applies to subdivision development in a floodplain.	Adoption of policy supports Oregon's Statewide Planning Goal 7 Implementation Guidelines: "Local governments should evaluate the risk to people and property based on the new inventory information and an assessment of the types and intensities of land uses to be allowed in the hazard area." May require additional staff time for permit process.	No comments were provided.
F14	Maintenance Plan or Emergency Action Plan	18.96.080(G)(2): County Zoning, Nonresidential Construction	Adopt Oregon Model Floodplain Ordinance section 5.2.2(6) and 5.2.2(7) proposes applicants supply a comprehensive Maintenance Plan and Emergency Action Plan (EAP) to assure flood proofing protection measures are maintained and that the operators of the building exercise a plan of action for the installation and sealing of the structure prior to a flood event.	Assure flood proofing protection measures are maintained and that the operators of the building exercise a plan of action for the installation and sealing of the structure prior to a flood event for nonresidential construction	Adoption of this policy applies to nonresidential construction in a floodplain.	Adoption of policy requires additional staff time for individual assessments, provides specific mitigation and response action items for property to address.	No comments were provided.
F15	Manufactured Home	18.96.080(G)(3): County Zoning, Manufactured Homes	Adopt Oregon Model Floodplain Ordinance section 5.2.3(4) states that manufactured dwellings shall be anchored to prevent flotation, collapse, and lateral movement during the base flood and electrical crossover connections shall be a minimum of 12-inches above base flood elevation.	Include additional standard for the elevation of electrical crossover connections to be at least 12-inches above base flood elevation	Adoption of this policy applies to manufactured homes located in the floodplain.	Adoption of policy supports Deschutes County Comprehensive Plan Section 3.5, Goal 1 "Protect people, property, infrastructure, the economy and the environment from natural hazards," but requires additional staff time for individual assessment.	No comments were provided.

Source: Community Planning Workshop

CHAPTER 5: RECOMMENDATIONS

Based on our review of current Deschutes County Code, CPW identified several areas where language can be expanded upon, language from model ordinances can be added, and language can be condensed to reduce redundancy. The intent of the code review and identification of policy options was to identify code amendments that can enhance the county's ability to prepare for and recover quickly following a hazard event. For many issues, CPW identify multiple options. The county should carefully examine each option determine which option is most appropriate. All of policy options identified in this report reflect areas that will add safety measures not explicitly seen in current language.

This chapter presents CPW's recommendations regarding policy options. Our recommendations were informed through two work sessions with the Deschutes County Planning Commission and one work session with the Deschutes County Board of County Commissioners. We also discussed and reviewed the options with Community Development Department staff. Because the code amendments are legislative changes, the county will be required to conduct public hearings for any amendment. Amendments are also subject to review and acknowledgement by the state Land Conservation and Development Commission (LCDC).

Recommendations

To assist county staff in evaluating the policy options presented in this report, we grouped our recommendations into three areas: (1) combining zones; (2) higher standards; and (3) code requirement clarity. At the direction of staff and the Planning Commission, the recommended policy options are prioritized.

Adopt Wildfire and Flood Combining Zones

To more efficiently regulate development in hazardous areas and consistently apply development standards, CPW recommends that the county draft and adopt a wildfire combining zone. We also recommend the county consolidate the Title 18.96 Flood Plain Zone, Title 18.108.190 Flood Plain Combining District, and Title 19.72 Flood Plain Combining Zone into a single Flood Plain Combining Zone within Title 18 of the County Code (County Zoning).

Implementation of a wildfire combining zone will make interpretation and application of development standards easier when mitigating wildfire risk. The creation of a wildfire hazard combining zone would eliminate the need to individually prescribe wildfire provisions for each base zone. Many of the wildfire-specific best practices and standards presented in this report can be included within a combining zone.

Consolidation of the floodplain zone will help to reduce redundancy in the development code, help to eliminate code interpretation challenges, and reduce the potential for code enforcement errors. Furthermore, developers and property

owners benefit from clear, consistent requirements that can be found in a single location within Deschutes County Code Title 18.

Adopt Higher Standards

CPW recommends the County review adopt the recommended wildfire and flood standards to increase the safety and well-being in Deschutes County. Wildfire policy options include adoption of National Fire Protection Association (NFPA) regulations 1141 and 1144 and from the International Code Council. These options include:

- **NFPA 1144 and ICC Wildland Fire Hazard Assessment.** We recommend the county adopt standards that require an assessment be initiated before development to identify the level of risk to a property and ensure adequate mitigation standards are obtained before construction and occupancy.
- **NFPA 1141, NFPA 1144, and ICC's Fire Prevention and Control Plan.** We recommend the county adopt standards that require subdivisions address water supply, access, building ignition and fire-resistance factors, fire protection systems and equipment, defensible space, and vegetation management.
- **ICC International Fire Code.** We recommend the county adopt standards for road identification signs to improve visibility for emergency responders to locate properties in danger.

CPW recommends the county adopt elements of the NFIP's Community Rating System as standards. The CRS standards presented to the Board of County Commissioners and county staff include:

- **431.a Protecting Critical Facilities.** Protecting critical facilities is vital to reducing damages caused by flood and improves the county's ability to respond to the needs of residents during a disaster.
- **432.a.(3) Development Limitations (prohibit hazardous materials).** Prohibiting storage of hazardous materials in the floodplain also reduces adverse impacts by removing materials that may cause contamination during a flood event.
- **432.d Cumulative Substantial Improvements.** Adoption of a substantial improvements policy reduces the future of flood damage by requiring homeowners to bring existing structures into compliance with NFIP regulations. Instead of tracking improvements annually, cumulative substantial improvements track the improvements over the lifetime of the structure.
- **432.e Lower Substantial Improvements Threshold.** The lower substantial threshold standard recommends that the county lower the cost of improvement to less than 50% of the market value structure. Lowering the threshold provides a mechanism that ensures an increased investment in flood hazard areas will receive the needed protection from flood risk.

Increase Clarity in Code Requirements

Increasing clarity in policy requirements for developers and homeowners will reduce potential misinterpretation of the code and ease the process of complying with development requirements.

Wildfire policies that increased clarity include wildfire mitigation plans for subdivisions and single-family homes. Specific wildfire mitigation plans would include requirements such as a wildfire hazard assessment, defensible space standards, emergency vehicle access, and water supply that are clear to developers and homeowners. Lucid policy language for wildfire management plans would help reduce time and costs to prepare the plans and reduce risk to property and lives. Explicit requirements for defensible space and road identification signs are also examples of increasing clarity for developers and homeowners. These policies would also ensure that all applicants consistently comply with the same requirements.

Flood policies that increase transparency include flood definitions. Clear definitions for critical facilities and below-grade-crawlspaces help identify these terms and make standards more transparent for developers and homeowners.

Prioritized Policy Recommendations

This report identifies a range of policy and programmatic options for the county to consider based on model ordinances, best practices, and case studies. Based on input from the Deschutes County Planning Commission and the Board of County Commissioners, CPW prioritizes the policy options in the following order (the policy option is identified within parentheses as found in Tables 3 and 4 above):

- Adopt higher wildfire standards from NFPA 1141, 1144 and the ICC (W5, W6, W14)
- Adopt higher CRS standards: lower substantial improvements threshold, cumulative substantial improvements, protecting critical facilities, and development limitations (F1, F2, F3)
- Implement floodplain and wildfire combining zones (F5, W1)
- Prohibit wooden shake building materials in wildfire hazard zones (W2)
- Require defensible space standards in wildfire hazard zones (W4)
- Apply additional regulations to development on slopes greater than 25% (W3)
- Require Wildfire Mitigation Plans for subdivisions and single-family homes in wildfire hazard zones (W13)
- Require fire protection proof from subdivisions before development (W8)

CPW believes these options will have the biggest impacts in terms of reducing risk from natural hazards of flood and wildfire to property and lives. These model policies, best practices, ordinances, and case studies across the nation and will help the county improve the development process, save costs on rescue efforts, and most importantly reduce risk to the community.

APPENDIX A: WILDFIRE CASE STUDIES

This appendix summarizes case studies from communities around the West that have novel approaches to addressing the wildfire hazard. The following case studies from Boulder County, CO, Ashland, OR and Rancho Bernardo, CA all serve as evidence to support the best practices presented in the body of this document.

Case Studies

Ashland, OR

This case study presents evidence supporting the usefulness of Fire Prevention and Control Plans in hazardous areas. As it is in the same state as Deschutes County, Ashland could serve as a useful example of implementation in Oregon.

Boulder County, CO

This case study describes and evaluates Boulder County's implementation of Wildfire Mitigation Plans, as well as documents how residents have responded by maintaining defensible space.

Rancho Bernardo, CA

This case study documents the aftermath of a wildfire in Southern California, and demonstrates the dangers of development on steep slopes.

Case Study: City of Ashland, OR

The purpose of this case study is to describe and evaluate the City of Ashland's use of a Wildfire Hazard Area Zone and Subdivision Fire Prevention & Control Plan. This case study provides a brief background on Ashland's history of wildfire, describes Ashland's Wildfire Hazard Area Zone and Subdivision regulations, evaluates the significance of the case study and identifies its relevancy to Deschutes County's goal of natural hazards mitigation.

Background

Ashland is located in Jackson County in Southern Oregon and is situated in an area of high risk to wildfire. After the region experienced severe losses during the 1987 fire season, the city decided to assess their wildfire risk and develop regulations to mitigate the risk. A site-specific survey was conducted by Ashland's fire department and Oregon Department of Forestry to map the wildfire hazard areas within the Urban Growth Boundary. It was determined that 1,100 acres in Ashland is categorized as a wildfire hazard area. Some key criteria in the survey included: connectivity of fuel, roofing material, density of vegetation, and slope. Increased development pressure led to a policy change in the wildland urban-interface to their land use code starting in the 1980's.

Current Regulations/Program

As a result of the wildfire hazard rating mapping process described above, a Wildfire Hazard Zone Overlay was defined in 1992 in land use Chapter 18.62: Physical and Environmental Constraints. The goal of this policy is to provide clear and objective standards regarding wildfire mitigation to property owners. Property owners know exactly what size fuel break they need to install and how to maintain it as well as clear building code requirements. The subdivision code outlines a clear Fire Prevention & Control Plan stressing the need of cooperation between the planning department and fire/emergency management agencies.

Example regulations in Ashland's Municipal Code 18.62.110 Physical & Environmental Constraints: Development standards for Class E lands (wildfire hazard areas) include:

Ashland Municipal Code 18.62.090 Physical & Environmental Constraints: Development Standards for Wildfire Lands includes subdivision requirements for a Fire Prevention & Control Plan. Elements of this plan include:

- A Fire Prevention and Control Plan shall be required with the submission of any application for an outline plan approval of a Performance Standards Development, preliminary plat of a subdivision, or application to partition lands that contain areas designated as Wildfire Hazard areas.
- Criterion for Approval. The hearing authority shall approve the Fire Prevention and Control Plan when, in addition to the findings required by this chapter, the additional finding is made that the wildfire hazards present on the property have been reduced to a reasonable degree,

balanced with the need to preserve and/or plant a sufficient number of trees and plants or erosion prevention, wildlife habitat, and aesthetics.

Significance

Since the Wildfire Hazard Zone and Fire Prevention & Control Plan have been in place, there has not been any loss of property or life to wildfire in that region. However, this designated wildfire hazard zone is only currently mapped in a small portion of the city, which is surrounded by many other assessed hazardous areas without regulation. The City is now requesting for the Wildfire Hazard Area Zone to be extended to be City-wide so that the entire city would be subject to regulations such as a ban on wooden shake roofs and use of defensible space and fire-resistant landscaping.

In 2009, the Siskiyou Fire evacuated 109 home and a school all of which were not inside the Wildfire Hazard Zone. Again in 2010, the Oak Knoll Fire burned 11 homes, which were also outside the Wildfire Hazard Zone. These wildfires did not cause any damage inside the Wildfire Hazard Zone, however, were just outside the border and had the potential to damage other homes. This is the reason why the City would like to expand this zone to ensure that wildfire does not spread due to homes not required to follow wildfire prevention measures such as prohibiting wooden shake roofs and keeping fire-resistant landscaping.

Relevance

Deschutes County currently has stated that the entire county is in a Wildfire Hazard Zone. The Wildfire Hazard Zone has been defined in the development code in Title 15.04.085, however, there aren't any regulations associated with it. A Wildfire Hazard Zone with regulations such as the City of Ashland could be a useful measure to ensure protection of life and properties from wildfire risk before development occurs. The County also does not require wildfire mitigation plans prior to development for subdivisions such as the Fire Prevention & Control Plan with the City of Ashland. A specific plan requirement with explicit criteria to address would help developers understand expectations and proactively prevent wildfire risk.

Citations

"City of Ashland, Oregon - Fire – Wildfire Hazard Zone Expansion." City of Ashland, Oregon – Fire. September 25, 2014. Accessed May 28, 2015.

<http://www.ashland.or.us/Page.asp?NavID=16530>

Community Planning Workshop & Oregon Department of Land Conservation & Development, "Planning for Natural Hazards: Wildfire TRG." Technical Resource Guide, Salem, Oregon, 2000.

Case Study: Boulder County, CO

The purpose of this case study is to describe and evaluate Boulder County's use of a Wildfire Mitigation Plan. This case study provides a brief background on Boulder County's history of wildfire, describes Boulder County's regulations, evaluates the significance of the case study and identifies its relevancy to Deschutes County's goal of natural hazards mitigation.

Background

Boulder County has been facing an increase of population pushing development into the wildland-urban interface. These forested lands have very high risk for wildfire due to fire suppression policies allowing vegetation density to grow to 10-100 times its normal state, steep terrain, drought, high summertime temperatures and high winds. These dangerous conditions along with the increase of population into the wildland-urban interface have increased the challenging ability for emergency responders to protect lives and properties. A devastating fire, the Black Tiger Fire on Sugarloaf Mountain in 1989, burned 2,100 acres, destroyed 44 homes, caused losses of \$10 million, and required 500 firefighters to contain the fire. To help reduce the risk of wildfire to lives and properties, Boulder County implemented a requirement in 2000, to all new homes being built in wildfire hazard areas, to include a Wildfire Mitigation Plan.

Current Regulations/Program

The Wildfire Mitigation Plan requirement is for all new homes built in wildfire hazard risk areas. The Plan is to ensure that the home is properly sited before development, creates adequate defensible space, provides for emergency access and water supply, and requires the homeowner to continue routine maintenance around the property to help protect and prevent the spread of wildfire. This Plan is to be submitted with a Building Permit Application and will be part of the review process before a permit is issued.

Significance

Since the implementation of the requirement for Wildfire Mitigation Plans in wildfire hazard risk areas, a 2007 survey found that 97% of residents in Boulder County maintain defensible space. Since the Wildfire Mitigation Plan requirement has been in place, residents have become more aware of the importance of defensible space; and take an active role in mitigating the risks associated with living in wildfire hazard areas.

Relevance

Boulder County and Deschutes County face similar conditions in terms of population change, topography and climate. Like Boulder County, Deschutes County is also facing an increased population moving to the wildland-urban interface into wildfire hazard areas. These hazardous areas contain dense vegetation and sometimes steep slopes. A warmer climate with high summertime

temperatures as well as a newly declared drought has threatened the risk of wildfire.

Currently, Deschutes County does not require homeowners to have a Wildfire Mitigation Plan before development and has only relied on non-regulatory projects from Project Wildfire to reduce dense vegetation. Requiring a Wildfire Mitigation Plan before development with maintenance requirements will help ensure that homes and homeowners are aware and protected in the event of a wildfire.

Citation

Boulder County Community Wildfire Protection Plan. 2011.
<http://www.bouldercounty.org/doc/forest/cwppbooklowres.pdf>

Boulder County Land Use Department Publications, *Wildfire Mitigation Plan*.
Boulder County. March 14, 2013.
<http://www.bouldercounty.org/doc/forest/w02wildfiremitigationplan.pdf>

"The Black Tiger Fire." The Black Tiger Fire. Accessed June 8, 2015.
<http://www.bouldercounty.org/property/forest/pages/blacktigerfire.aspx>

Case Study: Steep Slopes in Rancho Bernardo, CA

The purpose of this case study is to describe and evaluate the effectiveness of developing on slopes less than 20% in wildfire hazard areas. This case study provides a brief background on the Witch and Guejito wildfires, describes the correlation between structural loss and slopes greater than 20%, and provides reason for this concept's relevance in Deschutes County. The evaluation of this wildfire event bears direct significance to wildfire mitigation practices in Deschutes County.

Background

The National Institute for Standards and Technology (NIST) was invited by the California Department of Forestry and Fire Prevention (CAL FIRE) to collect post-incident data from fires occurring in October 2007. The case study is focused on the Trails development at Rancho Bernardo, north of San Diego. There were 270 homes in the Trails community, 242 of which were within the fire perimeter. Of those, 74 homes were completely destroyed and 16 were partially damaged. Field measurements included roof type, defensible space, exposure to steep slopes, and several Firewise treatment techniques. The majority of the hazard mitigation treatments evaluated at the Trails Community appeared to be applicable even if they were not all individually effective.

Effects of Development on Steep Slopes

Among the numerous landscape and structural traits observed after the fires, the NIST found a significant pattern of increased destruction to residential structures with increased exposure to slopes greater than 20%. Increasing slope was associated with an increased likelihood for structural damage or destruction.

Table 5 Statistics on Structural Damage/Destruction during the 2007 Witch and Guejito Fires.

Slope Category	Total Number of Structures	Number of Structures Damaged/Destroyed	Percentage of Structures Damaged/Destroyed
0-10%	12	1	8.3%
10-20%	117	29	24.8%
20-30%	74	31	41.9%
30-40%	37	27	73.0%
40-50%	2	2	100.0%

Source: National Institute for Standards and Technology.

Relevance

Deschutes County currently regulates development on slopes in Title 18.113 Destination Resorts, as well as Title 18.36 and Title 18.40 Forest Use Zones.

Development in Destination Resort development zones is limited to occur on slopes less than 25%. Development in Forest Use Zones is limited to slopes less than 40%. Development in all other zones appears to be unregulated in regards to steep slopes. Given that much of the residential development in Deschutes County's unincorporated areas occurs in the wildland-urban interface, preemptive measures should be taken - to the greatest extent possible- to reduce the risk of structural damages or destruction resulting from wildfire events. This case study serves as direct evidence that structures exposed to slopes greater than 20% are more likely to be damaged or destroyed in a wildfire event.

Citation

National Institute of Standards and Technology. U.S. Department of Commerce.
Last modified May 2013.

<http://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.1796.pdf>.

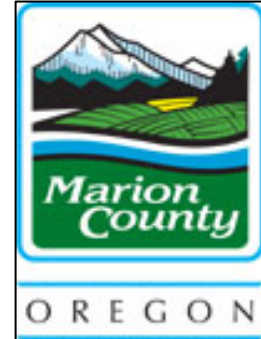
APPENDIX B: FLOOD CASE STUDIES

This appendix summarizes case studies from communities around the West that have novel approaches to addressing the flood hazard. The following case studies from Marion County, OR and Roseville, CA all serve as evidence to support the best practices presented in the body of this document

B.1 Case Studies

Marion County, OR

This case study explains the use of a floodplain overlay zone by Marion County, OR and how the policies in place have helped prepare for and recover following a flood event.



Roseville, CA

This case study examines the policies put in place by Roseville, CA that have made it the only community with a Class 1 CRS rating from the NFIP.

Case Study: Marion County, OR

The purpose of this case study is to describe and evaluate Marion County, OR use of a floodplain overlay zone. This case study provides a brief background on Marion County's history of flood hazard, and describes the county's floodplain overlay policy, evaluates the significance of the case study and identifies its relevancy to Deschutes County's goal of mitigating flood hazard.

Background

Marion County, located in the Willamette River basin, has many streams and rivers that are subject to flooding. Properties in and near floodplains are subject to flooding events almost annually due to spring rains, heavy thunderstorms, or rapid runoff from snow melts.

Damage to critical facilities such as, public water and sewer systems, transportation networks, flood control facilities, emergency facilities, and government offices can hinder the ability of the county to deliver services. Infrastructure susceptible to flood damage includes: bridges on county roads and highways, sewage treatment plants, recycling centers, and a major landfill located beside the Willamette River (Marion County Natural Hazards Mitigation Plan). Populations, private property, businesses, and manufactured homes along the western border of the County are at particular risk due to their close proximity to the Willamette River.

Current Regulations

Due to the pervasive flood problem, many residents purchase insurance through FEMA's National Flood Insurance Program (NFIP) to help recover from losses. Marion County's participation in the National Flood Insurance Program (NFIP) Community Rating System (CRS) offers residents a savings of up to 20% on flood insurance premiums. The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Marion County's Floodplain Overlay Zone, Chapter 178 of the Marion County Rural Zoning Ordinance, contains higher regulatory standards than NFIP regulations (Marion County Floodplain Program).

Significance

Marion County's Floodplain Overlay Zone, ordinance Chapter 178, regulates floodplain development. The overlay zone serves many purposes, some include; dangerous uses in the floodplain, minimize expenditure of public money, control the alteration of natural floodplains, control development, and regulate construction of flood barriers. The ordinance defines and prohibits development of new critical facilities within the floodway. The ordinance also defines and prohibits storage of materials and equipment that are hazardous to persons or property within the floodway. The Floodplain Overlay Zone regulations also contribute to CRS standards and improve the County's flood insurance programs. Implementing these regulations can benefit Deschutes County as well, adding safety standards and potentially making participation in the CRS more realistic financially.

Relevance

Marion County's zoning code, Title 17 Chapter 178, is an example of how Deschutes County can implement a Floodplain Overlay Zone to easily and effectively regulate floodplain development. Marion County's ordinance applies to all unincorporated lands in identified floodplains as shown graphically on county zoning maps. The ordinance is applied consistently county wide, increasing transparency for developers and homeowners.

Deschutes County may consider adopting higher "substantial improvement" and "substantial damage" standards, but will want to apply a policy appropriate for the county. In July 2014, Marion County defined substantial damage as "flood related damage costs that equal or exceed 20% of the original market value." This means if any structural flood damage exceeds 20% of its market value, then the dwelling must be brought up to flood resistance standards before it can be reoccupied (Board of Commissioners Minutes). In July 2014, Marion County adopted the NFIP 50% standard to be consistent federal law.

Citations

FEMA. "National Flood Insurance Program Community Rating System." Accessed May 19, 2015. <http://www.fema.gov/national-flood-insurance-program-community-rating-system>

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Case Study: Roseville, CA

The purpose of this case study is to describe and evaluate Roseville's use of the National Flood Insurance Program's Community Rating System. This case study provides a brief background on Roseville's history of flood, describes Roseville's strategies for averting damages caused by flooding, and evaluates how Roseville's practices can be incorporated into the review of Deschutes County's land use code.

Background

There have been two large century floods that have struck Roseville in the last 30 years. In 1986, 209 homes and businesses were damaged as the result of winter flooding. On Jan. 10, 1995, Roseville was hit with another 100 years flood event sending a deluge of water cascading over neighborhoods and intersections. More than 300 homes were damaged, a number of which were submerged in more than 6 feet of water. The 1995 flood event prompted a Presidential Disaster Declaration. After the flood incidents of 1986 and 1995, the City of Roseville vowed to never let another flood incident cripple the community again, and the city set forth investing in the National Flood Insurance Program's Community Rating System.

The National Flood Insurance Program (NFIP) offers a voluntary incentive program called the Community Rating System (CRS). The CRS recognizes and rewards communities that exceed the minimum requirements for floodplain management as identified in the NFIP. The CRS provides premium insurance discounts, ranging between 5% and 45%, for communities that go beyond the minimum requirements. To participate in the CRS, a community must implement additional CRS management activities and earn CRS credit points for each activity. A community rating number is assigned to a community based on the number of CRS credits they have earned. The community rating scale ranges from 1 to 10. One is the highest rating available and offers a 45% flood insurance discount; 10 is the lowest rating available and offers no insurance discount. Examples of CRS activities range from providing citizens with information regarding flood insurance and ways to reduce flood damage, increase protection to new development, reduce flood risk to existing development, and provide early flood warning.

Current Program

Following the 1986 flood, the city created the Placer County Flood Control District which included regional storm water detention basins. This project allows for the area to drain without causing any flood damage to homes. If the storm drain were full or plugged, all the water in the residential area would escape without causing damage to the homes. The project also ensures that any developments adjacent to the floodplain will have buildings constructed above the 1% (formerly 100 year) flood-water surface elevation. The city also introduced a 5-year, \$20 million flood control improvement project that involved buying out properties that were damaged on a repetitive basis, elevating buildings in flood risk areas, building berms and flood walls, and replacing culverts. Early warning systems have been installed using rain gauges and auto-dialer systems to alert the community members of rising creek levels.

Significance

The most noticeable impact of these programs is the financial benefits for property owners and policyholders in the Roseville floodplain area. With the Class 1 designation comes a 45% reduction in flood insurance eligibility for community members. Plus, the reduction in damage costs will allow for individuals to recover from flooding in a much quicker fashion.

Safety may be the biggest effect these programs have on the community. With a community that is more prepared for flooding events, people are better equipped to respond to rising floodwaters and avoid potential danger from fast moving rivers and streams. First responders are also in less danger because they don't have to be sent into the flood areas to evacuate people. The early warning system put in place gives residents the opportunity to prepare or evacuate themselves before the situation becomes too dangerous.

Relevance

Despite the differences in geography and climate between Roseville and Deschutes County, the desire to go above the minimum standards is an important action that would improve current conditions in Deschutes County and support goals stated in the county's Comprehensive Plan policy 3.5.10.

Citation

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